Confronting Poverty

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WEAK STATES AND U.S. NATIONAL SECURITY

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CHAPTER FIVE

Feeding Insecurity? Poverty, Weak States, and Climate Change

JOSHUA BUSBY

Since the severe droughts of the 1980s, the nomadic herders and more settled agriculturalists of Darfur have been in conflict over grazing rights. Despite periodic tension and confrontations in earlier years, the two had previously shared the semiarid region's resources and, at least until legal reforms in 1970, had local mechanisms for resolving disputes.[1] In a more anodyne telling of the region's history, pastoralists, on their periodic dry season peregrinations, had been able to graze their camels and cattle on the hills around the farmers' lands. The farmers allowed the herders to use their wells and shared the chaff and husks left over from the harvests. When the rains persistently failed in the 1980s, resources dwindled, a problem accelerated by overgrazing and farming practices. Farmers started fencing off their lands to keep the nomads out, so herders, including migrants from Chad, pushed further south in search of other grazing lands, bringing them into conflict with other settled agriculturalists.[2] These tensions gave rise to the first Darfur wars of 1987–89 and then 1994–98. By 2003 the acrimony between the parties, now involving a variety of ethnic groups, escalated into intense fighting. The Sudanese government weighed in on the side of the herders, arming them and providing air support for their depredations against the farmers, thereby contributing to a gross abuse of human rights against civilians.[3]

In June 2007 UN secretary-general Ban Ki-moon fingered climate change "amid the diverse social and political causes" as the ecological spark that ignited the Darfur conflict.[4] Some Sudan experts strongly

disagreed, arguing that "the most important culprit for violence in Darfur is government, which not only failed to utilize local and central institutions to address the problems of environmental stress . . . , but actually worsened the situation through its militarized, crisis management interventions whenever political disputes have arisen."[5] If famine and drought were primarily to blame, some added, "why have scores of environmental catastrophes failed to set off armed conflict elsewhere?"[6] Others worried that invoking climate change as a potential cause for the conflict would let the government off the hook. Still others found the connections between climate change and conflict "highly problematic as they suggest a near deterministic relation between the environment and armed conflict, thereby relieving the main actors of their own responsibility."[7]

This debate underscores a number of challenges for those that draw connections between environmental change and security. What purpose is served by making such claims? Does it potentially help the people of Darfur? What is meant by the term "security"? Security for whom? The people of Darfur? The people of the United States?

The relationship between environmental quality, poverty, and security is necessarily messy, with feedback mechanisms that are still only hazily understood. The "environment" alone covers a diversity of phenomena, and even narrowing the focus to climate change still encompasses a broad issue. This chapter lays bare the complexity of extrapolating from the likely physical effects of climate change to its impact on social and economic systems. The scientific evidence suggests climate change will likely have a disproportionate effect on poor countries with weak governance, particularly in Africa and Asia.[8] Moreover, poverty and weak state capacity will in turn impede efforts to address environmental challenges in some of the places that need such help the most, including the Horn of Africa, parts of South Asia, and specific countries like Haiti and the Democratic Republic of the Congo (DRC).

At this point, the consequences of climate and environmental change for regional and international security are less clear. Although evidence of the links between climate change and a variety of security outcomes (and there are likely to be a number of them) is mounting, there is a temptation to claim more certainty about the connections than is yet warranted. Even so, some appreciation of the uncertainties will actually help policymakers forge working majorities rather than impede action. With politically charged issues like climate change, overstating the threat for policy gain could be self-defeating, undermining the very agenda that

advocates of more robust policies are championing. At the same time, it is important to consider the interaction between resource scarcity and other contributors to conflict (such as ethnic tensions and poverty), particularly since conflict may be difficult to resolve without addressing those environmental stressors.

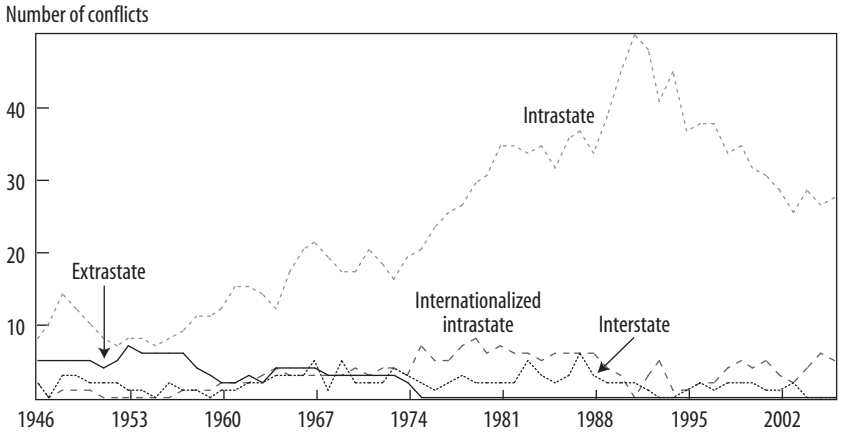
WHY "SECURITIZE" CLIMATE CHANGE?

The main purpose of a volume like this one is to inform and improve policymaking. If, as its contributors argue, poverty and state weakness are interrelated, poor states with weak governance will be less able to deal with threats such as climate change that can have wide impacts on resources, food, and migration. In order to address problems like climate change, policymakers must therefore take into account the constraints imposed by poverty and weak governance.

A broader purpose here is to persuade interested publics in the developed world that the threats in poor countries affect their own security, and thus that poverty alleviation should be an important element of a U.S. national security strategy. In other words, this volume speaks not just to the parochial security concerns of poor countries but also to wider interests of influential and rich countries like the United States that have the capacity to provide foreign assistance.

Wealthy countries, largely responsible for the greenhouse gas concentrations that cause global warming, have been asked to provide billions of dollars in financing to help poor countries adapt to climate change by improving their coastal defenses against storm surges, investing in drought-resistant crop varieties, developing early warning systems and evacuation plans in the event of weather disasters, and so on. Those investments would ensure that the worst effects of climate change, including the security consequences identified in this chapter, do not come to pass or are less severe than anticipated. Modest investments of this nature would also likely avert the need for more expensive disaster response and crisis management strategies later on, such as the mobilization of foreign militaries for humanitarian relief and possibly conflict termination and peacekeeping. Since the mobilization of those funds, particularly in the United States, is likely to be part of a broader policy of climate mitigation, the fate of foreign assistance for poor countries may be bound up with how climate change is approached in general. Despite the attraction of "securitizing" climate change—that is, naming climate change a security

FIGURE 5-1. Number of State-Based Armed Conflicts by Type, 1946–2006



Source: Human Security Project, "Human Security Report 2006" (University of British Columbia, Human Security Centre, 2006). Data for 2006 with corrections to 2003 and 2005 interstate conflicts from Halvard Buhaug, Nils Petter Gleditsch, and Ole Magnus Theisen, "Implications of Climate Change for Armed Conflict," SDCC Working Paper (Washington: World Bank, February 25, 2008).

issue—it entails some risks. In particular, proponents must not overemphasize the links between climate change and conflict and thus reify the partisan divides that have frozen climate policy in the past.

In the past several years, a stream of reports from think tanks, nongovernmental organizations (NGOs), and governments has suggested that climate change could be a "threat multiplier," particularly in the developing world. Countries with a history of instability, weak state capacity, and sectarian divides are expected to be increasingly vulnerable to extreme weather, droughts, floods, storms, declining agricultural output, and water scarcity.[9]

As a number of observers have warned, one drawback of viewing climate change as a security issue is that it becomes the kind of problem that is entitled and perhaps requires emergency, potentially militarized, attention, which may not be appropriate and may end up diverting resources to less efficient purposes. Successfully evoking national security necessarily activates the policy apparatus whose core mission is to prepare to fight and win wars, skill sets that may have limited utility for a global public good that demands transformations in energy systems and investments in adaptive measures.[10] Critics worry that security concerns might merely serve as political theater: "Serious thinking about climate

change must recognize that the 'hard' security threats that are supposedly lurking are mostly a ruse. They are good for the threat industry—which needs danger for survival—and they are good for the greens who find it easier to build a coalition for policy when hawks are supportive."[11]

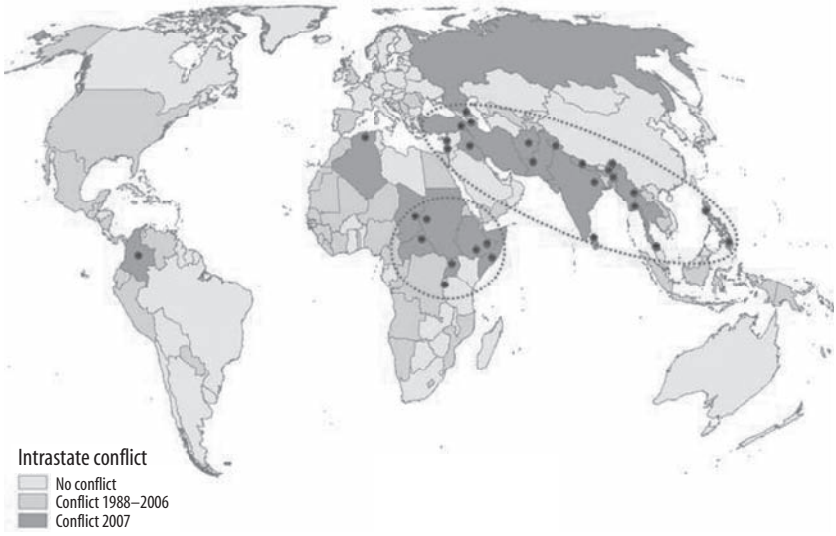
A clear conception of what constitutes "security" is essential to avoid focusing exclusively on the presence or absence of conflict or the opposite danger of widening our view of security so much that it encompasses any threats to human welfare.[12] An overly restrictive focus on climate and armed conflict may leave one analyzing a dwindling set of cases as state-based armed conflicts become rare. There have been no new cases of interstate conflict since 2003 (see figure 5-1), while intrastate conflicts or civil war have declined from the high watermark of the early post–cold war years.[13]

This holds for Africa, the world's most conflict-ridden continent. The number of conflicts in sub-Saharan Africa, for example, declined from sixteen in 1999 to seven in 2006. Moreover, the number of non-state conflicts in the region—that is, between warring non-state rebel groups—dropped from twenty-eight in 2002 to twelve in 2006.[14] Intrastate conflict is concentrated in the "shatter belt," which includes two bands in the Horn of Africa and the Great Lakes region, and an area from the Caucasus to the Philippines (figure 5-2).[15]

Of course, these trends may not last, especially if the connections with climate change are valid, and indeed may already be starting to tick up again. Furthermore, climate change has other security implications that may be equally if not more severe than conflict, such as its contribution to the increasing destructive potential of natural disasters. Disasters may swamp civilian authorities' capacity to respond, even if they fail to give rise to violent conflict.[16]

In terms of the narrow climate-conflict nexus, thus far there is some, but limited, evidence to support the more far-reaching claims about the connections between climate change and violence, state failure, or both. In this context, advocates and scholars risk undermining the persuasive impact of their arguments by overstating the claimed security consequences of climate change and the certainty with which they make their claims. Extreme partisanship has paralyzed the policy debate on climate change in the United States for more than a dozen years. When it comes to shifting public and elite perceptions on this issue, bipartisan support in the United States will be essential. Efforts that overstate the degree of confidence about the security connections will play into rising fears that

FIGURE 5-2. Intrastate Armed Conflicts, 2007



Source: Halvard Buhaug and others, "Implications of Climate Change for Armed Conflict" (Washington: World Bank, 2008).

