

**SESSION IV: DISASTERS AND INSTABILITY:  
COPING WITH CLIMATE CATASTROPHES  
SATURDAY, AUGUST 2, 11:30-12:45 P.M.**

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# THE CLIMATE SECURITY CONNECTION: WHAT IT MEANS FOR THE POOR

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## **EXECUTIVE SUMMARY:**

Consensus over the links between climate change and international security is beginning to form among climate scientists, development academics, and policymakers. Developing countries are most vulnerable, partly as an accident of geography, but also because vulnerability is made worse by poverty, bad governance, and past conflict. Though academic debate still lingers in demonstrating causality and the ability to predict conflict, security and development practitioners face more immediate choices about action. Increased frequency of natural disasters may lead to increased frequency (and stretching) of military forces. The world political climate might also constrain the traditional forms of international crisis intervention. To reduce the impact of climate on security concerns, international actors should focus on mitigation, adaptation, and information generation. National actors can best respond by forming regional partnerships for responding to disasters. Private actors should study and respond to the impact climate change will have on their existing projects and help foster community resilience.

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When cyclone Nargis struck Myanmar's Irrawaddy Delta in May 2008, the world received yet another reminder of nature's sometimes terrifying capacity for physical destruction. In its wake, the storm left more than 80,000 dead, another 50,000 missing, and some 2.4 million survivors.<sup>1</sup> The storm also brought unprecedented scrutiny to Myanmar's military government, which was seen as negligent in ignoring early warnings from Indian meteorologists and dilatory in responding to the pleas for help from its country's displaced population.<sup>2</sup> A few isolated voices called for military intervention to provide aid to the Burmese people.<sup>3</sup> More serious wrangling occurred over visas for Western aid workers; in the aftermath of the aborted Saffron revolution of 2007, the Myanmar military rulers saw the influx of foreigners as a threat to its government and deflected pressure to admit aid workers by at first limiting visas to workers from Asian NGOs.<sup>4</sup> Thousands of Burmese soldiers were mobilized after the storm, putatively to provide relief but to many outside observers, mainly to restore stability and protect the regime. The Myanmar military was so worried that international aid might be tantamount to a foreign invasion that they rebuffed the U.S. government's offer to deliver humanitarian aid by ship.<sup>5</sup> After three weeks of waiting, U.S. secretary of defense Robert Gates huffily announced plans to redeploy U.S. naval assets that had been stationed offshore ready to provide additional aid at a moment's notice.<sup>6</sup>

In a world where scientists predict climate change will exacerbate the severity and number of extreme weather events, Myanmar's experience, like the hurricanes that buffeted the U.S. Gulf Coast in 2005, gave people around the world a visual image of the potential future.<sup>7</sup> These storms provided the public with a sense of the security risks when affected countries lack the capacity or will to respond. They observed what resembled the aftermath of an armed attack: widespread suffering, destruction of infrastructure, mobilization of the military, and the movement of refugees. Lacking only human intent to wreak such devastation, the failure of the Myanmar government's response underscored how "natural" disasters tend to be magnified by incompetent or venal governance.

Even if storms such as Nargis and Hurricane Katrina cannot be linked directly to climate change, these weather events have altered the terms of the climate debate.<sup>8</sup> Two thousand-seven was the year in which "climate change and security" as a linked concern emerged on to the international agenda. A host of reports and meetings from think tanks and governments highlighted in dramatic language the emerging risk to peace and security from the effects of climate change. By 2008, these products had become almost too

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<sup>1</sup> (AP 2008).

<sup>2</sup> (Reuters 2008a).

<sup>3</sup> (Kaplan 2008).

<sup>4</sup> (Montlake 2008).

<sup>5</sup> Delivery of U.S. humanitarian aid by air, more easily controlled, was still allowed.

<sup>6</sup> (Kellerhaus Jr. 2008).

<sup>7</sup> A 2007 Working Group report by the Intergovernmental Panel on Climate Change (IPCC) concluded that "confidence has increased that some weather events and extremes will become more frequent, more widespread and/or more intense during the 21st century." All are likely continuations of trends already observed at the end of the twentieth century (IPCC 2007).

<sup>8</sup> Scientists do not attribute single weather events like Nargis to climate change; at most, they would say that climate change makes extreme storms like Nargis more likely. Whether climate change has been responsible for an increase in both the severity and number of hurricanes and tropical cyclones is one of the most hotly debated subjects in the scientific community. For an overview, see (Mooney 2007).

numerous to enumerate.<sup>9</sup> In the reports on climate and security, climate change was frequently described as a “threat multiplier” for conflict and even state failure. Though hardly unanimous in their assessment, a parallel academic discussion linked a number of expected effects of climate change—such as rainfall variability, disasters, and refugee flows—to the increased likelihood of violent conflict.<sup>10</sup>

Policymakers have also made the connection between climate and security. In April 2007 at the initiative of the UK government, the UN Security Council held its first-ever debate on the potential impact of climate change on peace and security.<sup>11</sup> In June 2007, the U.N. secretary-general Ban Ki-moon weighed in, controversially linking the crisis in Darfur, Sudan to climate change: “Amid the diverse social and political causes,” he argued, “the Darfur conflict began as an ecological crisis, arising at least in part from climate change.”<sup>12</sup> In October 2007, the Nobel committee recognized this emerging threat to peace and security by awarding former vice president Al Gore and the Intergovernmental Panel on Climate Change its peace prize. The EU’s High Representative for foreign policy and security, Javier Solana, released his own report in March 2008.<sup>13</sup> The U.S. Congress requested a national security estimate from its intelligence apparatus,<sup>14</sup> and a classified report by the National Intelligence Council was duly prepared and released in June 2008.<sup>15</sup>

According to these many initiatives, poor countries and poor communities, particularly in Africa and Asia, face some of the gravest security risks. Poor countries lack the capacity to respond to severe flooding, drought, storms, extreme heat waves, water scarcity, and other knock-on consequences of climate change like refugee flows and crop failure. Their vulnerability is partly an accident of geography; sites near the equator, the poles, along coasts, and those reliant on glacier melt for water are likely to experience more weather volatility and the worst effects of climate change. In most of these cases, vulnerability is made worse by poverty, bad governance, and past conflict in societies already

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<sup>9</sup> Publications included reports from several U.S. think tanks: the CNA Corporation, a joint report from CNAS and CSIS, as well as a special report for the Council on Foreign Relations by this author (Busby 2007b; Campbell et al. 2007; CNA Corporation 2007). also (Busby 2007a; Busby 2007c; Busby 2008). Think tanks and institutes from Canada, the UK, and Germany also weighed in (Brown, Crawford, and Campeau 2008; Paskal 2007; WBGU 2007). Articles on the topic appeared in prominent journals like *Foreign Affairs*, *Survival*, and the *Washington Quarterly* (Borgerson 2008; Podesta and Ogden 2008).

<sup>10</sup> For a summary of this discussion, see (Busby 2008, forthcoming). On the association between rainfall volatility and violent conflict, see (Hendrix and Glaser 2007; Levy et al. 2005). On the correlation between disasters and conflict, see (Brancati 2007; Nel and Righarts 2008). On the association between refugees and conflict, see (Gleditsch, Nordås, and Salehyan 2007; Salehyan and Gleditsch 2006). For a more skeptical take on the links between climate and security, see (Salehyan 2008).

<sup>11</sup> (UN Security Council 2007).

<sup>12</sup> Droughts in the 1980s brought pastoralists and agriculturalists into conflict over grazing rights in Darfur. Most scientists would shy away from attributing a single incident to human-induced climate change, only that climate change would make events like this one more likely. Since the original drought dates back to the 1980s, it is unclear if anthropogenic climate change could be considered a contributing cause. See (Ki-Moon 2007). For a critical examination, see (de Waal 2007).

<sup>13</sup> (Solana 2008).

<sup>14</sup> In March 2007, Senators Richard J. Durbin (D-IL) and Chuck Hagel (R-NE) introduced a bill requesting a National Intelligence Estimate to assess whether and how climate change might pose a national security threat (Durbin 2007).

