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STRENGTHENING TRANSATLANTIC COOPERATION

Policy Brief

Climate and Energy Program

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This brief is an abridged version of "Mapping Climate Change and Security in North Africa," part of the German Marshall Fund of the United States' Climate & Energy Policy Paper Series. The full paper is available at www.gmfus.org/publications.

Mapping Climate Change and Security in North Africa

by Joshua W. Busby, Kaiba White, and Todd G. Smith

North Africa is a strategically important region for Europe largely because of its proximity, with the broader transatlantic policy community exercising particular concern where Africa's problems spillover. This study aims to reach a better understanding of how climate change and physical sources of vulnerability to natural hazards might intersect with North Africa's various demographic, social, and political sources of weakness.

Using Geographic Information Systems (GIS), we mapped the confluence of those sources of vulnerability and extracted maps of regional vulnerability from a broader research effort on the entire continent of Africa. The maps revealed vulnerability across the region to climate change and other risks. The results lead us to conclude that resources and attention need to be directed to the areas and countries, such as Ethiopia, Sudan, Chad, and Niger, where modest to high physical vulnerability to climate change is likely to be worse because of weak governance and low household and community resilience. For countries with higher living standards and better governance such as Morocco, Tunisia, and Algeria, support for these countries should include more information-sharing to help them address their physical vulnerabilities largely through mobilization of their own internal resources.

Regional Vulnerability

Climate change is increasingly recognized to have implications that extend beyond impacts on people's quality of life and into the security sphere. Scholars and analysts have invoked a host of purported problems that climate change could contribute to, from armed conflict to migration flows to complex emergencies that require humanitarian intervention. A number of these concerns apply directly to North Africa, which, for the purposes of this study, is the region including the countries along the Mediterranean, south to the Sahelian countries of Mali and Niger, and extending across to Sudan and the horn of Africa.

North Africa is a region where the amount of water available per person is already low, in many cases less than 1,000 cubic meters per year (a common indicator of chronic water scarcity) and where climate change is expected to make the region much hotter. The brittleness and weakness of regimes in the region and the

1744 R Street NW
Washington, DC 20009
T 1 202 683 2650
F 1 202 265 1662
E info@gmfus.org

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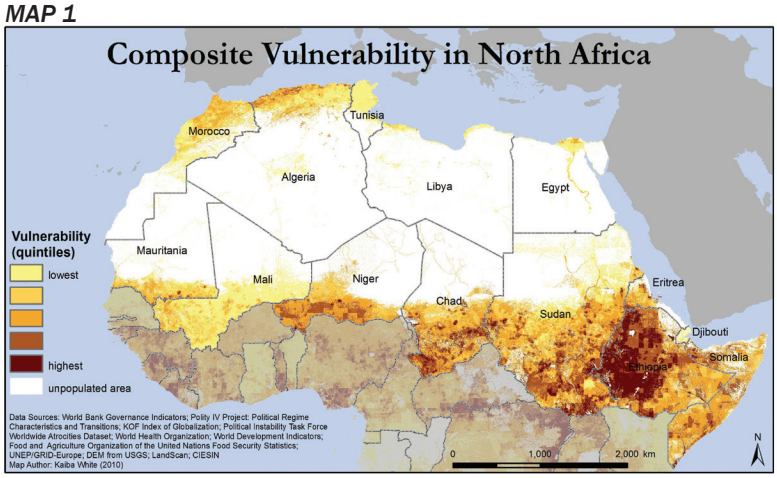
MAP 1



wider continent, coupled with the low level of human and economic development, enhance Africa's vulnerability to a variety of ills, including climate change, terrorism, armed conflict, and piracy.

Using GIS, we mapped the confluence of those sources of vulnerability and extracted maps of regional vulnerability from a broader research effort on the entire continent of Africa.

The maps reveal vulnerability across the region to climate change and other risks. The Mediterranean coastline looks particularly exposed to climate-related hazards, but other areas appear more vulnerable when we add in other dimensions like community and household resilience and governance and political violence. Putting the four sources of vulnerability together — climate-related hazard exposure, population density, household and community resilience, and governance and political violence — we find that western Ethiopia stands out as the most vulnerable part of the region, with pockets of high vulnerability throughout south-central Sudan, southern Chad, Niger, and Somalia. Small pockets of medium vulnerability exist along the Mediterranean coastline in Morocco, Algeria, and Egypt (See Map 1).