the problem has been oversold. In March 2009 Gallup reported that 41 percent, the highest proportion ever, believe the threat of climate change has been exaggerated (figure 5-3).[17]

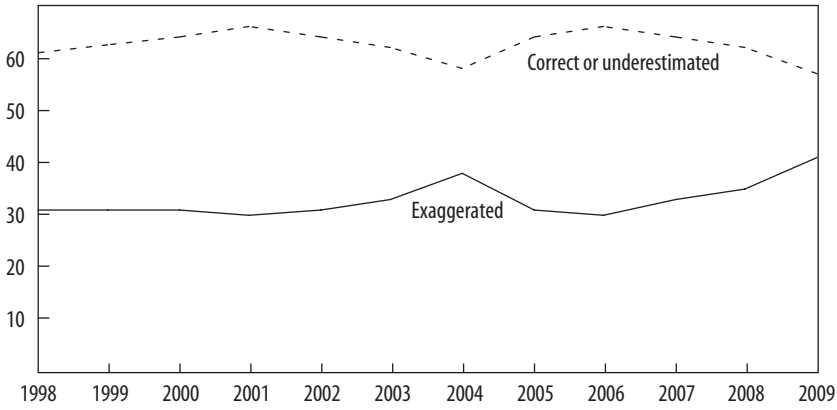
Equally worrying, many Americans view the underlying scientific connections between greenhouse gas emissions and climate change through a partisan filter. Although a 2006 Pew Center poll found considerable agreement on the solid evidence of global warming among a majority of Democrats (81 percent), Republicans (58 percent), and Independents (71 percent), only 24 percent of Republicans believed the evidence showed human activity to be the cause, compared with 54 percent of Democrats and 47 percent of Independents.[18] Another poll in March 2008 showed the partisan gap on climate change had grown to more than thirty percentage points, up from an indistinguishable difference in 1998 (figure 5-4).[19]

Members of Congress are even more divided than the public on this issue. In February 2007, in a poll of some 113 members of Congress, only 13 percent of Republicans (down from 23 percent in April 2006) said it had been proved beyond a reasonable doubt that man-made causes were responsible for warming compared with 95 percent of Democrats.[20]

Aside from long-term mitigation programs to reduce greenhouse gas emissions and decarbonize the economy, investments in adaptation are

FIGURE 5-3. Public Opinion on Climate Change Exaggeration

Percentage indicating the seriousness of global warming



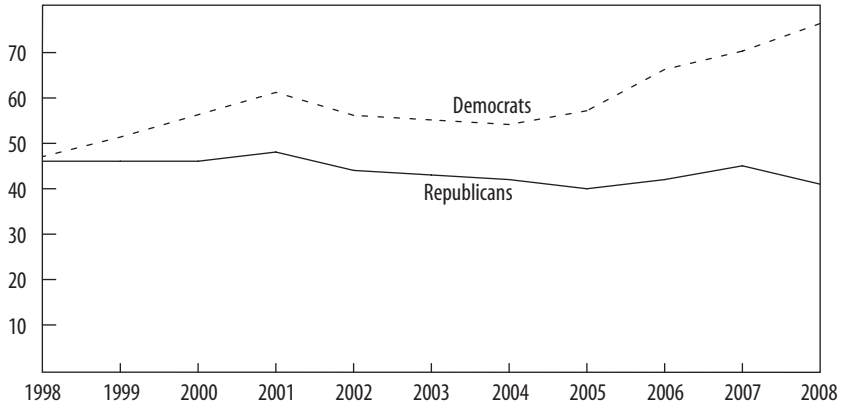
Source: Lydia Saad, "Increased Number Think Global Warming Is Exaggerated," Gallup Poll, March 11, 2009.

the most important initiatives governments can take to head off the worst consequences of climate change, including the security concerns discussed in this chapter. For poor countries, most of those resources will have to come from external sources. As of May 2009, however, the United States had contributed zero dollars to the Global Environment Facility's various adaptation funds and zero dollars to a World Bank–administered trust fund for disaster reduction. The cap-and-trade bill wending its way through the U.S. Congress in 2009 includes provisions that would generate revenue. The measure that passed the House of Representatives in June 2009 sets aside 1 percent of the yearly allowances for the period 2012–21 for helping poor countries adapt, with increases to 2 percent scheduled for 2022–26 and to 4 percent for 2027–50.[21] With carbon allowances in 2016 estimated to be worth between $80 billion and $108 billion, the funds for international adaptation could reach $800 million to $1 billion in that year alone. Another 5 percent of allowances for 2012–25 are set aside for international forest conservation, valued at an estimated $4 billion to $5.4 billion in 2016.[22]

Climate change policy is at a critical juncture. Even with a sixty-vote majority in the U.S. Senate, the Democratic Party may not yet have the unity of interests and perspective on climate change to get a domestic cap-and-trade bill passed, revenue from which could conceivably generate reasonably large resources for both domestic and international adaptation

FIGURE 5-4. Partisan Gaps in Public Opinion on Climate Change

Percentage saying the effects of global warming have already begun[a]



Source: Riley E. Dunlap, "Partisan Gap on Global Warming Grows," Gallup Poll, May 29, 2008.
a. Results for political independents not shown.

programs, as well as for the conservation of tropical forests. Efforts that are as clear about what is not known as what is known are more likely to gain support. For those who have yet to fully accept the causal arguments linking greenhouse gases to climate change, particularly Republicans, exaggeration could be distinctly unattractive. While this may strike some readers as an unseemly interjection of politics into policy, the messaging on this issue is extremely important. The ability of development and health advocates to forge a bipartisan U.S. coalition on debt relief and HIV/AIDS in the late 1990s and early 2000s has served those constituencies well. Climate change advocates will need similar support.[23] With this in mind, it is time now to examine evidence for various connections between climate change and violent conflict, the hypothesized security link that has dominated both the scholarly and policy communities.

The Evidence

Like the early discussion of environmental security in the 1990s, the recent spike in attention has focused largely on the connections between environmental change and conflict. For policymakers, this emphasis misses the point made earlier, that conflicts are rare and perhaps becoming rarer. Exclusively focusing on conflict might lead to an impoverished view of security.

Disasters, made more likely and more severe by climate change, affect security. Natural disasters can be as destructive as warfare, with major implications for modern militaries, which have increasingly been tapped to provide humanitarian relief and rescue services. At the very least, the diversion of military assets for humanitarian purposes has opportunity costs in terms of other activities those soldiers could have been engaged in. Of course, disasters may indeed make conflict more likely, but even where this is not the case, failed disaster management can pose broader legitimacy and credibility challenges for governments, as was the U.S. experience in the aftermath of Hurricane Katrina.

In discussing the connections between climate change and conflict and climate change/disasters and the opportunity cost of military deployments, both dynamics emphasize the security consequences that emanate from climate change. One can invert this logic and think about insecurity and state weakness as having an impact on a country's ability to protect its environment. This section discusses these three concerns in turn: conflict, disasters, and environmental protection under insecurity.

Uniting all three issues is an appreciation of relative vulnerability. Owing to their geography, some countries are more exposed to risks from climate change than others. However, vulnerability depends only in part on environmental factors. Rich, well-governed countries are less likely to suffer the consequences of climate change as they have greater resources, capacity, and resilience to respond than do weak, failing, and failed states. For example, the Index of State Weakness and the map for climate vulnerability developed by Columbia University's Center for International Earth Science Information Network (CIESIN) both indicate that the poorest countries, particularly in sub-Saharan Africa and South and Southeast Asia, are especially vulnerable (see the index in chapter 2).[24]

CIESIN's metrics of sensitivity in this instance included socioeconomic attributes but not security factors such as a country's past history of conflict or broader insecurity in its neighborhood.[25] In a subsequent study in 2008, CIESIN looked at three attributes of political risk: (1) whether a country was located in a dangerous neighborhood, (2) if it had a history of crisis, and (3) its level of capacity. These were combined with three measures of environmental vulnerability based on future climate projections: (1) the size and percentage of the population located near coastal areas, (2) countries with low adaptive capacity at different ranges of projected temperature increases, and (3) countries facing water

TABLE 5-1. Countries Most Vulnerable to Climate and Political Risks

Coastal population exposure[a]			
Total population exposed	*Percentage of population exposed*	*Aggregate temperature changes*[b]	*Water scarcity*[c]
China (74), Philippines (58), India (67), Indonesia (77)	Philippines (58), Egypt (78), Indonesia (77)	South Africa (110), Nepal (22), Morocco (96), Bangladesh (48), Tunisia (120), Paraguay (75), Yemen (30), Sudan (6), Côte d'Ivoire (10)	Mozambique (39), Côte d'Ivoire (10), Nigeria (28), Iraq (4), Guatemala (60), Zimbabwe (8), Ethiopia (19), Somalia (1), China (74), Syria (57), Algeria (59)

Source: Drawn from the Index of State Weakness (see chapter 2). Figures in parentheses indicate the country ranking on the index. Climate risk based on 2030 projections, and political risk based on historical data on three indicators of instability: dangerous neighborhood (1992–2005), crisis history (1990–2005), and low capacity from the World Bank Government Effectiveness indicators (dates not specified).

a. Population exposed based on countries with two or more of these instability risk factors sorted by population, that is, the number of people projected to be living within 1 meter of the low-elevation coastal zone (LECZ) in 2030. Percentage of population refers to the highest percentage of projected population in 2030 within 1 meter of the LECZ.

b. Based on countries with two or more of the risk factors.

c. Based on countries with two or more instability factors, sorted by change in percentage of population in water scarcity 2000–30.

scarcity (see table 5-1, which also shows country rankings on the Index of State Weakness in parentheses).

Countries with high risk factors for instability and coastal vulnerability were located by and large in Asia (these included China, India, the Philippines, and Indonesia), while many of those with low adaptive capacity and subject to aggregate temperature increases were located in North Africa (notably Morocco, Tunisia, and Sudan). Many of the countries subject to water scarcity and political risk were located in Africa (notably Ethiopia, Mozambique, and Nigeria). Hence countries in sub-Saharan Africa appear to be among the most vulnerable to climate change and among the lowest performers on the Index of State Weakness.

Missing from this discussion of climate and political risk thus far is a final concern: strategic value. Is anarchy or state failure anywhere a problem everywhere?[26] Are countries that simultaneously carry the burden of political and climate risk important for the national security of others? Some countries are more strategically important than others—as allies, sources of raw materials, conduits for transit, potential adversaries, or sources of damaging blowback or spillovers.[27] The effects of climate change in these areas would likely be of considerable interest to policymakers in the United States and other donor countries.

The effects of climate change in China or Pakistan, for example, or even in Haiti (given its proximity to the United States), are going to be

more significant than effects in Burkina Faso. That said, events have a way of surprising people. Who would have thought that pirates off the coast of Somalia would have been an issue of any significance some years ago? Nevertheless, part of the challenge in anticipating the security consequences of climate change and the appropriate anticipatory action must be to identify where climate risk, political risk, and strategic importance come together. A first step will be to review the evidence on the connections between climate and conflict, climate and disasters, and environmental protection amid insecurity and weak state capacity.