<sup>15</sup> (Fingar 2008).

riven by sectarian strife.<sup>16</sup> And for low-lying island nations, climate change poses an existential risk that may make them uninhabitable, requiring eventual resettlement of their populations.<sup>17</sup>

For practitioners, this emergent interest in climate and security potentially has two problems. First, most analyses focus their energies on causal connections and problem justification rather than on what should be done. This chapter does not attempt to re-argue the case that climate and security are legitimately linked. I begin with the assumption that the connection is credible.<sup>18</sup> We need to move beyond diagnosis to prescription and begin to identify the appropriate strategies and policies to minimize the adverse security consequences of climate change, particularly for the world's poor. However, understanding the nature of the climate-security challenge does have important policy implications. The existing discussion of climate and security has a second problem; it has largely focused on whether or not climate change will cause conflict. If practitioners focus on the climate→conflict connection, they may end up overlooking or minimizing more likely security consequences—large-scale disasters that create humanitarian emergencies for which military assets will be frequently mobilized unless there is significant investment in adaptation and risk reduction.

Mobilization for disaster relief is an increasingly familiar task for many modern militaries.<sup>19</sup> A world with more severe extreme weather, however, poses vexing challenges for continued military mobilization and the broader international community. At some level, the military's sustained engagement in disaster relief, whether at home or abroad, may divert a country's armed forces from essential security tasks elsewhere. Moreover, not all of these missions are welcomed by local populations, as the U.S. discovered to its dismay during Operation Restore Hope in Somalia. Where you have governments, as in Myanmar, unwilling or unable to respond as they should to disasters, international political friction is more likely, as outside governments and private actors seek to provide aid directly. Under these circumstances, some observers like the journalist Robert Kaplan have called for armed humanitarian relief or like France's foreign minister (and Doctor Without Borders cofounder) Bernard Kouchner, an extension of the responsibility to protect for disaster relief.<sup>20</sup> However, as former U.S. secretary of state Madeleine Albright argued in a June 2008 opinion piece, the political support for humanitarian intervention has suffered in recent years: "the notion of national sovereignty as sacred is gaining ground, helped in no small part by the disastrous results of the American invasion of Iraq."<sup>21</sup>

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<sup>16</sup> Many of these concerns were anticipated by (Purvis and Busby 2004).

<sup>17</sup> (Kelman 2006).

<sup>18</sup> For a more detailed assessment of these arguments, see (Busby 2008, forthcoming).

<sup>19</sup> The U.S. military, for example, provided relief in midst of the Somali famine of the early 1990s, after Hurricane Mitch devastated Central America in 1998, after the 2004 torrential rains and mudslides that struck Haiti and later that year in Asia after the tsunami, in the wake of Hurricanes Katrina and Rita in 2005 as well as the Pakistani earthquake of that same year, among other operations.

<sup>20</sup> Kouchner called on the United Nations to invoke the responsibility to protect after Myanmar's government failed to respond forcefully to the cyclone. The International Crisis Group's Gareth Evans, one of the main champions of the responsibility to protect (where countries would intercede to prevent genocide, crimes against humanity, or war crimes from occurring), initially rejected the extension of the "R2P" for post-disaster situations for fear it would undermine support for the idea. He later seemed to support the idea, seeing the Myanmar government's action as a crime against humanity (Erlanger 2008; Evans 2008).

<sup>21</sup> (Albright 2008).

What is more, aid workers themselves are increasingly becoming targets. In the first half of 2008, more than 20 aid workers were killed in Somalia in a deliberate campaign of intimidation, despite an on-going drought.<sup>22</sup> This is part of a larger trend of increased attacks and fatalities among aid workers, particularly among nongovernmental organization (NGO) workers (see Appendix A). In the context of potentially diminished enthusiasm for intervention and broader politicization of emergency aid, preventive strategies of risk reduction and enabling more localized resilient response become all the more important. While Myanmar represented an extreme situation given the outsized paranoia of the country's ruling elite, this episode demonstrated the poverty of a primarily military approach to disaster management. At the same time, Myanmar's experience showed the need for improved information collection and sharing, as well as better early warning and risk reduction systems and more robust protocols for international disaster assistance, even with pariah regimes. This chapter explores a variety of these potential mechanisms and policies so that the poor bear less of the brunt of half-hearted and partial reactive measures.

This chapter lays out what should be done in two steps. First, Part I provides a bit more context to the nature of the challenge, describing the impact of disasters and the actions that have been taken to reduce the risks of climate-related disasters. Part II then identifies what different actors should do to minimize the adverse security consequences of climate change, beginning with the international community, then regional organizations and national governments, before finally turning to the role of non-state actors, including philanthropies, NGOs, and businesses.

## THE EFFECTS OF DISASTERS

Between 1991 and 2005, nearly one million people were estimated to have lost their lives in natural disasters, with poor countries bearing the burden of almost 2/3 of those deaths (see Appendix B).<sup>23</sup> This was nearly the same number of people who died in battle, including civilians, during that same time period.<sup>24</sup> During this period, the number of people affected by disasters was far larger, nearly 3.5 billion, of which nearly 90 percent were in developing countries (see Appendix C). Floods, like those that have inundated Mozambique and parts of southern Africa in recent years, accounted for nearly 60 percent of those affected by disasters.<sup>25</sup> These numbers led one study to claim that far more people were affected by disasters each year than armed conflict.<sup>26</sup> Moreover, while total economic damages were larger in richer, developed countries, the effects on poor countries can be

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<sup>22</sup> (Gettleman 2008).

<sup>23</sup> (UN/ISDR 2008a).

<sup>24</sup> According to the Uppsala-PRIO battle deaths dataset, there were an estimated 1,069,579 battle deaths between 1991 and 2005. Definition. Battle deaths includes all people, soldiers and civilians, killed in combat. The dataset has a high, low, and "best" estimate of battle deaths, and the number here reflects the "best" estimate (Center for the Study of Civil War 2007).

<sup>25</sup> (UN/ISDR 2008b).

<sup>26</sup> Between 1990 and 1999, one report estimated that 188 million people per year were affected by natural disasters, six times more than the 31 million affected by armed conflict. The report defined "affected by natural disaster" as those people who for a time either lost their home, animals, their crops, their livelihoods or their health as a result of a natural disaster (UN/ISDR 2003).

especially devastating as a proportion of gross domestic product (GDP).<sup>27</sup> Moreover, foreign assistance typically lags far behind the losses from disasters.<sup>28</sup> Africa and Asia have borne a disproportionate share of the effects of disasters on human lives (see figure 1 below).<sup>29</sup>

While the number of people affected by natural disasters rose over the course of the 20<sup>th</sup> and early 21<sup>st</sup> century, the number of people killed by natural disasters declined during this period (see Appendices D & E).<sup>30</sup> In Africa, for example, reported deaths from disasters fell from 579,452 in the period 1983-1992 to 43,078 between 1993 and 2002.<sup>31</sup> So, while we are getting better at preventing people from dying, more people are having their lives disrupted by disasters. Declining disaster fatalities is a consequence of two related policy successes. On one level, actions to reduce risks—such as early warning systems and better building codes—have ensured that disasters kill fewer people. At the same time, more robust disaster response mechanisms both internationally and by affected governments and communities have reduced the number of people who subsequently die from starvation, thirst, injury, and disease. For example, as ill-prepared and botched the effort to protect the dikes in New Orleans in the lead up to Hurricane Katrina, fewer than 2,000 people died despite the dislocation of more than a million people.<sup>32</sup> Higher numbers of people affected by disasters may be a consequence of the rising number of reported hydrometeorological disasters (which may already or soon be made more likely as a consequence of climate change) (see Appendix F).

*Figure 1. Total Number of Deaths and of People Affected by Natural Disasters by 100,000 Inhabitants: 1974-2003*

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<sup>27</sup> The World Bank estimated that between 1990-2000, natural disasters resulted in damages constituting between 2 to 15 percent of exposed countries' annual (World Bank 2004).