Climate-Related Hazard Exposure

Mapping climate hazard exposure on its own showed the Mediterranean coast of Morocco, Algeria, and Tunisia to be especially vulnerable as well as pockets of coastal Egypt, large swathes of western Ethiopia, and portions of southern Sudan (see Map 2)

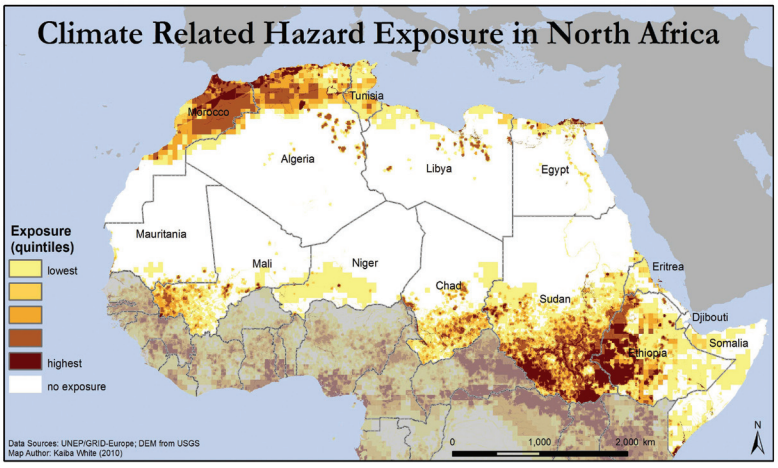
Population Density

However, whether or not physical exposure to climate hazards such as droughts, floods, fires, and cyclones actually translates into large-scale potential loss of life, damages, or security consequences like those explored in this paper ultimately depends on other factors. Obviously, there will be more potential loss of life if large numbers of people live in an area that is physically vulnerable. Because this work focuses on the direct impact on human populations, we exclude unpopulated areas from our analysis.

Our maps of population density show the population of North Africa concentrated along the Mediterranean coastline and along the Nile in Egypt, with dense concentrations of people in western Ethiopia, a large concentration radiating around Khartoum, Sudan, and some moderate population density in the southern portion of Sahelian countries like Niger and Chad. The central part of the region is sparsely populated throughout the extent of the Sahara desert (see Map 3).

When we add the population basket to create a composite vulnerability index of physical exposure and population density, we find that coastal Morocco, Algeria, and Tunisia are more vulnerable while the interior, just south of the coast, of all three countries is less vulnerable. Egypt along the Nile appears much more vulnerable when we add in

MAP 2



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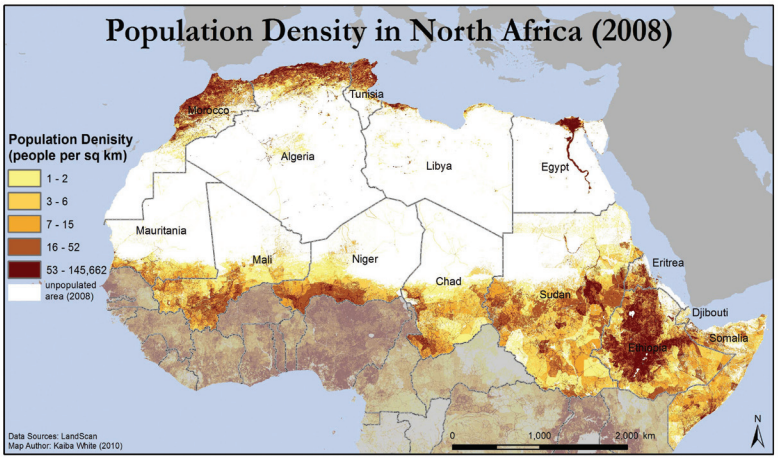
MAP 3



population, as do densely populated areas around Khartoum (Sudan), Addis Ababa (Ethiopia), and Maradi (Niger). Portions of southern Sudan are less vulnerable given low population density.

Household and Community Resilience

Households and communities are the first line of people's defense against climate related hazards. Whether or not people suffer and die in large numbers will depend upon the resources they have to protect themselves, how healthy they are, their level of education, and their access to services. We created a map of household and community resilience and added it to climate related hazard exposure and population density. The addition of resilience reveals that the northern part of the Sahelian countries of Niger, Chad, and Mali appears the most vulnerable, alongside Ethiopia and Somalia.

Adding this dimension to our overall composite index brings down Morocco and Tunisia's vulnerability while significantly increasing the vulnerability (by two quintiles) of southern Niger and Chad, as well as eastern Ethiopia and much of Somalia (see Map 4).

Governance and Political Violence

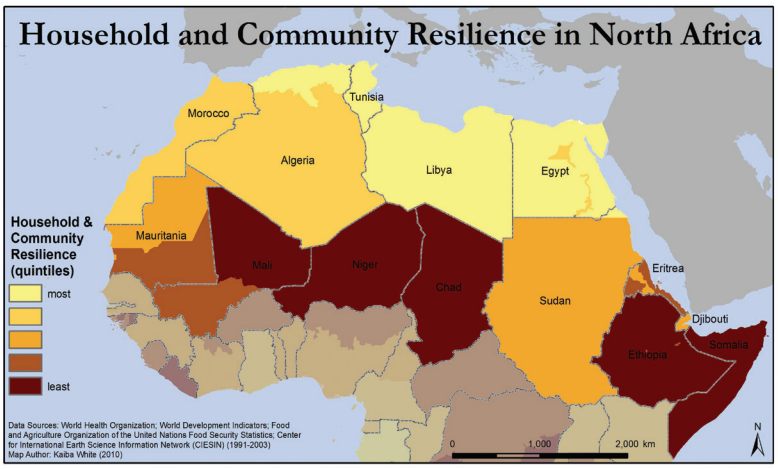
In many cases, households and communities will find their capacities overwhelmed by extraordinary weather events, forcing them to become reliant on the state for emergency relief. Some countries are more willing and able to provide that assistance. When we look at governance and political violence, we find that the Mediterranean countries have substantially better governance than a number of countries in the Sahel and the Horn of Africa, lowering the vulnerability of the former and elevating the vulnerability of the latter.