Climate Change and Conflict

The predominant concern in the emerging literature on climate and security is how climate change, as a "threat multiplier" or "stressor," will, with its variety of effects, make violent conflict more likely. Many of the relevant issues are revealed in contentious exchanges between environmental security scholar Thomas Homer-Dixon, Sudan scholar Alex de Waal, and climate and energy specialist David Victor. According to de Waal, "In the case of Darfur, it's pointless to ask about, or to argue over, the relative importance of climate change as a cause of the violence." For Homer-Dixon, however, the crisis in Darfur cannot be adequately explained without including "climate change as a causal factor."[28]

Ultimately, the debate here comes down to assessments of relative causal weight. Critics of Homer-Dixon's position argue that environmental factors have little independent value in explaining the cause of conflict. But in Homer-Dixon's view, it is difficult to separate causal dynamics that are inherently intertwined, as in the case of the complex, indirect consequences of resource scarcity for intrastate security: "Resource stress always *interacts* in complex conjunction with a host of other factors—ecological, institutional, economic and political—to cause mass violence." Note that the causation tends to be indirect; fighting is not about the natural resources directly, but scarcity and resource pressures lead to "forms of social dislocation—including widening gaps between rich and poor, increased rent-seeking by elites, weakening of states and deeper ethnic cleavages—that, in turn, make violence more likely." Furthermore, recognizing the trends in conflict, Homer-Dixon argues that "this violence is almost always *sub-national*; it takes the form of insurgency, rebellion, gangsterism and urban criminality, not overt interstate war."[29]

Perhaps assessments of causal weight may be beside the point. If the crisis in Darfur is caused at least in part by resource scarcity, then the

question becomes whether resolving the conflicts over grazing rights and access to water is necessary to end the broader conflict. If the answer is yes, then environmental concerns must be addressed in the solution. In short, resource scarcity, particularly sudden shifts in resource availability, can add to other factors that cause tension and conflict in a society. Where climate change will exacerbate such scarcities, failure to address the impact of volatile rains, recurrent droughts, extreme weather events, and other effects of climate change could undermine broader policies of conflict prevention and resolution.

The exchange between de Waal and Homer-Dixon points to the limits of qualitative case studies of conflict and the difficulty of assessing the relative importance of some causes when outcomes depend on multiple factors. One of the enduring criticisms of the literature on environmental security from the 1990s was that it relied on anecdotal evidence with unclear generalizability. This inspired the move to quantitative studies of conflict with large datasets that offered more potential for providing broadly generalizable findings (despite the difficulty of getting at precise causal mechanisms in individual cases). But the data were so poor that it was not possible to establish clear links between environmental change and conflict. When the State Failure Task Force (now the Political Instability Task Force) found no connection between environmental variables and state failure in 1998, part of the problem was the lack of data for environmental indicators. Data on water quality, for example, were available for only thirty-eight countries. In view of these limitations, the task force's next two reports omitted environmental variables.[30]

However, recent scholarship has made considerable progress both in finding better data (particularly on subnational indicators of conflict and environmental vulnerability) and specifying causal relationships. Even so, there is little unanimity on the contribution of climate change to conflict. Part of the problem is the fact that climate change is a novel problem. Most effects of climate change will occur in the future, for which the past may not be a good guide. As a consequence, looking backward to historical data to understand the connections between environmental degradation and conflict may not be all that useful.[31]

Nonetheless, scholars have sought historical analogues of the physical effects of climate change on conflict, by examining factors such as rainfall variability/availability, land degradation, migration/refugee movements, and disasters. Although an exhaustive discussion of the findings to date is beyond the scope of this chapter, a cursory review indicates

the potential security consequences of climate change that one could test empirically.[32]

If, for example, climate change is likely to lead to more variable precipitation, one can test, as Marc Levy and his colleagues have done, whether rainfall volatility has historically been correlated with a higher incidence of violent conflict. Using this approach, Levy and his colleagues found variable rainfall made the onset of violent conflict more likely.[33] The specific mechanism is still unclear, but it may be that harsh economic conditions drive people to fight over remaining scarce resources or may tempt them to join rebel movements.[34] Day laborers and farmers may be among those most affected by the loss of income that follows crop failures, as short-term swings in rainfall may leave less time for adaptation. Alternatively, powerful groups may take advantage of the latent tension when resources are scarce and weigh in on the side of one faction, as the Sudanese government did in Darfur.[35] The three causal dynamics can be diagrammed in simplified form as follows:

Scarcity

Climate effects ⟶ Competition over scarce resources ⟶ Fighting over scarce resources

Scarcity, mediated by rebel group offer

Climate effects ⟶ Competition ⟶ Offer to join the rebels ⟶ Fighting

Exploitation

Climate effects ⟶ Competition ⟶ Powerful actor takes sides/sows division ⟶ Fighting

This representation presupposes a number of antecedent conditions, as these kinds of climate effects would generally have security consequences in countries already beset by other problems, including poverty and weak governance. Despite the promising work on water scarcity and conflict, other studies have found weaker support for water-related variables and conflict. Work with subnational data suggests that water scarcity (as well as land degradation) may have weak or insignificant effects on conflict; such studies find that political and economic factors are more important in the onset of violent conflict.[36]

Low overall water availability appeared to be insignificant in the Levy study as well, making variation, flux, and disruption the more likely mechanism to induce conflict. However, many persist in connecting climate change to water scarcity and conflict. Jeffrey Sachs, for example, implied that the Taliban were better able to recruit in Afghanistan because of water scarcity: "Many conflicts are caused or inflamed by

water scarcity. The conflicts from Chad to Darfur, Sudan, to the Ogaden Desert in Ethiopia, to Somalia and its pirates, and across to Yemen, Iraq, Pakistan, and Afghanistan, lie in a great arc of arid lands where water scarcity is leading to failed crops, dying livestock, extreme poverty, and desperation."[37]

Yet the historical record for direct conflict over scarce water resources, particularly at the interstate level, is almost nonexistent. As researchers have pointed out: "So far, . . . no international water dispute has escalated to the level of war. Indeed, . . . the last international war over water, in Sumeria, occurred 5,000 years ago."[38] The evidence for intrastate conflicts suggests it is not scarcity per se but variable rains that have more evidentiary links to conflict.

Climate variability is important because deviation from the normal or expected upends patterned behavior and gives people little time to anticipate, plan, and prepare, forcing them to scramble for measures that can protect their livelihoods and families.[39] In Darfur, for example, rainfall declined appreciably between 1920 and 1970, but there was no long-term downward trend from 1970 on.[40] However, rainfall was quite volatile in this period, with significant year-to-year fluctuations (figure 5-5).[41]

Therefore the scarcity diagram can now be recast:

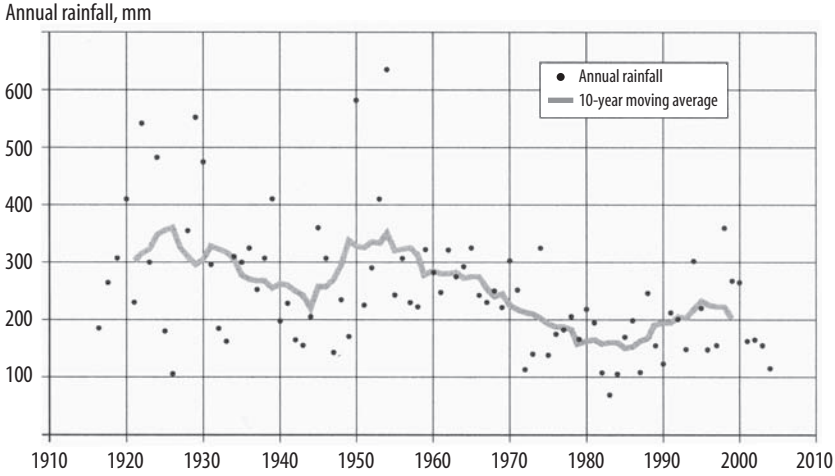
Variability

Rainfall variability ⟶ Emergency protection ⟶ Conflict over sudden change ⟶ Fighting

Any discussion of water scarcity and conflict should ultimately focus on causal mechanisms for which the evidence is most compelling. For example, linking Taliban recruitment success to water scarcity assumes a general water scarcity–conflict link, for which the evidence to date is less persuasive than the evidence about rainfall volatility and conflict.[42] For all the reasons noted earlier, such conceptual stretching of a complex subject, which often occurs in the translation of academic to policy-relevant prose, may prove less rather than more effective.

Migration is another mechanism often invoked as a potential cause of climate-induced conflict. Through discrete events like hurricanes, climate change may spur large numbers of people to move to more hospitable places, between or within countries. Here it is essential to disaggregate the reasons people move, whether the migration is permanent or temporary, induced by sudden distress, or a product of seasonal patterns or contract work.[43] Intense storms, like those that have led Bangladeshis to cross over into India, give rise to distress movements. More gradual

FIGURE 5-5. El Fasher Annual Rainfall, 1917–2005



Source: Tearfund, "Darfur: Relief in a Vulnerable Environment," 2007 (www.tearfund.org).

processes such as persistent drought or slowly rising sea levels may spur permanent migration, as expected for a number of low-lying island nations in the South Pacific.

Like the Hutu who fled in the aftermath of the 1994 Rwandan genocide to the Congo, refugees may trigger conflict, possibly by eliciting a cross-border response from their former country (if they were out of favor at home). They may also clash with locals over scarce resources, the disagreements exacerbated by a number of fault lines, such as differences over ethnicity, race, religion, nationality, or a history of past conflict.[44] Alternatively, clashes with locals might land migrants into trouble with the host national or regional government and thereby elicit a response from their own home or regional government on their behalf. These three possibilities can be diagrammed as follows:

Migrants pursued by home government

Climate effects → Migration → Home government/region goes after migrants → Conflict

Migrants and scarcity

Climate effects → Migration → Competition with locals over scarce resorces → Conflict

Fault lines

Migrants +Scarcity + Interstate dispute

Climate effects → Migration → Competition → Host repression → Home intervention

Some studies have found that countries experiencing an influx of refugees from neighboring states are significantly more likely to experience civil wars.[45] Unlike political refugees, however, climate refugees may not be as prone to organized violence, as they may perceive their dislocation as an act of God so may not blame their new hosts for inadequately addressing their needs. Whether environmental migration turns violent depends on how local governments handle the inflow of new arrivals.[46] Migratory movements may also be less likely to lead to violence because of their largely local and temporary nature.[47] Of course, for low-lying island nations and perhaps even dry land areas subject to desertification, that assumes migrants can eventually return home. Climate change, in addition to displacing populations, may make some places uninhabitable. If so, the conflict patterns often associated with massive, more permanent migrations—in which refugees become fed up with the lack of new opportunities or host populations are unable to cope with the refugees, for example—could become much more likely. At present, no one really knows how many people will be displaced by climate change in the coming years. The most widely cited figure is 200 million people by 2050, derived through "heroic extrapolations," according to its authors.[48]

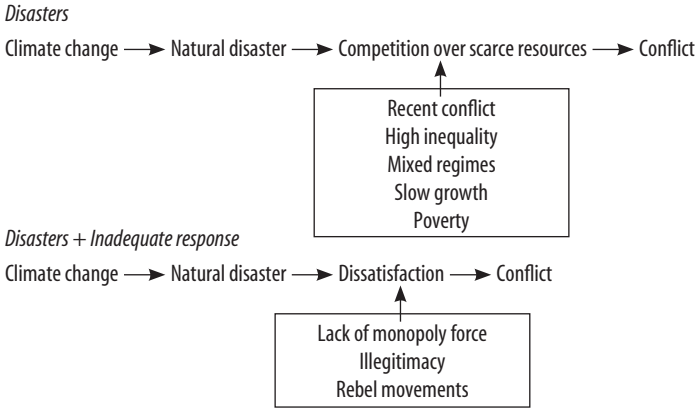
As suggested earlier, the *climate change* → *migration* → *conflict* link often involves natural disasters.[49] As with variability, the supposition is that so-called "swift onset disasters," because of their dislocative effects, ultimately give people reasons to take up arms or engage in criminality out of desperation. Given that disasters provide local populations with teachable moments about how much their governments care for them, governments that fail to respond adequately may find their legitimacy challenged and the dissatisfied populations easily recruited by opposition or rebel movements. This, coupled with the physical destruction wreaked by disasters, can lead to local anarchy and looting. Such challenges to the state's monopoly of force, though perhaps temporary, can give rise to broader criminal activity and violence.[50] It took 70,000 soldiers to restore order from the temporary lawlessness in New Orleans after Hurricane Katrina. If that can happen in the United States, one can imagine the relative vulnerabilities of poor and weak states.