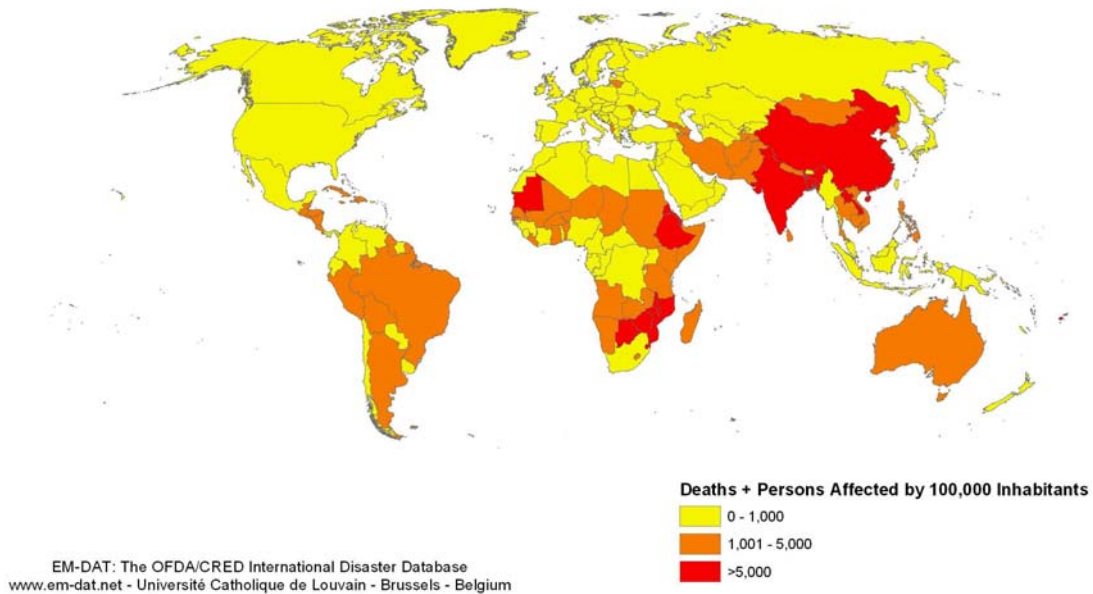
<sup>28</sup> In the period 1990-2004, disaster losses exceeded foreign assistance by a ratio of 4 to 1 (Warner 2007).

<sup>29</sup> (EM-DAT 2008d).

<sup>30</sup>This could be an artifact of better data collection (EM-DAT 2008b; EM-DAT 2008c).

<sup>31</sup> (Basher and Briceño 2005, 271).

<sup>32</sup> (EM-DAT 2008a; Grier 2005).



## CLIMATE RISK REDUCTION AND DEALING WITH DISASTERS

Sadly, some climate change is already inevitable so we have to prepare for some of the likely consequences, including swift-onset extreme weather events as well as more slow-moving disasters like droughts. When disasters exceed local civilian police, fire, and rescue capabilities, there are few options other than emergency military and humanitarian mobilization or leaving people to fend for themselves, as Myanmar largely did. If we focus our energies on disaster response (which is part of the equation), we have waited too long. People are dead, lives are disrupted, infrastructure is damaged, and communities can become desperate or resentful or both. Post-disaster environments are going to be the dangerous moments when mishandled or inadequate disaster response can give way to the kinds of lingering grievances that can motivate people to take up arms.

A modest investment in risk reduction and adaptation in poor countries will likely be much more cost-effective and security-enhancing than responding to humanitarian disasters through military and relief operations. One estimate from the U.S. Geological Survey and the World Bank suggested an investment of \$40 billion would have prevented worldwide disaster losses of \$280 billion in the 1990s. Between 1960 and 2000, the Chinese spent \$3.15 billion on flood control, and averted losses of an estimated \$12 billion.<sup>33</sup> Despite this favorable cost-benefit ratio, the world currently spends too little on adaptive strategies that would reduce climate risk and the risks of disasters. In 2006, for example, only 4 percent of the estimated \$10 billion in humanitarian assistance was spent on disaster prevention, even though each dollar spent on prevention could save between \$5 and \$10 dollars in economic losses from disasters.<sup>34</sup>

<sup>33</sup> (DFID 2005).

<sup>34</sup> (Schwartz 2006).

Why so little interest in risk reduction and adaptation? On one level, humans seem to be, though not always, a reactive species, waiting for crises to happen. With respect to adaptation (which involves such mundane measures as early warning systems, better building codes, coastal defenses, development of water resistant crops, and other efforts), it has been wrongly perceived as a competitor to mitigation. Supporters of a more robust climate policy have been unenthusiastic about adaptation because they fear it would signal that the world had given up on greenhouse gas emission reductions. While the world cannot adapt its way out of the climate problem (the consequences for most countries would ultimately be too severe), adapt we must. The anti-adaptation attitude has started to change, but unless the change is accelerated, the international community, regional organizations, and affected countries will be forced to expend greater effort later on, including calling upon military assets, to compensate for inadequate risk reduction and disaster response capabilities.

### *The International Community*

Even before the climate community had fully appreciated the connection between climate change and disasters, the international community, largely through the auspices of the United Nations, had already increasingly become engaged on the subject of disaster risk reduction. Since 2001 the UN's Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR) has coordinated between the UN system, regional and international organizations, governments, and non-state actors to reduce the risks posed by disasters. In January 2005, the Second World Conference on Disaster Reduction took place in Kobe, Japan. There, participants reviewed the 1994 Yokohama Strategy on natural disasters and established the Hyogo Framework for Action for the next decade. UN/ISDR's objective has been to "mainstream" disaster risk reduction into country-level planning efforts. Government agencies as diverse as finance, health, and housing all should be thinking about how disasters might effect their area of responsibility and how to incorporate risk reduction as a normal part of doing business. In recent years, the UN/ISDR agenda of disaster risk reduction has intersected with climate change, and the two communities have increasingly tried to sync their agendas.

Internationally, however, there are scant funds for adaptation or disaster risk reduction. Estimates of poor countries' needs for adaptation run in to the billions of dollars—the UNDP's 2007/2008 Human Development Report estimated that \$86 billion per year would be needed by 2015 for pro-poor adaptation.<sup>35</sup> As of 2008, the level of resources available for adaptation was but in the hundreds of millions (see comparison figures 2 and 3 below).

*Figure 2. Poor Country Adaptation Needs by 2015 (2005 dollars)*

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<sup>35</sup> Of that \$86 billion, \$44 billion would be required to climate proof new investment, \$40 billion would be required for adapting poverty reduction strategies for climate change, and \$2 billion would be needed to additional disaster response (Watkins 2007).

**Table 4 Investing in adaptation up to 2015**

Estimated donor country cost	Estimated cost	
	% of OECD GDP	US\$ billion
	2015	2015
Climate-proofing development investment	0.1	44
Adapting poverty reduction to climate change	0.1	40
Strengthening disaster response	(.)	2
<b>Total</b>	<b>0.2</b>	<b>86</b>

Source: HDRO estimates based on GDP projections from World Bank 2007d.

Figure 3. Multilateral Resources for Adaptation, 2007

**Table 3 The multilateral adaptation financing account**

Adaptation fund	Total pledged (US\$ million)	Total received (US\$ million)	Total disbursed (less fees) (US\$ million)
Least Developed Countries Fund	156.7	52.1	9.8
Special Climate Change Fund	67.3	53.3	1.4
Adaptation Fund	5	5	-
<b>Sub-total</b>	<b>229</b>	<b>110.4</b>	<b>11.2</b>
Strategic Priority on Adaptation	50	50	14.8 <sup>a</sup>
<b>Total</b>	<b>279</b>	<b>160.4</b>	<b>26</b>

a. Includes fees.

Note: data are as of 30th April 2007.

Source: GEF 2007a, 2007b, 2007c.

The World Bank’s Global Environment Facility (GEF) administers three adaptation-related funds for developing countries including the Special Climate Change Fund (SCCF), the Least Developed Country Fund (LDCF), and a newer Adaptation Fund linked to the Clean Development Mechanism. Together, pledges to GEF adaptation programs cumulatively amount to slightly more than \$250 million.<sup>36</sup> The December 2007 climate negotiations in Bali made the GEF the trustee of the new Adaptation Fund, with funding derived from a portion of the proceeds from Clean Development Mechanism (CDM) projects.<sup>37</sup> The value of those credits was estimated to be worth between \$80 million and \$300 million a year from 2008 to 2012.<sup>38</sup> Though the United States is a donor to the GEF, it has not contributed to either existing adaptation fund, nor has it, as a non-party to the Kyoto Protocol, contributed to the new Adaptation Fund.