Governance ratings derived from national-level data include indicators of voice and accountability and government effectiveness, an index of global integration, and measures of political instability. Along with the subnational political violence, these form the core elements of our basket for governance and political violence.

When we incorporate subnational data on atrocities, parts of Sudan and Somalia stand out, while relatively good governance in Morocco, Tunisia, and Mali drives down their overall vulnerability (see Map 5).

Putting these four baskets together, we find that western Ethiopia again stands out as the most vulnerable part of the region with pockets of high vulnerability throughout south-central Sudan, southern Chad, Niger, and Somalia. Small pockets of medium vulnerability exist along the Mediterranean coastline in Morocco, Algeria, and Egypt (see Map 1).

MAP 4



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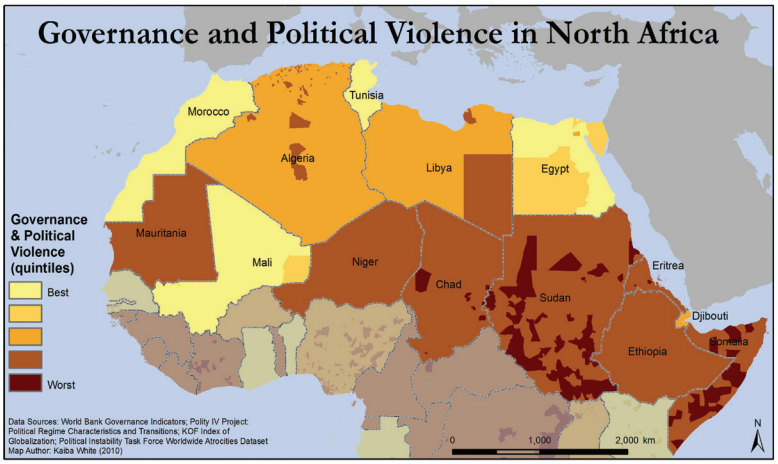
Policy Recommendations

Resources and attention should be directed to the areas and countries where modest to high physical vulnerability to climate change is likely to be worse because of weak governance and low household and community resilience. These areas include western Ethiopia and pockets in southern Sudan, Chad, and Niger. While targeted assistance to governments and NGOs for disaster prevention and risk are essential, equally important may be support for basic government capacity and conflict resolution in those countries, as they may generate positive spillovers for their ability to address climate-related challenges. Our findings also lead us to conclude that North African countries along the Mediterranean, like Morocco and Tunisia, may be more physically vulnerable to climate change than others but possess more capacity at the household and governance levels to cope with these problems. Support for these countries should include more information-sharing to help them address their physical vulnerabilities largely through mobilization of their own internal resources.

MAP 5



Authors

Joshua W. Busby is an assistant professor in the LBJ School of Public Affairs and a Crook distinguished scholar in the Robert S. Strauss Center for International Security and Law, University of Texas at Austin. Kaiba White is a GIS research associate at the Robert S. Strauss Center for International Security and Law, University of Texas at Austin. Todd G. Smith is a Ph.D. Student in the LBJ School of Public Affairs at the University of Texas at Austin.

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STRENGTHENING TRANSATLANTIC COOPERATION

The German Marshall Fund of the United States (GMF) is a nonpartisan American public policy and grantmaking institution dedicated to promoting greater cooperation and understanding between North America and Europe. GMF does this by supporting individuals and institutions working on transatlantic issues, by convening leaders to discuss the most pressing transatlantic themes, and by examining ways in which transatlantic cooperation can address a variety of global policy challenges. In addition, GMF supports a number of initiatives to strengthen democracies. Founded in 1972 through a gift from Germany on the 25th anniversary of the Marshall Plan as a permanent memorial to Marshall Plan assistance, GMF maintains a strong presence on both sides of the Atlantic. In addition to its headquarters in Washington, DC, GMF has seven offices in Europe: Berlin, Bratislava, Paris, Brussels, Belgrade, Ankara, and Bucharest.

About the Transatlantic Climate Bridge

Transatlantic Climate Bridge

This paper would not have been possible without funding from the "Transatlantic Climate Bridge," an initiative jointly launched by the German Federal Foreign Office and the German Federal Environment Ministry to connect and support those working to address the challenges of climate change, energy security, and economic growth at the local, the state, and the federal level in the United States and Germany.