Some early studies have suggested disasters might help diminish civil conflicts by producing a rallying effect, inspiring former antagonists to resolve common problems together, but a more recent view is that disasters can foster local competition for resources.[51] Only in rare circumstances, as occurred after the 2004 Asian tsunami, will groups

involved in conflict be so weak or so profoundly affected by a disaster that they will be less likely to fight on. Otherwise, disasters may well foster competition for basic resources—food, water, shelter, relief—and make conflict more likely. One study found earthquakes made violent conflicts more likely, particularly in poor countries with a history of conflict. Earthquakes also increased the likelihood of rebellions and, to a lesser extent, civil wars, again especially in poor countries with a recent history of conflict. It is thought that these effects can be generalized to other kinds of natural disasters.[52]

Another study also found that disasters enhanced the risk of violent conflict in countries with high levels of inequality, mixed regimes (partial democratization), and slow economic growth. Disasters may increase grievances and incentives to grab scarce resources and may undermine a state's capacity to respond. That study found that a "rapid-onset" natural disaster like an earthquake or hurricane was 50 percent more likely to generate violent civil conflict than other kinds of slower-moving disasters.[53]

Here, the causal diagrams include other important elements, particularly weak state capacity and poverty:



Needless to say, much more work needs to be done to assess how environmental and sociopolitical sources of vulnerability conjoin and to identify the precise mechanisms by which conflict has come about historically—and could emerge in the future.

Weak State Capacity, Climate Change, and Disasters

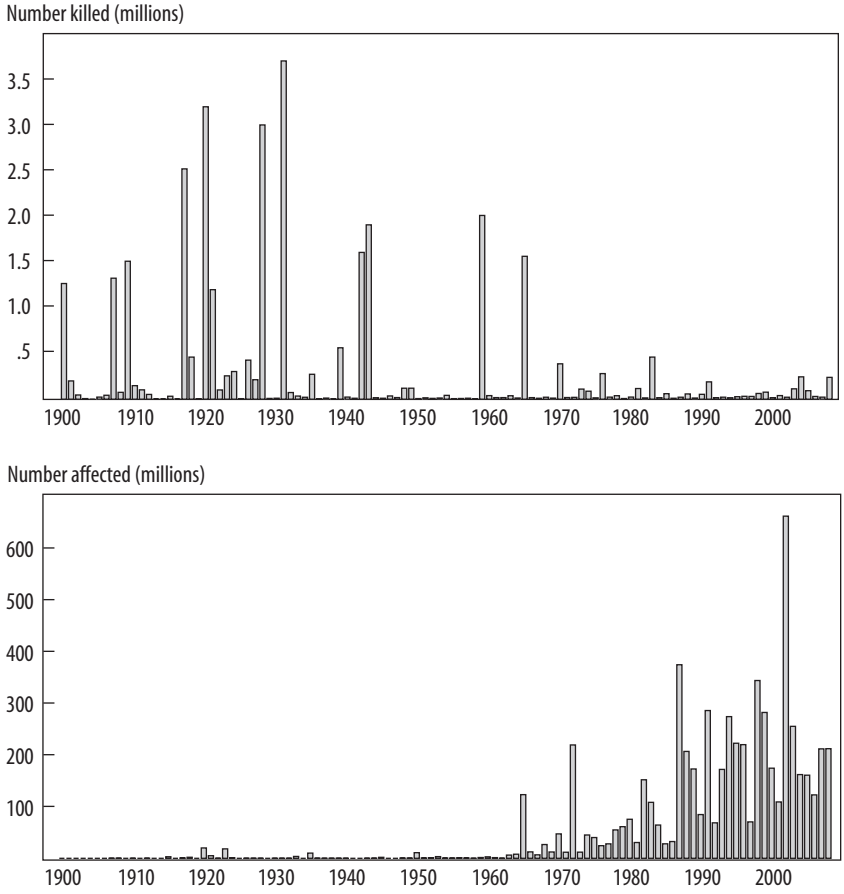
The climate-conflict connection has received outsized attention in policy circles, but the more likely short-term and pervasive consequence

of climate change will be increases in the severity and number of extreme weather events, such as floods, hurricanes, storms, droughts, extremely hot days, and heavy precipitation. The specific contribution of climate change to the severity and number of particular kinds of disasters is still being debated within the scientific community, but the general expectation is that climate change will exacerbate weather extremes.[54] The aggregate patterns of disasters reveal three trends. First, the number of reported natural disasters has gone up (which analysts note may be a function of better data rather than changes in weather patterns as a result of climate change). Second, mortality figures related to disasters have come down. Disaster preparedness has made most disasters much less lethal. Third, because populations are increasing, particularly along densely populated coasts and in urban areas, the total affected population has increased sharply (see figure 5-6).[55] Poor countries in the developing world, with their capacity constraints, are far more vulnerable to natural disasters than advanced industrialized countries. The human impact on poor countries is almost always more severe. Moreover, while they have less valuable property to lose, disasters have a more significant economic impact on poor countries.

With the rising number of reported disasters and number of people affected, modern militaries are increasingly deployed to deal with natural disasters as local fire, water, and rescue services are overwhelmed by the consequences of extreme weather events. Rich countries have had to deploy their troops both domestically and internationally in response to natural disasters. Among wealthy countries, the most notable domestic deployment was the U.S. response after Hurricane Katrina in 2005, when the peak mobilization exceeded 70,000, soldiers—including 22,000 on active duty and more than 50,000 members of the National Guard, or about 10 percent of the total guard strength.[56] Greece and Australia are two other advanced industrialized countries that have called on their soldiers to fight forest fires in recent years. The military is becoming a vital instrument of disaster management and response.

Internationally, the United States and other Western militaries have been increasingly deployed to respond to humanitarian disasters. Since the 1990s, a number of extreme weather events—acute and persistent droughts, floods, and hurricanes—have elicited calls for such relief. As a result, disaster assistance has become a more normal capability of the U.S. military since the deployment of nearly 30,000 to Somalia in

FIGURE 5-6. Natural Disaster Deaths and People Affected, 1900–2008



Source: Center for Research on the Epidemiology of Disasters, "EM-DAT Database" (www.emdat.be/ExplanatoryNotes/glossary.html).

Operation Restore Hope in December 1992. The U.S. military was dispatched to Central America in 1998 in the wake of Hurricane Mitch, to Haiti in 2004 after torrential rains and mudslides, later that year to Asia following the tsunami, and to Pakistan in 2005 after its massive earthquake. U.S. forces were also at the ready to provide aid after Cyclone Nargis struck Myanmar in 2008, but the country's military dictatorship allowed only the Air Force to provide assistance. These are but a

TABLE 5-2. Countries Most Vulnerable to Disasters, 1968–2007[a]

Droughts	*Floods*	*Windstorms*
Burkina Faso (44), Mozambique (39), Rwanda (24), Somalia (1), Tanzania (55)	Afghanistan (2), Bangladesh (48), Malawi (46), Mozambique (39), Nepal (22), Nigeria (28), Somalia (1), Sudan (6), Tanzania (55)	Bangladesh (48), Madagascar (49), Mozambique (39)

a. Figures in parentheses indicate country ranking on the Index of State Weakness.

few examples of a wider normalization of disaster relief as part of the activities of the U.S. and other militaries.

Indeed, postdisaster relief operations may be more likely to occupy defense assets than wars over resource scarcity.[57] Such military mobilization for domestic or international humanitarian relief presents some opportunity costs in terms of limited manpower and infrastructure. If the incidence or severity of climate disasters were to increase as scientists expect, then the trade-offs between national defense and humanitarian relief could become more stark. If the countries affected were strategically important, the trade-off would be more about competing national security directives. The following diagram summarizes the dynamic in such cases:

Disasters + Humanitarian intervention

Climate change ⟶ Natural disaster ⟶ Large-scale suffering ⟶ Relief ⟶ Diversion of military assets/Humanitarian intervention

The modeling of future climate effects can help identify areas at greatest risk of climate disasters. Past incidence of disasters might also be a reasonably good guide to the distribution of future disasters (at least in the short run), if not to their frequency and magnitude. On the basis of data from countries with a high population, a low GDP, and a history of a high number of disasters, researchers have found that a number of countries in Africa and Asia are particularly vulnerable to floods, droughts, and windstorms (table 5-2) (this metric of disaster risk is not entirely separable from the Index of State Weakness).[58] Similar patterns emerge when the same data are analyzed by a different methodology identifying the top five vulnerable countries according to the numbers killed, populations left homeless, and the total number affected (table 5-3).[59]

While these past records of historic disasters tell something about the relative vulnerability of different countries, the precise effects of natural

TABLE 5-3. Top Countries by Climate Disaster Vulnerability, 1980–2002

Category of vulnerability	*Top five*
Mortality	Ethiopia, Bangladesh, Sudan, Mozambique, India
Mortality per thousand	Mozambique, Sudan, Ethiopia, Honduras, Bangladesh
Homeless	Bangladesh, China, Pakistan, Philippines, Vietnam
Homeless per thousand	Tonga, Bangladesh, Laos, Samoa, Sri Lanka
Affected	China, India, Bangladesh, Ethiopia, Iran
Affected per thousand	Botswana, Antigua and Barbados, Bangladesh, Zimbabwe, Malawi

disasters on particular places remain a subject of great debate. Scientists have sought to model complex weather systems, and yet their ability to specify the likely consequences for particular places at the subnational level is patchy at best. Even if there is near unanimity on the overall direction and anthropogenic source of much of the climate change seen in recent years, scientists continue to vigorously debate pieces of the overall puzzle, including whether climate change will exacerbate the severity and number of hurricanes. Nonetheless, the overall direction is clear; poor countries with weak governance in the developing world, particularly in sub-Saharan Africa and the densely populated countries of South Asia, are also especially vulnerable to natural disasters.[60]

Insecurity, Poverty, and Environmental Protection

Thus far, the focus here has been on the consequences of climate change for security concerns, including conflict and disaster response. However, violence and insecurity, coupled with bad governance and endemic poverty, are also likely to have an impact on environmental quality and mediate between a state's ability to respond to its own problems and contribute to global or regional public goods. As noted earlier, intrastate violence is largely confined to a handful of countries in the developing world, particularly in sub-Saharan Africa, parts of Asia, and the Middle East. The environmental risks of conflict include the land-use implications of unexploded ordnance, the contamination of groundwater and the air from damage to infrastructure, and the direct destruction of habitats. A whole range of harmful effects—from deaths, birth defects, and defoliation caused by Agent Orange in Vietnam to the outbreaks of disease from the accumulation of bodies in Rwanda's rivers after the 1994 genocide to the deliberate sabotage of oil wells during the Gulf War—make it clear that war leaves an environmental footprint.

TABLE 5-4. Environmental Performance and Peace Indices, 2008

Country	*Environmental performance ranking (150 countries)*	*Global peace ranking (140 countries)*
Niger	150	129
Angola	149	110
Sierra Leone	148	n.a.
Mauritania	147	120
Mali	146	99
Burkina Faso	145	81
Chad	144	135
Democratic Republic of the Congo	143	128
Yemen	142	106
Guinea-Bissau	141	n.a.
Djibouti	140	n.a.
Guinea	139	n.a.
Solomon Islands	138	n.a.
Cambodia	137	91
Iraq	136	140
Mozambique	135	50
Madagascar	134	43
Burundi	133	n.a.
Rwanda	132	76
Zambia	131	53
Sudan	130	139
Central African Republic	129	134
Benin	128	n.a.
Nigeria	127	129
Bangladesh	126	86

n.a. Not available.