Coming out of the 2005 international conference on disaster reduction in Japan, a new trust fund, the Global Facility for Disaster Reduction and Recovery (GFDRR), was created in 2006 as a partnership between the World Bank and UN/ISDR to support disaster

<sup>36</sup> As of March 2008, for example, the LDCF had pledges totaling \$172.84 million and the SCCF had pledges of \$90.3 million. Another \$50 million was available for the Strategic Priority on Adaptation under the GEF Trust Fund. Another adaptation fund is to be financed from proceeds from the Clean Development Mechanism projects (GEF 2008). See also (GEF 2005).

<sup>37</sup> Two percent of the Certified Emission Reduction (CER) from the CDM are dedicated to the Adaptation Fund.

<sup>38</sup> (UNFCCC 2007).

risk reduction and response. As of June 2008, it had received modest contributions of \$78 million, including \$15 million of the Bank's own resources. Again, the United States, as of this writing, has not contributed anything.<sup>39</sup> One of the highest priority areas for the GFDRR is to support more detailed vulnerability assessments, not just which countries are the most vulnerable to disasters but the sub-regions that are also subject to disaster risk. Such efforts will almost surely improve the "guesstimates" of the likely costs of adaptation. An important preliminary effort was developed by Columbia University, which identified more than 80 disaster hot spots where more than 30 percent of the country's GDP was at risk to two more or natural disasters.<sup>40</sup> The GFDRR has targeted these hot spot countries to support incorporation of disaster risk reduction into national planning.

A key difficulty for many poor countries is the lack of capacity and information on disaster risks, including tracking basic meteorological information. While rich countries like the UK and the Netherlands have 6 or more meteorological stations per 10,000 square kilometers, many African countries are lucky if they have one. Ethiopia's meteorological budget was but \$2 million in 2005.<sup>41</sup> Malawi's was less than \$1 million. Their meteorologists described their meager set-up as follows: "Broken equipment, outmoded technology, slipshod data and a sparse scattering of weather stations are all that his national agency can manage on a \$160,000 budget."<sup>42</sup> Outside support coupled with concerted and creative local effort can partially overcome these obstacles. Mali's government, for example, successfully used simple rain gauges to collect better data on rainfall and worked with local farmer's organizations and NGOs to disseminate that information to improve agricultural planning.<sup>43</sup>

Given that tens of billions of dollars in additional resources will soon be needed for adaptation, what should be done to facilitate larger sums of international assistance? While adaptation was a high priority item at the Bali conference of parties (COP) in December 2007, the world has been in something of a holding pattern waiting for the George W. Bush administration to wind down. In 2009, with a new U.S. president, there will be high expectations that the Copenhagen COP will provide critical guidance on the future of the climate regime, including adaptation. Two related problems appear likely. Given the GEF's undistinguished track record in transferring large amounts of resources (and unpopularity with developing countries), it is unclear that the GEF can be the sole conduit for adaptation funds. As in HIV/AIDS, donor countries will likely wish to channel a significant portion of funding through bilateral relationships. However, similar to other areas of development assistance, these will likely be subject to significant limits of absorptive capacity among recipient countries. This could become yet another area in which developing countries seek unrealistic sums of resources that donors are not prepared to give and poor countries are not prepared to receive.

On the giving side, linking funding for adaptation to CDM credits will likely create a more reliable stream of support than sums subject to annual foreign aid appropriations. When the United States adopts a domestic cap and trade system, it should reserve a portion

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<sup>39</sup> (GFDRR 2008).

<sup>40</sup> (Dilley et al. 2005; GFDRR 2007).

<sup>41</sup> (Watkins 2007, 173-174).

<sup>42</sup> (Revkin 2007).

<sup>43</sup> (Watkins 2007, 173-174).

of the funds generated from allowances for both domestic and international adaptation. Other donors and developing countries should use whatever diplomatic leverage they can to entreat and shame the United States into making that kind of dependable funding stream available. A determined President Obama or McCain may have already secured the U.S. Congress's blessing for a cap-and-trade scheme by the latter part of 2009. In that instance, the 2009 Copenhagen COP must include discussion of how American companies can potentially participate in the CDM going forward, if the U.S. becomes a party to the post-2012 regime. Breakthroughs on U.S. eventual participation in the CDM would provide another stream of revenue for adaptation.

Aid absorption will still be a significant problem even if these funds are made available. Channeling all the resources through traditional aid mechanisms would likely end in tears, either in disappointingly slow or low-level scale-up of activities and a fair amount of aid diversion, either by tied aid to Western companies or by corrupt governments. To guard against these problems, donors ought to focus on how to link adaptation finance to private sector and large-scale public investments in developing countries, particularly but not exclusively to climate-proof new infrastructure investments. These measures should be accompanied by transparency mechanisms so mass publics can follow the funds through the system. In addition, the World Bank, the World Food Programme, and the GFDRR have experimented with supporting the development of insurance markets in poor countries, helping countries like Ethiopia and Haiti and farmers in the Mekong Delta purchase insurance.<sup>44</sup> It is unclear if insurers will ultimately balk at providing these services to poor countries vulnerable to increasing weather events. That said, donors should continue to experiment with such insurance schemes. As the UNDP noted, conditional cash transfers could be linked up to a greater degree with climate disasters. In this setting, people living in vulnerable areas or already affected by disasters might receive assistance if they engage in some other socially desirable activity, either ones related to disaster risk reduction or some more distant issue such as inoculating their children.<sup>45</sup>

While recognizing that risk reduction must be the main focus to minimize the negative security externalities of climate change, there will inevitably be some disasters that are too large to be completely contained by early action. Warning systems and vulnerability assessments will help policymakers identify the places most susceptible to climate risks. However, environmental vulnerability is but a part of total vulnerability. In 2004, the scholar Nigel Purvis and I recommended that, "The emerging early warning systems in the disaster reduction community must take political indicators of vulnerability, such as the repressive nature of political regimes and other governance factors, more fully into account."<sup>46</sup> Scholars at Columbia University provided an important first cut at that kind of analysis as an input into the National Intelligence Council's assessment on the security risks of climate change for the United States. In a July 2008 working paper, the Columbia team looked at three measures of environmental vulnerability: (1) the size and percent 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 scarcity. They intersected that analysis with countries vulnerable to political risk, looking at three criteria: (1) whether the countries were located in dangerous neighborhoods; (2) those that had a history of crisis; and (3) those

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<sup>44</sup> (Lacey 2006).

<sup>45</sup> (Watkins 2007, 173-174).

<sup>46</sup> (Purvis and Busby 2004).

that had low capacity. Interestingly, countries with high risk factors for instability and coastal vulnerability were largely located in Asia including China, India, the Philippines, and Indonesia, while many of the countries with low adaptive capacity subject to aggregate temperature increases were located in North Africa, including Morocco, Tunisia, and Sudan. Many of the countries subject to water scarcity and political risk were located in Africa, including Mozambique, Nigeria, and Ethiopia (see Appendix G for a more complete list). This research will benefit from refinement, but in the meantime, disaster-risk donors and national security experts at a minimum should pay special attention to the countries that fall in this cohort of environmental and political risk.<sup>47</sup>

#### *Regional and National Action on Risk Reduction and Response*

While mobilization of enhanced resources for adaptation and evaluation of climate risk by the international community are critical, regional organizations and action can help facilitate more effective risk reduction and response. While neighbors may sometimes be on unfriendly terms, regional allies and organizations are often perceived as less threatening than the international community or Western countries. While it might be tempting for the United Nations to discuss extending the responsibility to protect for disaster response, further politicization of humanitarian relief would probably be counter-productive and make the Red Cross and other NGO providers fatter targets for violent reprisals. More effective action might be taken at a regional level by identifying at-risk countries and seeking more technocratic treatment of disaster preparedness and response. In the wake of cyclone Nargis, for example, the Thai government has offered to help establish an early warning system in Myanmar.<sup>48</sup>

Many disaster risks extend beyond borders or have the potential for negative spillover effects, giving regional partners an added incentive to help their neighbors. Given the proximity between Bangladesh and India, and Bangladesh's history of coastal flooding and refugee movements, both countries have a stake in improving Bangladesh's disaster preparedness. Since nearly half of Bangladesh's population lives within ten meters of sea level, the situation may not be easily soluble and could lead to tension between the two countries, as has already occurred as India has built a border fence.<sup>49</sup> That said, one way countries can at least reduce the potential for conflict is through joint disaster training exercises. In the wake of the Myanmar cyclone and China's earthquake, the Chinese and American militaries, for example, plan to conduct joint humanitarian relief training missions in 2009.<sup>50</sup> In the 1990s, the U.S. Department of Defense also organized a number of trust-building environmental security workshops in Central Asia, the Middle East, and Africa. As it implements its new strategic Africa Command, the United States military would be well-advised to resurrect those training workshops with a special emphasis on training African militaries for disaster preparedness.<sup>51</sup>

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<sup>47</sup> (Levy et al. 2008).