Equally important, countries experiencing domestic instability are less able to protect their own biological resources. The twenty worst performers on the 2008 Environmental Performance Index[61] are among today's most conflict-ridden states, according to the Global Peace Index (GPI) (see table 5-4).[62] Even a number of countries that currently have a lower rank on the GPI (that is, are more peaceful) have experienced wrenching conflict in the past twenty years, including Rwanda, Mozambique, and Cambodia.

Many of the countries most affected by conflict also possess natural assets of global significance, such as biodiversity sites and carbon sinks

created by forests, which remove carbon dioxide from the atmosphere and temporarily store carbon in their living matter. One study found that "over 90% of the major armed conflicts between 1950 and 2000 occurred within countries containing biodiversity hotspots, and more than 80% took place directly within hotspot areas."[63] Commonly concentrated in major tropical forest reserves, such hot spots could play an important role in reducing greenhouse gases. For a variety of reasons discussed in the next section, however, countries suffering from conflict and inadequate governance will have considerable difficulty contributing to this vital global public good.

CASE EXAMPLES

This section focuses on the impact of disasters on Haiti and the difficulty in protecting the DRC's natural resources, given the Congo's past history of violence, its weak state capacity, endemic poverty, and continued instability.

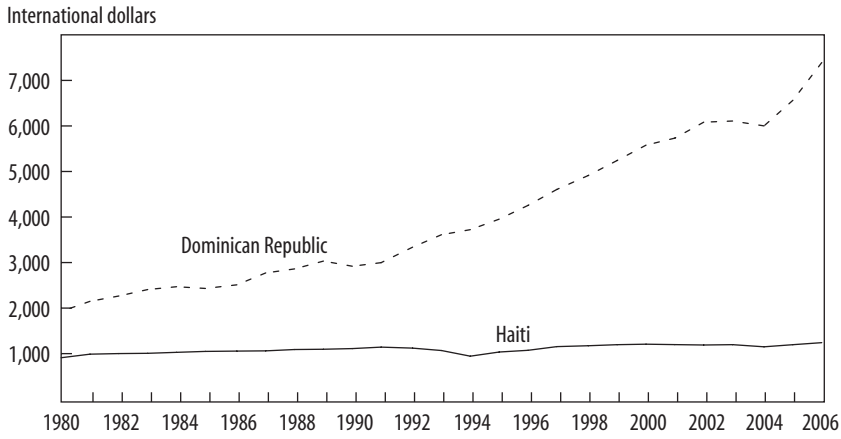
Haiti

Haiti's misfortunes are all too familiar. The country has lacked stable government for much of its history and as a result has long suffered crippling poverty, persistent political instability, and violence. Though it shares an island with the Dominican Republic, the two countries have developed along very different trajectories. While by no means a paragon of governance, the Dominican Republic was ninety-first on the Index of State Weakness of 141 countries, whereas Haiti, at number 12, was the Western Hemisphere's least strong state. Other indicators of quality of life suggest a growing disjuncture between these neighbors. Between 1980 and 2004 the ratio of the Dominican Republic's GDP per capita in purchasing power parity to that of Haiti increased from 2.1 to 5.1 (see figure 5-7).[64]

What accounts for this widening gap in achievement? To be sure, Haiti's colonial origins and tortured history have played a role, as has the fractured nature of its society. Sadly, the venality and incompetence of Haitian leaders continued into the post-Duvalier era. Haiti's poverty and political weakness have in turn contributed to its environmental vulnerability and been a consequence of its degraded environment.

In the Environmental Performance Index, Haiti had the lowest environmental performance of any country in the Americas in 2008.[65] The

FIGURE 5-7. GDP per Capita in Purchasing Power Parity, Dominican Republic and Haiti, 1980–2006



Source: International Monetary Fund, *World Economic Outlook* (Washington, October 2008).

dramatic difference in Haiti's forest cover compared with that of its neighbor (captured by satellite and aerial photos) encapsulates Haiti's susceptibility to extreme weather events such as floods and landslides. By 2005 Haiti's forest cover was down to 3.81 percent, compared with the Dominican Republic's 28.44 percent.[66]

The combination of a dysfunctional government and poverty has created a vicious cycle in which peasant communities in search of fuelwood put their own lives in jeopardy through land-use practices that strip the hillsides bare of tree cover. The resulting erosion has made it difficult for rural communities to sustain their livelihoods and pushed Haiti's annual rural-to-urban migration in excess of 75,000, swelling the mass of shantytowns in the unstable capital city of Port-au-Prince, which is already home to 2.5 million, or one-quarter of the country's population.[67] The large, unemployed and underemployed urban population has, in turn, made Haiti more susceptible to political instability. Haitians are also much more vulnerable to the Caribbean's yearly storms than their wealthier Dominican counterparts. According to a 2004 report of the United Nations Development Program (UNDP), natural disasters are 100 times more lethal in Haiti than in the Dominican Republic.[68]

The world has repeatedly witnessed this vulnerability over the past decade. In February 2004 an armed rebellion successfully deposed

President Jean-Bertrand Aristide. A UN peacekeeping force, led at first by 1,000 U.S. marines, was authorized to restore order on behalf of the interim government. In the midst of this political chaos, devastating floods killed nearly 3,000 people between May and September of that year. Already on the island as peacekeepers, the American soldiers—by then some 1,900 of them—were able to stave off even worse effects by airlifting food and drinking water and evacuating the injured from submerged towns.[69] A UN stabilization force of more than 7,000 soldiers and 2,000 police has remained in Haiti since June 2004.[70]

In April 2009 the International Crisis Group reported that "between 2001 and March 2007, natural disasters resulted in 18,441 deaths, 4,708 injuries and 132,000 homeless." Hence "reversing a decades-long trend of environmental destruction is essential to Haiti's development, social and economic stability and, ultimately, security." On an island with a population just shy of 10 million inhabitants, some 6.4 million persons were affected, with damages estimated at $6.4 billion. Between August and September 2008, a succession of four storms and hurricanes affected an additional 800,000, left nearly 800 dead, and caused damages of nearly $900 million.[71] For a country that is already poorest in the hemisphere, such economic losses represent a significant diversion of resources from other unmet social needs.

With climate change, the effects of extreme weather events on Haiti are likely to make a difficult situation much worse, though the models for the effects of climate change in the Caribbean have yet to provide a sense of what might happen in particular geographic areas. These models vary widely in the trends and direction of future precipitation.[72]

The future frequency, as well as the intensity, of hurricanes is one of the most salient concerns for Haiti. While much of the scientific community agrees that climate change will trigger more numerous and intense and extreme weather events, whether these trends are yet observable and attributable to climate change is still being debated. The Fourth Assessment of the Intergovernmental Panel on Climate Change issued in 2007 found no clear global trend in the *frequency* of tropical cyclones. However, the number of tropical storms in the North Atlantic (which is relevant for Haiti) from 1850 to 1990 was about ten a year, five of which were hurricanes. From 1998 to 2007, the average number was about fifteen a year, with eight hurricanes. Although better reporting of data may in part account for this trend, scientists appear more confident that the specific North Atlantic link between climate change and hurricane

frequency is related to human activity. As for hurricane *intensity,* the scientific community is more confident that the severity of hurricanes, if not their number, has increased, though this too is still actively debated. A number of peer-reviewed studies suggest the strongest hurricanes have increased in number over the past two or three decades.[73]

What are the implications of Haiti's vulnerability to natural disasters for the United States? To begin with, the U.S. military is called upon periodically to provide humanitarian relief, as it did in 2004 after devastating floods and again after the intense hurricane season of 2008. The political violence that periodically has plagued Haiti has also been an impetus for U.S. and UN military interventions to restore order. To the extent that environmental conditions in Haiti are indirectly or directly contributing to Haiti's political instability and violence, climate change could increase the need for such deployments.

In addition, Haiti's proximity to the United States makes it a natural concern because negative spillovers—such as its growing role as a conduit for drugs—might affect American interests. More salient for U.S. policy, however, is the extent to which desperate Haitians have an incentive to migrate to the United States. Natural disasters and environmental degradation prompt rural-to-urban migration not only within Haiti also but between Haiti and the United States. In the first weeks after Hurricane Georges struck Haiti in 1998, the number of interdictions from the U.S. Coast Guard spiked sharply, even in comparison with other potential causes of Haitian migration.[74]

An influx of refugees would be particularly problematic for the United States, both in terms of interdiction and possible strategic blackmail. Haiti, like Cuba, has long used the threat of migration to extract concessions from the United States, knowing that the U.S. public tends to react negatively to sudden influxes of large numbers of migrants, particularly from Haiti. In 1980 Fidel Castro forced the United States to accept more than 100,000 Cubans after he encouraged tens of thousands to migrate to Florida during the Mariel boatlift. And, in 1994, Jean-Bertrand Aristide, in exchange for U.S. intervention to restore him to power, dissuaded thousands of Haitians from emigrating to the United States.[75] In the absence of U.S. action to address climate change or support risk reduction, countries in the region could be tempted to use the threat of migration again. Whether the migration of Haitians would on its own constitute a national security threat to the United States is unclear. On the one hand, the desperation that drives Haitians

to seek a better life in the United States is understandable. On the other hand, sudden flows of migrants would create challenges for local law enforcement, the military, and Coast Guard, who would likely be called upon to detain refugees at sea and establish holding facilities as President Bill Clinton did in the mid-1990s when he used Guantánamo Bay to house nearly 50,000 Haitian and Cuban refugees. Incidents such as this could elevate the migration issue to become a more significant fault line in international politics.

The Democratic Republic of the Congo

The Democratic Republic of the Congo, with the third worst score on the Index of State Weakness and seventh worst score on the Environmental Performance Index, stands as a stark reference case for the analyses in this volume.[76] Conflict has compounded the DRC's failings in these areas, making it difficult to protect the environment.

The former Zaire's slide into chaos began long before its long-time kleptocratic president Mobutu Sese Seko was deposed and died in 1997.[77] The international community has attempted to come to grips with violence in the DRC with a UN peacekeeping force in place since 1999. That force is the UN's largest peacekeeping deployment, with more than 16,500 soldiers, an additional 1,000 police, and several thousand other civilians and military observers.[78]

The DRC could be a major beneficiary of avoided deforestation schemes, given the extent of the tropical forests in the Congo Basin. Nearly 20 percent of the world's greenhouse gases are absorbed by tropical forests.[79] With deforestation and land clearing responsible for nearly a fifth of the world's annual greenhouse gas emissions, advocates of efforts to reduce greenhouse gas emissions have sought schemes to slow down the rate of deforestation. These schemes are known as avoided deforestation or reduced emissions from deforestation and forest degradation (REDD).

REDD schemes offer an opportunity to reduce greenhouse gas emissions at low cost. For major emitting industrial countries like the United States, avoided deforestation could be a much more cost-effective way to address climate change than retrofitting industrial facilities.[80] For this reason, the draft climate bill circulating in the U.S. Congress in 2009 sets aside 5 percent of the allowances to support international forest carbon conservation efforts.