<sup>48</sup> (Xinhua News Agency 2008).

<sup>49</sup> (Buerk 2006; IIED 2007).

<sup>50</sup> (Reuters 2008b).

<sup>51</sup> Elsewhere, I have explored how the United States should incorporate climate risk strategies as part of a broader Disaster Risk Reduction Pool, modeled on a similar initiative by the British government (Busby 2007b).

*Risk Reduction and the Role of Non-State Actors*

Security issues are typically viewed through a state-centric lens, but non-state actors—NGOs, businesses, and private philanthropy—all have a hugely important role in facilitating disaster risk reduction and resilient response at all levels, from the local community, to the nation-state, to the regional level, and beyond. NGOs are among the most important service providers of relief. Space forbids a comprehensive review of this sector, but one institution in particular has a special role to play in this area, and that is the Bill & Melinda Gates Foundation.

The Gates Foundation has thus far largely resisted pressure from Al Gore, Jeff Sachs, and others to embrace a widened issue focus on climate change, but it should rethink that resistance. Every natural disaster potentially undoes much, if not, all of the Gates Foundation's good work in public health and development. The foundation would benefit from a more robust climate adaptation emphasis in both its development and health shops. While climate mitigation may not be an area in which the foundation has a comparative knowledge advantage, adaptation is a closer fit with its expertise and mission. The foundation already has made a few grants to support adaptation measures, including research into drought-tolerant maize in Africa, as well as several grants to NGOs providing disaster relief.<sup>52</sup> Moreover, the foundation, with its legal imperative of distributing 5 percent of its annual endowment including the influx of Warren Buffett's donation, will need to give away more than \$3.5bn per year, an especially tall order.<sup>53</sup> The foundation may well need new sectors that can absorb large amounts of resources. Finally, the Gates Foundation is now the outsized player in the foundation world, the largest in the United States and by some measures in the entire world.<sup>54</sup> While governments still possess greater resources to dedicate to global causes, the Gates Foundation has the capacity to lead by example, both signaling to other donors, including governments, where good bets are. The Gates Foundation, for example, was one of the early champions of the Global Fund, pledging \$100 million in 2001 to help legitimate and get it off the ground.<sup>55</sup> With the World Bank's adaptation and disaster funds lagging in visibility and resources, a Gates Foundation grant of significant size could challenge the public sector, particularly in the United States under a new president, to match and exceed that effort.

Among the efforts the private sector, including but not limited to the Gates Foundation, can take to enhance the adaptation agenda are supporting local community groups in their efforts to communicate disaster risks more effectively. The GDFRR, for example, has supported innovative efforts such as television programs highlighting disaster risks. Patrick Meier has written about the capacity for local viral self-organizing efforts by communities to protect themselves from and respond to disasters. He writes of non-violent guerrilla communication strategies, taking advantage of the latest in cell phone and satellite technology, even in places like Myanmar.<sup>56</sup> Indeed, as David Rieff has pointed out, the

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<sup>52</sup> (Bill and Melinda Gates Foundation 2008).

<sup>53</sup> (Bill and Melinda Gates Foundation Undated).

<sup>54</sup> (O'Brien and Saul 2006).

<sup>55</sup> Between 2001-2008, the Gates Foundation contributed \$450 million to the Global Fund which has received more than \$10.5 billion in contributions overall (Global Fund 2008).

<sup>56</sup> (Meier 2008).

Burmese people's capacity for self-help prevented the worst fears of the NGO community from actually being realized.<sup>57</sup> While formal systems of disaster preparedness are important, donors may profit from more diffuse efforts to support community organization, disaster consciousness, and communication technologies that will lead to unexpected capacities by vulnerable communities to get the word out and protect themselves.<sup>58</sup> Businesses have a fiduciary imperative to protect themselves and should begin to internalize climate risks in all aspects of their investment strategies. Lest they be deterred from investing in countries with potential climate risk, the public sector may need to incorporate additional support for disaster risks in export credit guarantee programs.

## CONCLUSION

This chapter has focused on a piece of the climate security connection, emphasizing the importance of preventive disaster risk reduction as a means of avoiding (or at least reducing the incidence of) costly mobilization of military assets for humanitarian relief. The operating assumption was that climate change would more likely yield this sort of security externality than it would contribute to the increased incidence of violent conflict. That said, if the emergent academic discussion of the links between likely climate consequences and conflict is right, then the strategies discussed here should also make an important contribution to conflict prevention. This has enormous significance for the poor who already are likely to bear the brunt of climate change. As Paul Collier found in his research for *The Bottom Billion*, one of the best predictors of poverty is past incidence of conflict.<sup>59</sup> Therefore, strategies that are designed to reduce the potential for conflict will also redound upon a country's capacity for becoming wealthy. In this context, adaptation and risk reduction will not only insulate poor countries and communities from the direct impact of climate on lives and livelihoods, but the indirect impact on their long-term well-being and security.

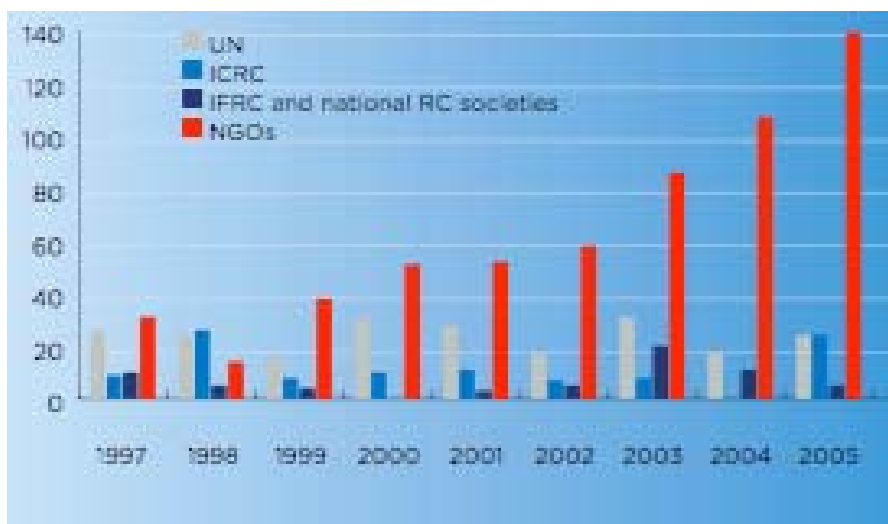
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<sup>57</sup> (Rieff 2008).

<sup>58</sup> (Glantz 2004).

<sup>59</sup> (Collier 2007).