A $500 million World Bank pilot program and a number of private efforts are also being developed to compensate heavily forested countries

for keeping their forests intact and preventing deforestation in the first place. According to a 2007 study by the Woods Hole Research Center, the DRC stands to gain as much as $120 million to $400 million a year in income to rural households through REDD schemes and also a 50 percent reduction in greenhouse gas emissions. For a country that received $800 million in foreign assistance and had a per capita income of $125 in 2005, this would be a significant source of income.[81]

A forthcoming study by Resources for the Future has mapped the biological potential of different places on the planet for their ability to reduce such emissions through avoided deforestation. Without controlling for or overlaying indicators of government capacity, the research team found that the Congo River Basin, with its vast tracts of unaltered forest, offers the best biological potential for low-cost avoided emissions on the planet. The DRC alone has 1.1 million square kilometers of dense tropical forests, an area twice the size of France. As the country "with the most profit potential in carbon markets," it could increase its annual GDP by 20 percent between 2012 and 2020.[82]

Despite this profit potential for generating forest carbon, other risk factors—including readiness, ease of doing business, and governance—still make the Congo Basin "a region with among the highest investment risk in the world."[83] Given the fragility of the DRC's government, rich history and recent past of violent conflict, and incapacity to establish domain over its territory, the DRC is not in an optimal position to take advantage of the avoided deforestation potential, at least in the short run.

Such schemes require particular sorts of government capacity, notably the ability to collect information and conduct surveillance, both to establish the baseline for forest cover and to monitor changes over time. Ultimately they would have significant economic value, enabling emitters of greenhouse gases in rich countries to meet their obligations by supporting avoided deforestation activities in the developing world. Those investments will only be meaningful, however, if the recipient governments have monitoring capability.

Some functions along these lines can be performed by satellite technology, but they must be backed by a capacity to deter illegal deforestation. In addition, countries must be able to distribute the revenue generated from the scheme. Otherwise, the schemes cannot be guaranteed to meet their goals. If governments do not have the capacity to distribute funds equitably, forest carbon credits could become something of a resource curse, putting traditional rural forest-dwelling communities at

a disadvantage.[84] The revenues would be valuable enough for contracts to become contestable items, worthy of political control and possibly a source of conflict in and of themselves. Indeed, badly designed, the program could encourage a sort of "green blackmail," whereby countries would initiate deforestation programs merely to extort payments from donors to stop them from continuing that deforestation. Given these concerns, only countries possessing a modicum of stability and governance capacity can reassure investors that their programs will provide adequate monitoring, distribute income equitably, and deter undesirable behavior. The DRC government is unlikely to generate this kind of confidence for investors interested in taking advantage of its great REDD potential. Despite these various concerns, the World Bank included the DRC in its list of countries potentially eligible for REDD projects in 2008. As of March 2009, the bank was preparing a plan for the DRC, which might set the stage for the government's actual readiness but could prove to reveal as much about the country's fundamental barriers to participation as anything else.[85]

The DRC's forestry and conservation policies have been nearly as volatile as its security situation in recent years. In eastern Congo near the Ugandan border, media reports suggest that fighting and poverty have put increased pressure on the resources, animals, and fishing in and around Lake Edward: in desperation, people have deforested for fuelwood, overhunted hippo and elephant populations, and overfished lakes.[86] In other parts of the country, rebels have driven park rangers out of the Virunga Mountains gorilla reserve. A census revealed that gorilla populations had increased during the fighting—perhaps because the region was too violent for poachers.[87] As for its forestry policy, the DRC has issued concessions to foreign firms for timber on a number of occasions, but in the face of outside pressure, canceled them.[88] It is unclear whether the country possesses enough stability to permit large logging operations to function. That said, it would be a tragedy if the price of peace in the DRC were a swift uptick in logging.

For the United States, instability and weak governance in heavily forested countries like the DRC means fewer sites and sources of low-cost emissions reductions. If the DRC and other countries remain less able to contribute to the global public good of emissions reductions of greenhouse gases, the United States will have to do more through expensive and politically difficult domestic policy measures. There is, and will likely continue to be, a large disjuncture between the kinds of domestic

climate policies that are politically possible in the United States and what scientists believe are necessary to avoid the worst consequences of climate change. The hardest part for the United States has simply been getting started. Successful international REDD programs could buy the United States some time while its policies adjust. Where this option is foreclosed or limited, the country will likely be increasingly blamed for being the world's largest historic emitter of greenhouse gases. Inaction on climate change limits the negotiating room for American diplomats in a variety of settings and provides opponents of the United States convenient excuses to blame America. Therefore, it has an additional incentive, among others, to limit and reduce these negative reputational consequences. If a reservoir of good will around the world is important for U.S. national security, then actions on climate change are likely to become increasingly important. With REDD schemes offering some of the best potential for emissions reductions, the conditions in heavily forested countries like the DRC become more relevant to U.S. strategic interests than they might appear to be at first blush.

CONCLUSIONS AND POLICY IMPLICATIONS

Because climate change is a highly polarized and politically contested subject in the United States, efforts to oversell its security implications could backfire. A more evenhanded review of the state of knowledge on climate-security connections, such as provided in this chapter, could defuse some of the hyperbole and point policymakers in the right direction. Although violent conflict obviously remains an important topic for them to consider, other security issues arising with climate change, such as those in the wake of natural disasters, demand their attention. Disaster response, particularly to poor countries with weak governance, is already becoming a normal part of military deployments and will probably become an even more important security concern. It must also be recognized that conflict and unstable governance make environmental protection difficult, and that environmental variables are not merely a cause and conflict an outcome. Indeed, conflict contributes to poor environmental quality. This chapter has explored these dynamics throughout the developing world, notably in Darfur (in the discussion of the connections between climate and conflict), Haiti (between climate change, disasters, and negative spillovers), and the DRC (between conflict and environmental quality).

TABLE 5-5. Poor Country Adaptation Needs by 2015

	Estimated cost, 2015	
Need	*Percent of OECD GDP*	*Billions of 2005 U.S.$*
Climate-proofing development investment	0.1	44
Adapting poverty reduction to climate change	0.1	40
Strengthening disaster response	—	2
Total	0.2	86

The security connections with climate change bear more study.[89] An important avenue to explore further is the circumstances under which climate consequences come together with state capacity, poverty, and other variables to give rise to violence. To this end, various states should be assessed as to their relative vulnerability to the risks of climate change. Since these risks are largely local ones, identifying these risks at the subnational level will be increasingly important. However, such assessments need to include indicators of political risk, since vulnerability is only partly a function of geography. Where such risks transcend borders, however, analyses need to consider broader regional vulnerability.

Enough is already known about the relative vulnerability of large and densely populated coastal areas, drought-prone regions reliant on rainfed agriculture, and other at-risk sites for countries to begin investing in adaptive measures and risk reduction. Such programs are often justified on the grounds of cost-effectiveness in any case. To the extent that the causal connections between climate change and conflict ultimately have some validity, investments in adaptation and risk reduction (from coastal defenses to better building codes, early warning systems, and evacuation strategies) will also improve the prospects for peace and help to avoid violence.

Internationally, however, there are scant funds for adaptation or the reduction of disaster risk. Poor countries' needs for adaptation could run to billions of dollars: the UNDP's 2007/2008 Human Development Report estimated that pro-poor adaptation programs would require $86 billion a year by 2015.[90] As of 2008, resources available for this were only in the hundreds of millions (table 5-5).

The World Bank's Global Environment Facility (GEF) administers three adaptation-related funds for developing countries: the Special Climate Change Fund (SCCF), the Least Developed Country Fund (LDCF), and the Adaptation Trust Fund. As of early 2009, pledges to GEF adaptation

programs totaled slightly more than $300 million, but actual disbursements were only a small fraction of that amount.[91] Though the United States is a donor to the GEF, it has not contributed to existing adaptation funds, nor has it, as a non-party to the Kyoto Protocol, contributed to the new Adaptation Trust Fund. Even the Global Facility for Disaster Reduction and Recovery (GFDRR), a new fund established in 2006 by the World Bank and UN International Strategy for Disaster Reduction (ISDR), had received only modest contributions of $79 million by 2008, which included $16.8 million of the bank's own resources. Again, the United States, as of this writing, has not contributed anything.[92]

Should a cap-and-trade bill with provisions for adaptation finance pass the U.S. Congress, the resources for international adaptation would increase considerably, although they would fall well short of what advocates believe will be necessary to insulate poor countries from the worst consequences of climate change. In any event, the international transfer of funds of more than $80 billion a year for adaptation alone, as envisioned by the UNDP, is unlikely and could suffer from the kinds of distortions and inadequacies that have plagued traditional foreign assistance programs, even if funds were made available. As the United States debates the broader bill on climate change, it should give some additional thought to the modalities by which such adaptation funds will be delivered. UN-administered programs may be politically challenged in the United States, and the GEF, as a World Bank instrument, has weak legitimacy in developing countries and possibly capacity constraints of its own. The House 2009 version of the cap-and-trade bill empowers the secretary of state, in consultation with the U.S. Agency for International Development (USAID), the Treasury, and the Environmental Protection Agency, to distribute the funds for international adaptation, with at least 40 percent (and no more than 60 percent) delivered multilaterally.[93] Bilateral programming has certainly worked well for the United States in delivering antiretroviral AIDS therapy, but it is unclear that this is an appropriate model for climate adaptation or that USAID or another bilateral U.S. entity is institutionally capable of delivering the size and nature of adaptation funds the cap-and-trade program would provide.

One large challenge for the international community will be to help poor countries burdened by postconflict problems and weak governance to expand their capacity, not only for adaptation but also for improving public health, reducing greenhouse gas emissions, and conserving forests. Given the mixed track record of foreign assistance thus far, this may be a

tall order in poor countries despite the good intentions of donors, unless they can devise more effective mechanisms for assistance, both bilateral and multilateral.

If the measures discussed here—research, adaptation, and capacity building—are supported and are successful, the resulting contributions could diminish the security consequences of climate change in the developing world, strengthen environmental protection, and better provide global public goods. The impact on living standards and state capacity would, in turn, improve the prospects for a peaceful resolution of present conflicts and avoidance of disputes in the future.

NOTES

1. United Nations Environment Program (UNEF), "Sudan: Post-Conflict Environmental Assessment" (2007), chap. 3. One of the leading exponents of environmental degradation and drought as a contributing factor in the conflict in Darfur has been Mohamed Suliman. See, for example, Mohamed Suliman, "Ethnicity from Perception to Cause of Violent Conflicts: The Case of the Fur and Nuba Conflicts in Western Sudan" (London: Institute for African Alternatives, July 1997).

2. Stephan Faris, "The Real Roots of Darfur," *Atlantic Monthly*, April 2007, pp. 67–71. Faris bases his narrative on Darfur in part on the work of Alex de Waal, who, though disputing the causal story, confirms much of the historical arc. Both de Waal and M. W. Daly state the occurrence of severe drought in 1983 set the stage for the famine of 1984–85 and conflict of 1987–89. See M. W. Daly, *Darfur's Sorrow: A History of Destruction and Genocide* (Cambridge University Press, 2007); Alex de Waal, *Is Climate Change the Culprit for Darfur?* (New York: Social Science Research Council [SSRC], June 25, 2007) (http://blogs.ssrc.org/darfur/2007/06/25/is-climate-change-the-culprit-for-darfur/).

3. In advocacy circles, the differences between the farmers and the herders are often described in racial terms as differences between Africans and Arabs, with government-backed Arabs committing atrocities against the Africans. However, the reality of ethnicity in Darfur is far more complex. Ethnicity was at one time more fluid and based on vocation rather than recognizable physical differences. A number of tribes make up the rebels in Darfur, not all of which can neatly be described as "African." All are Sunnis and Arabic speakers. As Mahmood Mandami writes, Western campaigners' "characterisation of the violence as 'Arab' against 'African' obscured both the fact that the violence was not one-sided and the contest over the meaning of 'Arab' and 'African': a contest that was critical precisely because it was ultimately about who belonged and who did not in the political community called Sudan." Mahmood Mamdani, "The Politics

of Naming: Genocide, Civil War, Insurgency," *London Review of Books,* 2007. For a similar view, see Mohamed Suliman, "Ethnicity from Perception to Cause of Violent Conflicts."