**APPENDIX A: TRENDS IN TOTAL NUMBERS OF VICTIMS BY INSTITUTION, 1997-2005<sup>60</sup>**



**APPENDIX B: NUMBER OF NATURAL DISASTER FATALITIES, 1991-2005<sup>61</sup>**

	Flood	Wind storm	Drought*	Slide	Earthquake & tsunami	Volcanic eruption	Epidemic	Total
OECD	2150	5430	47516	426	5910	44	442	61918
CEE+CIS	2635	512	3109	1176	2412	0	568	10412
Developing countries	97061	65258	12599	9369	397303	900	47616	630106
Least developed countries	20127	149517	3320	1739	9247	201	70588	254739
Countries not classified	99	767	57	23	2277	0	104	3327
<b>Total</b>	<b>122072</b>	<b>221484</b>	<b>66601</b>	<b>12733</b>	<b>417149</b>	<b>1145</b>	<b>119318</b>	<b>960502</b>

\*: Drought related disasters category includes extreme temperatures

**APPENDIX C: NUMBER OF PEOPLE AFFECTED BY NATURAL DISASTERS, 1991-2005<sup>62</sup>**

	Flood	Wind storm	Drought*	Slide	Earthquake & tsunami	Volcanic eruption	Epidemic	Insect infestation	Total
OECD	3 680 209	14 565 498	18 004 502	12 482	921 522	78 420	461 219	0	37 723 852
CEE+CIS	8 823 124	4 051 295	11 416 841	71 801	1 285 530	0	199 632	0	25 848 223
Developing countries	1 858 951 169	382 712 627	736 645 786	2 630 620	43 198 839	2 127 117	9 387 233	2 200	3 035 655 591
Least developed countries	142 590 313	34 724 961	183 930 893	291 063	739 085	410 406	5 987 090	0	368 673 811
Countries not classified	398 961	891 082	607 940	511	111 527	0	251 463	0	2 261 484
<b>Total</b>	<b>2 014 443 776</b>	<b>436 945 463</b>	<b>950 605 962</b>	<b>3 006 477</b>	<b>46 256 503</b>	<b>2 615 943</b>	<b>16 286 637</b>	<b>2 200</b>	<b>3 470 162 961</b>

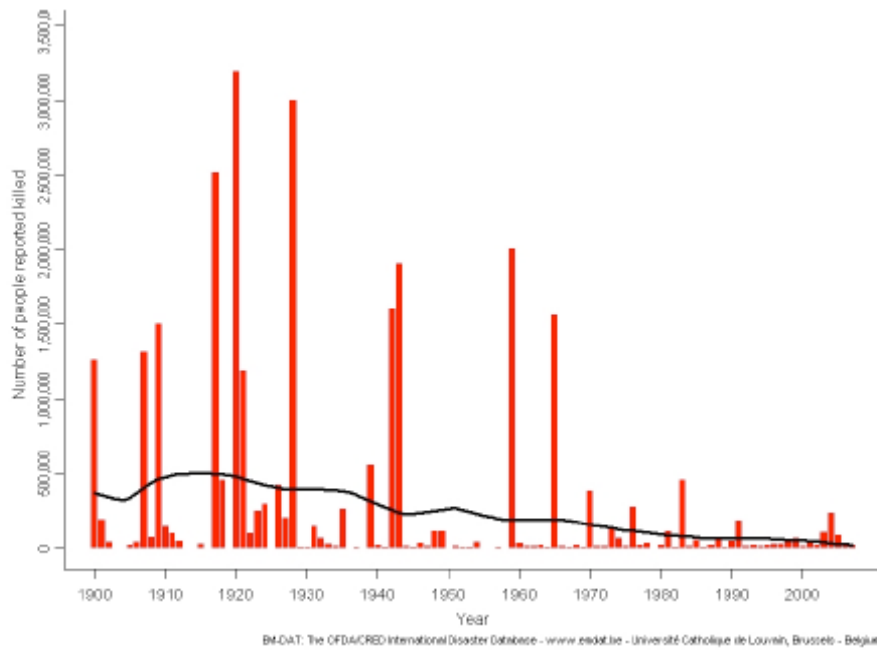
\*: Drought related disasters category includes extreme temperature

<sup>60</sup> (Stoddard, Harmer, and Haver 2006).

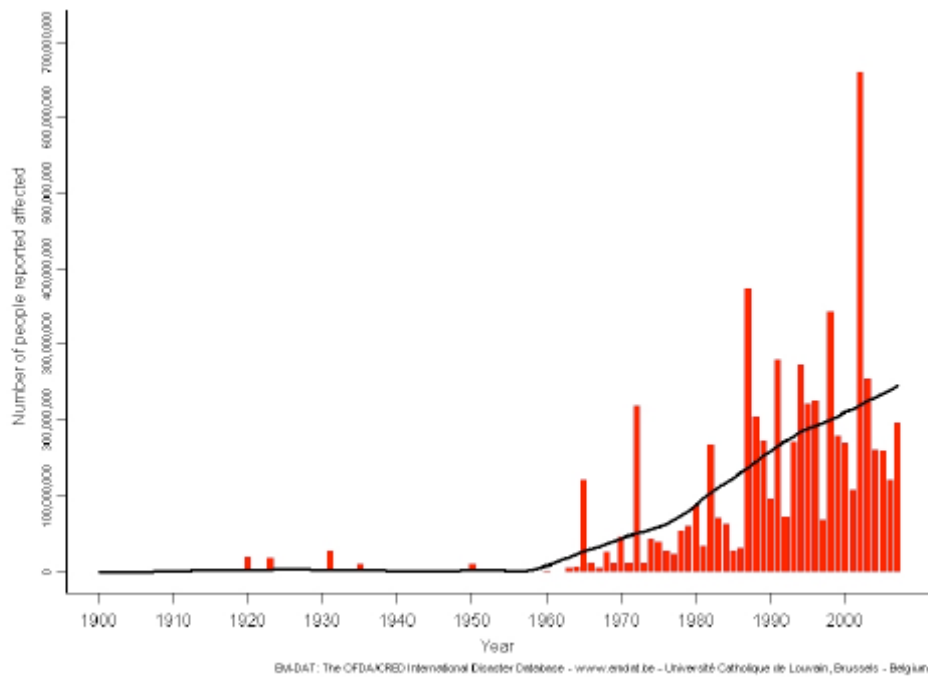
<sup>61</sup> (UN/ISDR 2008a).

<sup>62</sup> (UN/ISDR 2008b).

**APPENDIX D: NUMBER OF PEOPLE REPORTED KILLED BY NATURAL DISASTERS 1900-2007**<sup>63</sup>



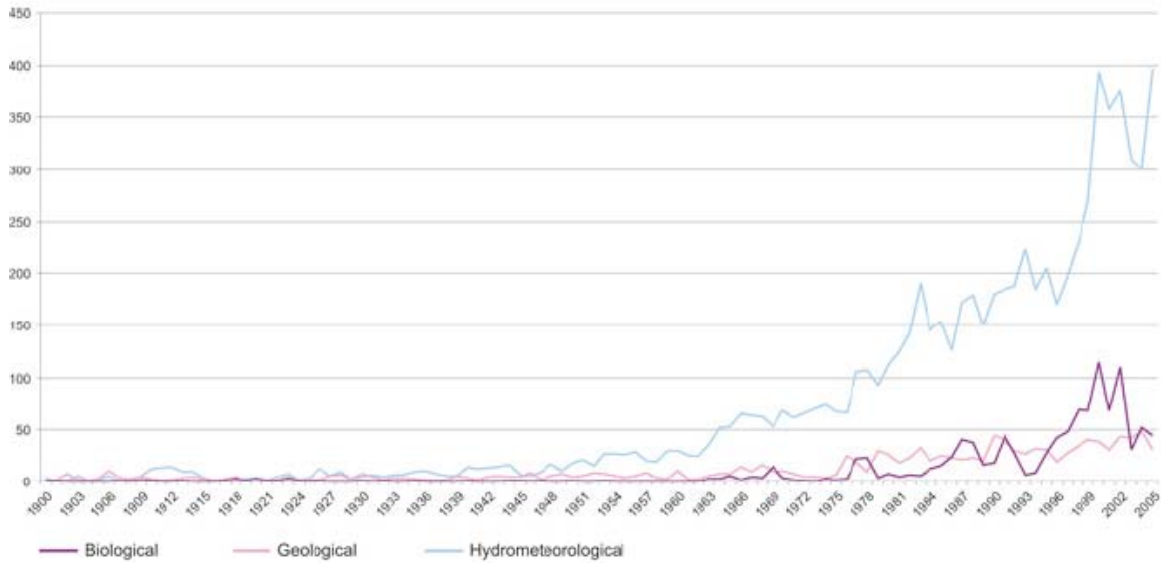
**APPENDIX E: NUMBER OF PEOPLE REPORTED AFFECTED BY NATURAL DISASTERS 1900-2007**<sup>64</sup>



<sup>63</sup> (EM-DAT 2008c).

<sup>64</sup> (EM-DAT 2008b).

**APPENDIX F: THE NUMBER OF NATURAL DISASTERS, 1900-2007<sup>65</sup>**



**APPENDIX G: LIST OF COUNTRIES MOST VULNERABLE TO CLIMATE AND POLITICAL RISK<sup>66</sup>**

Coastal Population Exposure		Aggregate Temperature Changes	Water Scarcity
Population Exposed	% of Population		
China Philippines India Indonesia	Philippines Egypt Indonesia	South Africa, Nepal, Morocco, Bangladesh, Tunisia, Paraguay, Yemen, Sudan, and Cote d'Ivoire	Mozambique, Cote d'Ivoire, Nigeria, Iraq, Guatemala, Zimbabwe, Ethiopia, Somalia, China, Syria, and Algeria

<sup>65</sup> (UN/ISDR 2008c).

<sup>66</sup> (Levy et al. 2008).

## BIBLIOGRAPHY

- Albright, Madeleine. 2008. *The End of Intervention* New York Times, June 11 2008 [cited July 18 2008]. Available from <http://www.nytimes.com/2008/06/11/opinion/11albright.html>.
- AP. 2008. *UNICEF: Burma cyclone recovery proceeding well* USA Today, July 7 2008 [cited July 18 2008]. Available from [http://www.usatoday.com/news/world/2008-07-07-Burma-recovery\\_N.htm](http://www.usatoday.com/news/world/2008-07-07-Burma-recovery_N.htm).
- Basher, Reid, and Sálvano Briceño. 2005. Climate and disaster risk reduction in Africa. In *Climate Change and Africa*, edited by P. S. Low. Cambridge: Cambridge University Press.
- Bill and Melinda Gates Foundation. 2008. *Global Development Grants* Gates Foundation, March 2008 [cited July 20 2008]. Available from <http://www.gatesfoundation.org/GlobalDevelopment/Grants/default.htm?yearFrom=2008&yearTo=2008&startPage=1&recordsPerPage=20&SortBy=RANK&SortOrder=descending&SortType=number>.
- Bill and Melinda Gates Foundation. 2008. *Implementing Warren Buffett's Gift* Gates Foundation, Undated [cited July 20 2008]. Available from <http://www.gatesfoundation.org/AboutUs/RelatedInfo/Buffett.htm>.
- Borgerson, Scott. 2008. *Arctic Meltdown* Foreign Affairs, March/April 2008 [cited July 18 2008]. Available from <http://www.foreignaffairs.org/20080301faessay87206/scott-g-borgerson/arctic-meltdown.html>.
- Brancati, Dawn. 2007. Political Aftershocks: The Impact of Earthquakes on Intrastate Conflict. *The Journal of Conflict Resolution* 51 (5):715-743.
- Brown, Oli, Alec Crawford, and Christine Campeau. 2008. *Environmental Change and the New Security Agenda: Implications for Canada's Security and the Environment* International Institute for Sustainable Development, June 2008 [cited July 18 2008]. Available from [http://www.iisd.org/pdf/2008/env\\_change\\_security\\_canada.pdf](http://www.iisd.org/pdf/2008/env_change_security_canada.pdf).
- Buerk, Roland. 2008. *Villagers left in limbo by border fence* BBC, January 28 2006 [cited July 20 2008]. Available from [http://news.bbc.co.uk/2/hi/programmes/from\\_our\\_own\\_correspondent/4653810.stm](http://news.bbc.co.uk/2/hi/programmes/from_our_own_correspondent/4653810.stm).
- Busby, Josh. *Addressing the Security Consequences of Climate Change* Atlantic Community.org, September 3 2007a [cited]. Available from [http://www.atlantic-community.org/index/articles/view/Addressing\\_the\\_Security\\_Consequences\\_of\\_Climate\\_Change](http://www.atlantic-community.org/index/articles/view/Addressing_the_Security_Consequences_of_Climate_Change).
- Busby, Josh. *Climate Change and National Security: An Agenda for Action* Council on Foreign Relations, 2007b [cited]. Available from [www.cfr.org/publication/14862](http://www.cfr.org/publication/14862).
- Busby, Josh. 2007c. Climate Change and Security: A Credible Connection? *Disarmament Times* (Fall):2-3, 8.
- Busby, Joshua. 2008. Under What Conditions Could Climate Change Pose a Threat to U.S. National Security? In *Global Climate Change: National Security Implications*, edited by C. Pumphrey. Durham, NC: Triangle Institute for Security Studies.
- Busby, Joshua. 2008, forthcoming. Who Cares About the Weather? Climate Change and U.S. National Security Studies. *Security Studies*.
- Campbell, Kurt M., Jay Gullede, J.R. McNeill, John Podesta, Peter Ogden, Leon Fuerth, R. James Woolsey, Alexander T.J. Lennon, Julianne Smith, Richard Weitz, and Derek Mix. *The Age of Consequences* CSIS/CNAS, November 2007 [cited]. Available from [http://www.csis.org/media/csis/pubs/071105\\_ageofconsequences.pdf](http://www.csis.org/media/csis/pubs/071105_ageofconsequences.pdf).

- Center for the Study of Civil War. 2008. *Battle Deaths Data* International Peace Research Institute, Oslo (PRIO), 2007 [cited July 20 2008]. Available from <http://www.prio.no/CSCW/Datasets/Armed-Conflict/Battle-Deaths/>.
- CNA Corporation. 2007. *National Security and the Threat of Climate Change* 2007 [cited July 8 2007]. Available from <http://securityandclimate.cna.org/report/>.
- Collier, Paul. 2007. *The bottom billion: why the poorest countries are failing and what can be done about it*. Oxford; New York: Oxford University Press.
- de Waal, Alex. 2007. *Is Climate Change the Culprit for Darfur?* SSRC, June 25 2007 [cited July 8 2007]. Available from <http://www.ssrc.org/blog/2007/06/25/is-climate-change-the-culprit-for-darfur/>.
- DFID. 2008. *Natural Disaster and Disaster Risk Reduction Measures* DFID, December 5 2005 [cited July 20 2008]. Available from <http://www.dfid.gov.uk/pubs/files/disaster-risk-reduction-study.pdf>.
- Dilley, Maxx, Robert S. Chen, Uwe Deichmann, Arthur L. Lerner-Lam, Margaret Arnold, Jonathan Agwe, Piet Buys, Oddvar Kjekstad, Bradfield Lyon, and Gregory Yetman. 2008. *Natural Disaster Hotspots: A Global Risk Analysis* World Bank and Columbia University, March 2005 [cited July 20 2008]. Available from <http://sedac.ciesin.columbia.edu/hazards/hotspots/synthesisreport.pdf>.
- Durbin, Dick. 2007. *Statement of Introduced Bills and Joint Resolutions*. April 1 2007 [cited July 8 2007]. Available from [http://www.fas.org/irp/congress/2007\\_cr/s1018.html](http://www.fas.org/irp/congress/2007_cr/s1018.html).
- EM-DAT. 2008. *The OFDA/CRED International Disaster Database*: Universite Catholique de Louvain, 2008a [cited July 20 2008]. Available from <http://www.emdat.be/Database/terms.html>.
- EM-DAT. 2008. *The OFDA/CRED International Disaster Database: Number of People Reported KAffected by Natural Disasters, 1900-2007* Universite Catholique de Louvain, 2008b [cited July 20 2008]. Available from [http://www.emdat.be/Database/Trends/Trends\\_IMAGES/Natural/affyr1.jpg](http://www.emdat.be/Database/Trends/Trends_IMAGES/Natural/affyr1.jpg).
- EM-DAT. 2008. *The OFDA/CRED International Disaster Database: Number of People Reported Killed by Natural Disasters, 1900-2007* Universite Catholique de Louvain, 2008c [cited July 20 2008]. Available from [http://www.emdat.be/Database/Trends/Trends\\_IMAGES/Natural/kilyr1.jpg](http://www.emdat.be/Database/Trends/Trends_IMAGES/Natural/kilyr1.jpg).
- EM-DAT. 2008. *The OFDA/CRED International Disaster Database: Total Deaths and People Affected by Natural Disasters* Universite Catholique de Louvain, 2008d [cited July 20 2008]. Available from [http://www.emdat.be/Database/Maps/WorldMap/worldmap\\_09.html](http://www.emdat.be/Database/Maps/WorldMap/worldmap_09.html).
- Erlanger, Steven. 2008. *France urges UN to force cyclone aid on Myanmar* International Herald Tribune, May 7 2008 [cited July 18 2008]. Available from <http://www.ihl.com/articles/2008/05/07/europe/cyclone.php>.
- Evans, Gareth. 2008. *Burma/Myanmar: "Facing Up to Our Responsibilities"*, Gareth Evans in *The Guardian* International Crisis Group, May 12 2008 [cited July 18 2008]. Available from <http://www.crisisgroup.org/home/index.cfm?id=5430>.
- Fingar, Thomas. 2008. *National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030* Director of National Intelligence, June 25 2008 [cited July 18 2008]. Available from [http://www.dni.gov/testimonies/20080625\\_testimony.pdf](http://www.dni.gov/testimonies/20080625_testimony.pdf).
- GEF. 2008. *GEF Support for Adaptation to Climate Change* Global Environment Facility, November 2005 [cited July 20 2008]. Available from [http://www.gefweb.org/projects/focal\\_areas/climate/documents/GEF\\_Support\\_for\\_Adaptation\\_to\\_Climate\\_Change.pdf](http://www.gefweb.org/projects/focal_areas/climate/documents/GEF_Support_for_Adaptation_to_Climate_Change.pdf).