4. Ban Ki-Moon, "A Climate Culprit in Darfur," *Washington Post*, June 16, 2007. For a similar view, see Jeffrey Sachs, "Ecology and Political Upheaval," *Scientific American* 295, no. 1 (2006): 37; "Poverty and Environmental Stress Fuel Darfur Crisis," *Nature* 449 (September 2007): 24; "Land, Water, and Conflict," *Newsweek*. July 7–14, 2008. Most scientists would shy away from attributing a single incident to human-induced climate change, claiming only that climate change would make events like this one more likely.

5. De Waal, *Is Climate Change the Culprit for Darfur?* See also Declan Butler, "Darfur's Climate Roots Challenged," *Nature* 447 (June 2007):1038.

6. Idean Salehyan, "The New Myth about Climate Change," *Foreign Policy* (August 2007) (www.foreignpolicy.com/story/cms.php?story_id=3922). For an elaboration of this argument, see Idean Salehyan, "From Climate Change to Conflict?: No Consensus Yet," *Journal of Peace Research* 45, no. 3 (2008): 315–32.

7. Halvard Buhaug, Nils Petter Gleditsch, and Ole Magnus Theisen, "Implications of Climate Change for Armed Conflict," SDCC Working Paper (Washington: World Bank, February 25, 2008) (http://siteresources.worldbank.org/INTRANETSOCIALDEVELOPMENT/Resources/SDCCWorkingPaper_Conflict.pdf).

8. See Intergovernmental Panel on Climate Change (IPCC), *Fourth Assessment Report—Climate Change 2007: Impacts, Adaptation and Vulnerability* (Geneva, April 13, 2007); *Fourth Assessment Report—Climate Change 2007: The Physical Science Basis* (February 5, 2007); *Fourth Assessment Report—Regional Climate Projections* (Contribution of Working Group I to the Fourth Assessment Report, 2007).

9. Center for Naval Analyses, "National Security and the Threat of Climate Change" (Alexandria, Va., 2007). For a more complete review of this literature, see Josh Busby, "The Climate Security Connection: What It Means for the Poor," in *Climate Change and Global Poverty: A Billion Lives in the Balance?* edited by Lael Brainard, Abigail Jones, and Nigel Purvis (Brookings, 2009).

10. Daniel Deudney, "The Case against Linking Environmental Degradation and National Security," *Millennium* 19, no. 3 (1990): 461–76. See also Ole Waever, "Securitization and Desecuritization," in *On Security*, edited by R. D. Lipschutz (Columbia University Press, 1995). For additional discussion and citations, see Josh Busby, "Who Cares about the Weather? Climate Change and U.S. National Security," *Security Studies* 17, no. 3 (2008): 468–504. For similar discussions applied to disease, see Stefan Elbe, "Should HIV/AIDS Be Securitized: The Ethical Dilemmas of Linking HIV/AIDS and Security," *International Studies Quarterly* 50, no. 1 (2006): 119–44; Jeremy Youde, "Who's Afraid of

a Chicken? Securitization and Avian Flu," *Democracy and Security* 4, no. 2 (2008): 148–69.

11. David Victor, "What Resource Wars?" *National Interest,* November/December 2007. See also Stephen M. Walt, "The Renaissance of Security Studies," *International Studies Quarterly* 35, no. 2 (1991): 211–39.

12. For my discussion of the narrow focus of climate and conflict and critique of the human security literature, see Busby, "Who Cares about the Weather?" and "The Climate Security Connection."

13. Such conflicts may become rare, in part because of the expansion of peacekeeping activities in the post–cold war era that have enabled a number of long-running conflicts to be settled. Armed conflicts are recorded when there are at least 25 battle deaths; when battle deaths exceed 1,000, the conflict is called a war. Interstate conflicts refer to conflicts between states; intrastate conflicts, including civil wars, reflect conflicts between a government and a non-state group. Extrastate conflicts, mostly colonial in nature, are between a state and an armed group outside the state's territory. Internationalized intrastate conflicts occur when the government, or an armed group opposing it, receives military support from one or more foreign states. See Human Security Project, "Human Security Report 2006" (University of British Columbia, Human Security Centre, 2006). Data for 2006 with corrections to 2003 and 2005 intrastate conflicts are from Buhaug and others, "Implications of Climate Change for Armed Conflict."

14. Human Security Project, "Human Security Report 2008" (University of British Columbia, Human Security Centre, 2008).

15. Buhaug and others, "Implications of Climate Change for Armed Conflict." Map from UCDP, PRIO, "UCDP/PRIO Armed Conflict Dataset v4-2008" (www.prio.no/CSCW/Datasets/Armed-Conflict/UCDP-PRIO/).

16. Josh Busby, "Climate Change and National Security: An Agenda for Action" (Council on Foreign Relations, 2007); Nigel Purvis and Josh Busby, *The Security Implications of Climate Change for the UN System* (Washington: Woodrow Wilson Center, 2004); Busby, "Who Cares about the Weather?"; Busby "The Climate Security Connection."

17. Lydia Saad, "Increased Number Think Global Warming Is 'Exaggerated,'" Gallup Poll, March 11, 2009.

18. Pew Research Center for the People and the Press, *Little Consensus on Global Warming*, July 12, 2006.

19. Riley E. Dunlap, "Partisan Gap on Global Warming Grows" Gallup Poll, May 29, 2008.

20. National Journal, *Congressional Insiders Poll* (February 3, 2007).

21. For adaptation allowances, see H. Res. 2454, sec. 782, subsec. n. For forest allowances, see section 781 (www.opencongress.org/bill/111-h2454/text).

22. Peter Behr, "Carbon Allowances—The Glue in House Energy Package," *Greenwire*, May 26, 2009.

23. Joshua Busby, "'Bono Made Jesse Helms Cry': Debt Relief, Jubilee 2000, and Moral Action in International Politics," *International Studies Quarterly* 51, no. 2 (2007): 247–75.

24. Gary Yohe and others, *A Synthetic Assessment of the Global Distribution of Vulnerability to Climate Change from the IPCC Perspective that Reflects Exposure and Adaptive Capacity* (Columbia University Center for International Earth Science Information Network [CIESIN], April 2006), especially the map, Global Distribution of Vulnerability to Climate Change, at http://sedac.ciesin.columbia.edu/mva/ccv/maps/MAP_4_3.pdf. See also Susan E. Rice and Stewart Patrick, "Index of State Weakness in the Developing World," Brookings Global Economy and Development Report (2007).

25. CIESIN constructed a variable measuring a country's adaptive capacity and its sensitivity. Adaptive capacity includes ratios of human resources dependency and literacy rates, economic capacity (market GDP per capita) and income distribution, and environmental capacity (population density, sulfur dioxide emissions, percentage of unmanaged land). Sensitivity includes settlement/infrastructure, food security, ecosystems, human health, and water resources. See Yohe and others, *A Synthetic Assessment of the Global Distribution of Vulnerability to Climate Change from the IPCC Perspective that Reflects Exposure and Adaptive Capacity*.

26. For a potentially expansive view of U.S. interests, see the remarks of General John Abizaid (Ret.) at the University of Texas in December 2008: "As the world gets smaller and becomes more global, can we put up with places out there that are falling apart to the point where they affect the rest of us? In the past, we could" (www.robertstrausscenter.org/events/view/72 [beginning at 1:15:53]).

27. For an expanded treatment of this theme, see Busby, "Who Cares about the Weather?"

28. Thomas Homer-Dixon, "Cause and Effect" (SSRC, August 2, 2007) (http://blogs.ssrc.org/darfur/2007/08/02/cause-and-effect/).

29. Thomas Homer-Dixon, "Straw Man in the Wind," *National Interest,* January 2, 2008. For a similar summary of the earlier literature, see Thomas Homer-Dixon, *Environment, Scarcity, and Violence* (Princeton University Press, 1999).

30. On the work of the State Failure Task Force, see Daniel C. Esty and others, "State Failure Task Force Report: Phase II Findings" (Science Applications International, 1998). See also Busby, "Who Cares about the Weather?" For a similar discussion, see Buhaug and others, "Implications of Climate Change for Armed Conflict."

31. Busby, "Who Cares about the Weather?" For a similar point, see Buhaug and others, "Implications of Climate Change for Armed Conflict."

32. For a summary of the literature, see Buhaug and others, "Implications of Climate Change for Armed Conflict." See also Busby, "Who Cares about the

Weather?"; Salehyan, "From Climate Change to Conflict?"; Ragnild Nordås and Nils Petter Gleditsch, "Climate Change and Conflict," *Political Geography* 26, no. 6 (2007): 627–38. For its part, the IPCC has begun to mention the links between climate and security, but as Nordås and Gleditsch note, the references to scholarly peer-reviewed publications are scant. See Nordås and Gleditsch, "IPCC and the Climate-Conflict Nexus," paper presented at International Studies Association Meeting, New York, February 15–18, 2009.

33. Marc A. Levy and others, *Freshwater Availability Anomalies and Outbreak of Internal War: Results from a Global Spatial Time Series Analysis*, Human Security and Climate Change Conference, Oslo, Norway, 2005. For a similar premise and results, see Cullen S. Hendrix and Sarah M. Glaser, "Trends and Triggers: Climate Change and Civil Conflict in Sub-Saharan Africa," *Political Geography* 26, no. 6 (2007): 695–715.

34. For a discussion of these mechanisms, see Jon Barnett and W. Neil Adger, "Climate Change, Human Security and Violent Conflict," *Political Geography* 26, no. 6 (2007): 639–55. See also Buhaug and others, "Implications of Climate Change for Armed Conflict."

35. Colin Kahl calls this strategic use of scarcity the "exploitation hypothesis," in contrast to the "deprivation hypothesis," which presumes that conflict is induced by scarcity itself. See Colin H. Kahl, *States, Scarcity, and Civil Strife in the Developing World* (Princeton University Press, 2006).

36. Clionadh Raleigh and Henrik Urdal, "Climate Change, Environmental Degradation and Armed Conflict," *Political Geography* 26, no. 6 (2007): 674–94. Weak or no support for water scarcity or other environmental variables such as deforestation as a contributor to civil war or armed conflict has also been found by Ole Magnus Theisen, "Blood and Soil? Resource Scarcity and Internal Armed Conflict Revisited," *Journal of Peace Research* 45, no. 6 (2008): 801–18.

37. Jeffrey Sachs, "Water Wars," *Project Syndicate*, April 2009.

38. Buhaug and others, "Implications of Climate Change for Armed Conflict." For a similar conclusion, see German Advisory Council on Global Change (WBGU), *Climate Change as a Security Risk: Summary for Policymakers* (Berlin, June 26, 2007).

39. Buhaug and others, "Implications of Climate Change for Armed Conflict."

40. Given that other countries in the region experienced a break in rain patterns thirty years ago but did not subsequently experience conflict, this thirty-year trend may not explain the triggers for conflict in 2003, according to Michael Kevane and Leslie Gray, "Darfur: Rainfall and Conflict," Environmental Research Letters, 2008 (www.iop.org/EJ/article/1748-9326/3/3/034006/erl8_3_034006.html#erl281852s4).

41. Tearfund, "Darfur: Relief in a Vulnerable Environment," 2007 (www.tearfund.org/webdocs/website/Campaigning/Policy%20and%20research/Relief%20in%20a%20vulnerable%20envirionment%20final.pdf).

42. Sachs, in previous editorials, was more careful to reference the important work of his Columbia colleagues on rainfall variability and conflict. See, for example Jeffrey Sachs, "Land, Water, and Conflict," *Newsweek*, July 7–14, 2008 (www.newsweek.com/id/143700?tid=relatedcl).

43. Clionadh Raleigh and Lisa Jordan, "Climate Change, Migration and Conflict," paper presented at American Political Science Association meeting, Boston, August 28–31, 2008.

44. For a discussion of these dynamics, see Rafael Reuveny, "Climate Change–Induced Migration and Violent Conflict," *Political Geography* 26, no. 6 (2007): 656–73.

45. Idean Salehyan and Kristian Skrede Gleditsch, "Refugees and the Spread of Civil War," *International Organization* 60, no. 2 (2006): 335–66.

46. On climate change–induced migration as a plausible cause of interstate conflict, see Nils Petter Gleditsch, Ragnhild Nordås, and Idean Salehyan, *Climate Change and Conflict: The Migration Link* (New York: International Peace Academy, May 25, 2007).

47. Raleigh and Jordan, "Climate Change, Migration and Conflict."

48. Oli Brown, "The Numbers Game," *Forced Migration Review*, November 2008; Norman Myers, "Environmental Refugees: An Emergent Security Issue," Thirteenth Economic Forum, Prague, May 22, 2005, pp. 23–27. For an extended discussion, see also Nordås and Gleditsch, "IPCC and the Climate-Conflict Nexus."

49. Datasets that track natural disasters use a very specific definition, referring not only to the physical attributes of the storm or flood, but to the type of response that is appropriate. The Centre for Research on the Epidemiology of Disasters (CRED) defines a natural disaster as a "situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction, and human suffering." A disaster is entered into its database if at least 10 people are reported killed, 100 people reported affected, a state of emergency has been declared, or a call for international assistance has been issued. See CRED, "EM-DAT Database" (www.emdat.be/ExplanatoryNotes/glossary.html).

50. See my discussion in Busby, "Who Cares about the Weather?"

51. For an exploration of these questions, see www.disasterdiplomacy.org.

52. Dawn Brancati, "Political Aftershocks: The Impact of Earthquakes on Intrastate Conflict," *Journal of Conflict Resolution* 51, no. 5 (2007): 715–43.

53. Philip Nel and Marjolein Righarts, "Natural Disasters and the Risk of Violent Civil Conflict," *International Studies Quarterly* 52, no. 1 (2008): 159–85.

54. Working Group II's contribution to the IPCC's Fourth Assessment wrote: "Confidence has increased that some weather events and extremes will become more frequent, more widespread and/or more intense during the 21st century." IPCC, *Fourth Assessment Report—Climate Change 2007: Impacts, Adaptation*

and Vulnerability. The scientific evidence in support of the specific claims about hurricanes is discussed in this chapter's section on Haiti.

55. "Affected" refers to people requiring immediate assistance during a period of emergency. It also includes displaced or evacuated people. See CRED, "EM-DAT Database." For a discussion of the greater vulnerability to disasters in urban areas and the links between disasters and poverty, see United Nations, "2009 Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate" (2009).

56. Michael Waterhouse and JoAnne O'Bryant, "National Guard Personnel and Deployments: Fact Sheet," Report RS22633 (Congressional Research Service, January 10, 2007).

57. See Busby "The Climate Security Connection," "Who Cares about the Weather?" and "Climate Change and National Security"; Purvis and Busby, *The Security Implications of Climate Change for the UN System*.

58. Raleigh and Jordan, "Climate Change, Migration and Conflict."

59. Bradley C. Parks and J. Timmons Roberts, *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy* (Cambridge, Mass.: MIT Press, 2006).

60. For more extended discussions of climate change and disasters, see Busby, "Who Cares about the Weather?"and "The Climate Security Connection."

61. Yale University, "Environmental Performance Index 2008" (http://epi.yale.edu/Americas). The project website describes the scale as follows: "The quantitative metrics underlying the 2008 EPI encompass 25 indicators chosen through: a broad-based review of the environmental science literature; in-depth consultation with a group of scientific advisors in each policy category; the evidence from the Millennium Ecosystem Assessment, the Intergovernmental Panel on Climate Change, the Global Environmental Outlook-4, and other assessments; environmental policy debates surrounding multilateral environmental agreements; and expert judgment. Each indicator builds on a foundation either in environmental health or ecological science."

62. Institute for Economics and Peace, "Executive Summary," 2008 (www.visionofhumanity.org/gpi/about-gpi/overview.php). According to the Global Peace Index (GPI) website, the dataset ranks the relative states of peace of different countries: "The index is composed of 24 qualitative and quantitative indicators from highly respected sources, which combine internal and external factors ranging from a nation's level of military expenditure to its relations with neighbouring countries and the level of respect for human rights. These indicators were selected by an international panel of academics, business people, philanthropists and peace institutions. The GPI is collated and calculated by the Economist Intelligence Unit."

63. Thor Hanson and others, "Warfare in Biodiversity Hotspots," *Conservation Biology,* February 19, 2009, pp. 1–9.

64. International Monetary Fund, *World Economic Outlook* (Washington, October 2008) (www.imf.org/external/pubs/ft/weo/2008/02/index.htm).

65. Yale University, "Environmental Performance Index 2008." Haiti's score was 60.7 on a 100-point scale. By contrast, the Dominican Republic had a score of 83. The average for the Americas was 78.

66. Rhett Butler, "Haiti," Mongabay.com, 2006 (http://rainforests.mongabay.com/deforestation/2000/Haiti.htm); Rhett Butler, "Dominican Republic," Mongabay.com, 2006 (http://rainforests.mongabay.com/deforestation/2000/Dominican_Republic.htm).

67. International Crisis Group, "Haiti: Saving the Environment, Preventing Instability and Conflict," April 28, 2009.

68. Julia Taft, "Storm-Tossed Lessons," *New York Times,* October 3, 2004.

69. Francie Grace, "Haiti Handover As Floods Devour," *CBS News*, May 31, 2004.

70. United Nations, "2009 Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate" (2009).

71. International Crisis Group, "Haiti: Saving the Environment, Preventing Instability and Conflict."

72. N. Mimura and others, "Small Islands. Climate Change 2007: Impacts, Adaptation and Vulnerability," in *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, edited by M. L. Parry and others (Cambridge University Press, 2007).

73. Pew Center on Global Climate Change, "Hurricanes and Climate Change FAQs," undated (www.pewclimate.org/hurricanes.cfm). For an accessible account of these debates, see Chris Mooney, *Storm World: Hurricanes, Politics, and the Battle over Global Warming* (New York: Harcourt, 2007). See also my discussion in Busby, "Who Cares about the Weather?"

74. Stephen Shellman, "Political Persecution or Economic Deprivation? A Time-Series Analysis of Haitian Exodus, 1990–2004," *Conflict Management and Peace Science* 24, no. 2 (2007): 121–37.

75. Kelly M. Greenhill, "Extortive Engineered Migration: Asymmetric Weapon of the Weak," *Conflict, Security and Development* 2, no. 3 (2002): 105–16.

76. Rice and Patrick, "Index of State Weakness in the Developing World."

77. For a review of Congo's slide into poor governance, see Pierre Englebert, "Life Support or Assisted Suicide? Dilemmas of U.S. Policy toward the Democratic Republic of Congo," in *Short of the Goal: U.S. Policy and Poorly Performing States,* edited by N. Birdsall, M. Vaishnav, and R. L. Ayres (Washington: Center for Global Development, 2006).

78. United Nations, "2009 Global Assessment Report on Disaster Risk Reduction."

79. Rhett Butler, "Rainforests Absorb 20% of Emissions Annually," Mongabay.com, February 19, 2009 (http://news.mongabay.com/2009/0218-forest_carbon.html).

80. See my discussion in Busby, "Climate Change and National Security."

81. To achieve those savings, the mean price of carbon would need to be between $19 and $65 per ton. See Rhett Butler, "Returns from Carbon Offsets Could Beat Palm Oil in Congo DRC," Mongabay.com, December 4, 2007 (http://news.mongabay.com/2007/1204-congo_whrc.html); and Nadine Laporte and others, "Reducing CO2 Emissions from Deforestation and Degradation In the Democratic Republic of Congo: A First Look" (Woods Hole Research Center, December 3–14, 2007) (http://whrc.org/BaliReports/assets/Africa_Bali_Booklet.pdf).

82. Resources for the Future (RFF), "Forest Carbon Index: Technical Report" (Washington, 2009, forthcoming).

83. The index adjusts the forest carbon supply potential for three risk factors: readiness, ease of doing business, and governance. RFF created the Index of Readiness, while the other indicators were drawn from World Bank data. Readiness involves remote-sensing capacity and environmental market experience. Ease of doing business measures regulations affecting ten stages of a business's life: starting a business, dealing with licenses, employing workers, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and closing a business. Governance has six dimensions: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption.

84. For a review of these concerns, see Tom Griffiths, "Seeing 'RED': 'Avoided Deforestation' and the Rights of Indigenous Peoples and Local Communities," Forest Peoples Programme, June 2007.

85. World Bank, "World Bank Engagement in the DRC's Forest Sector," n.d. (http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRSUMESSD/EXTFORINAFR/0,,contentMDK:22110942~pagePK:148956~piPK:216618~theSitePK:2493451,00.html?cid=3001).

86. Delphine Schrank, "As Go the Hippos. . . ," *The Atlantic*, June 2009 (www.theatlantic.com/doc/200906/congo-ecology).

87. Stefan Lovgren, "Spectacular Gorilla Growth in Congo, Despite War," *National Geographic*, January 27, 2009.

88. Rhett Butler, "Congo Cancels Logging Contracts Covering 13M Hectares," Mongabay.com, January 21, 2009 (http://news.mongabay.com/2009/0121-congo.html).

89. The U.S. Department of Defense recognized this as well, as part of a new 2008–09 initiative in support of social science. A University of Texas–led research team, including this author, was awarded a multimillion dollar grant to study climate change and security in Africa.

90. UNDP, *Human Development Report 2007/2008* (New York, 2007).

91. As of May 2009, for example, the LDCF had pledges totaling $176.5 million and the SCCF had pledges of $121 million. Another $50 million was available for the Strategic Priority on Adaptation under the GEF Trust Fund. See

Global Environmental Facility, "Status Report on the Special Climate Change Fund," May 26, 2009 (www.gefweb.org/uploadedFiles/Documents/LDCFSCCF_Council_Documents/LDCFSCCF6_June_2009/LDCF.SCCF.6.Inf.2.pdf). The December 2007 climate negotiations in Bali made the GEF the trustee of the Adaptation Trust Fund, with funding derived from a portion of the proceeds from Clean Development Mechanism (CDM) projects. Two percent of the Certified Emission Reduction (CER) from the CDM is dedicated to the Adaptation Fund. As of February 2009, the Trust Fund had received donations of $3.548 million and a loan of $700,000 from the LDCF. See Global Environmental Facility, "Status Report on the Administrative Trust Fund Resources" (Washington, February 25, 2009). The value of those credits was estimated to be worth between $80 million and $300 million a year from 2008 to 2012. See UN Framework Convention on Climate Change, "UN Breakthrough on Climate Change Reached in Bali" (Bonn, December 15, 2007).

92. GFDRR, "Global Facility for Disaster Reduction and Recovery: Donor Pledges and Contributions," June 8, 2009.

93. See H. Res. 2454, sec. 494 (www.opencongress.org/bill/111-h2454/text).