GEF. 2008. *Status Report on the Climate Change Funds as of March 4, 2008* Global Environment Facility, March 20 2008 [cited July 20 2008]. Available from [http://www.thegef.org/uploadedFiles/Documents/LDCFSCCF\\_Council\\_Documents/LDCFSCCF4\\_April\\_2008/LDCF.SCCF.4.Inf.2%20Trustee%20Status%20Report%2003.21.08.pdf](http://www.thegef.org/uploadedFiles/Documents/LDCFSCCF_Council_Documents/LDCFSCCF4_April_2008/LDCF.SCCF.4.Inf.2%20Trustee%20Status%20Report%2003.21.08.pdf).

Gettleman, Jeffrey. 2008. *Somali Killings of Aid Workers Imperil Relief* New York Times, July 20 2008 [cited July 20 2008]. Available from <http://www.nytimes.com/2008/07/20/world/africa/20somalia.html?hp>.

GFDRR. 2008. *Integrating Disaster Risk Reduction into the Fight Against Poverty: Annual Report 2007* World Bank and ISDR, 2007 [cited July 20 2008]. Available from <http://gfdrr.org/docs/GFDRR%20Annual%20Report%2007%20FINAL.pdf>.

GFDRR. 2008. *Global Facility for Disaster Reduction and Recovery: Donor Pledges and Contributions* GFDRR, June 8 2008 [cited July 20 2008]. Available from <http://siteresources.worldbank.org/EXTDISMGMT/Resources/GFDRRDonorPledgesandContributionsJun08.pdf>.

Glantz, Michael H. 2008. *Usable Science 8: Early Warning Systems: Do's and Don'ts* National Center for Atmospheric Research, February 6 2004 [cited July 20 2008]. Available from <http://www.ccb.ucar.edu/warning/report.pdf>.

Gleditsch, Nils Petter, Ragnhild Nordås, and Idean Salehyan. 2008. *Climate Change and Conflict: The Migration Link* International Peace Academy, May 25 2007 [cited May 2008]. Available from <http://www.ipacademy.org/our-work/coping-with-crisis/working-papers>.

Global Fund. 2008. *Pledges and Contributions* July 16 2008 [cited July 20 2008]. Available from [http://www.theglobalfund.org/en/funds\\_raised/pledges/](http://www.theglobalfund.org/en/funds_raised/pledges/).

Grier, Peter. 2008. *The Great Katrina Migration* Christian Science Monitor, September 12 2005 [cited July 20 2008]. Available from <http://www.csmonitor.com/2005/0912/p01s01-ussc.html>.

Hendrix, Cullen S., and Sarah M. Glaser. 2007. Trends and Triggers: Climate Change and Civil Conflict in Sub-Saharan Africa. *Political Geography* 26 (6):695-715.

IIED. 2008. *Climate change: study maps those at greatest risk from cyclones and rising seas* International Institute for Environment and Development, March 28 2007 [cited July 20 2008]. Available from <http://www.iied.org/mediaroom/releases/070328coastal.html>.

IPCC. 2007. *Fourth Assessment Report -- Climate Change 2007: The Physical Science Basis* February 5 2007 [cited July 8 2007]. Available from <http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>.

Kaplan, Robert D. 2008. *Aid at the Point of a Gun* New York Times, May 14 2008 [cited July 18 2008]. Available from <http://www.nytimes.com/2008/05/14/opinion/14kaplan.html>.

Kellerhaus Jr., Merle D. 2008. *U.S. Navy Ships to Begin Withdrawing from Burma Coast June 5* America.gov, June 4 2008 [cited July 18 2008]. Available from <http://www.america.gov/st/peacesec-english/2008/June/20080604110925dmslahrellek0.9681665.html>.

Kelman, Ilan. 2006. Island Security and Disaster Diplomacy in the Context of Climate Change. *Les Cahiers de la Sécurité* 63:61-94.

Ki-Moon, Ban. *A Climate Culprit in Darfur* June 16 2007 [cited. Available from [http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857\\_pf.html](http://www.washingtonpost.com/wp-dyn/content/article/2007/06/15/AR2007061501857_pf.html).

Lacey, Mark. 2008. *Aid Group Takes Out Insurance on Drought in Ethiopia* New York Times, March 7 2006 [cited July 20 2008]. Available from <http://www.nytimes.com/2006/03/07/international/africa/07cnd-ethiopia.html>.

Levy, Marc A., Bridget Anderson, Melanie Brickman, Chris Cromer, Brian Falk, Balazs Fekete, Pamela Green, Malanding Jaiteh, Richard Lammers, Valentina Mara, Kytt MacManus, Steve Metzler, Maria Muñoz, Thomas Parris, Randy Pullen, Catherine Thorkelson, Charles Vorosmarty, Wil Wollheim, Xiaoshi Xing, and Greg Yetman. *Assessment of Select Climate Change Impacts on U.S. National Security*

Center for International Earth Science Information Network (CIESIN), Columbia University, 2008 [cited].

Levy, Marc A., Catherine Thorkelson, Charles Vörösmarty, Ellen Douglas, and Macartan Humphreys. 2006. *Freshwater Availability Anomalies and Outbreak of Internal War: Results from a Global Spatial Time Series Analysis* Human Security and Climate Change Conference, 2005 [cited August 26 2006]. Available from [http://www.cicero.uio.no/humsec/papers/Levy\\_et\\_al.pdf](http://www.cicero.uio.no/humsec/papers/Levy_et_al.pdf).

Meier, Patrick. 2008. *The Burmese Cyclone, Nonviolent Action, and the Responsibility to Empower* Peacework, June 2008 [cited July 20 2008]. Available from <http://www.peaceworkmagazine.org/burmese-cyclone-nonviolent-action-and-responsibility-empower>.

Montlake, Simon. 2008. *Asian, Apolitical NGOs Get Better Access in Burma (Myanmar)* Christian Science Monitor, May 16 2008 [cited July 18 2008]. Available from <http://www.csmonitor.com/2008/0517/p04s01-woap.html>.

Mooney, Chris. 2007. *Storm World: Hurricanes, Politics, and the Battle over Global Warming*. Orlando: Harcourt.

Nel, Philip, and Marjolein Righarts. 2008. Natural Disasters and the Risk of Violent Civil Conflict. *International Studies Quarterly* 52 (1):159–185.

O'Brien, Timothy L., and Stephanie Saul. 2008. *Buffett to Give Bulk of His Fortune to Gates Charity* June 26 2006 [cited July 20 2008]. Available from <http://www.nytimes.com/2006/06/26/business/26buffett.html>.

Paskal, Cleo. 2008. *How climate change is pushing the boundaries of security and foreign policy* Chatham House, June 2007 [cited July 18 2008]. Available from <http://www.chathamhouse.org.uk/publications/papers/view/-/id/499/>.

Podesta, John, and Peter Ogden. *The Security Implications of Climate Change* The Washington Quarterly, 2008 [cited]. Available from [http://www.twq.com/08winter/docs/08winter\\_podesta.pdf](http://www.twq.com/08winter/docs/08winter_podesta.pdf).

Purvis, Nigel, and Josh Busby. 2007. *The Security Implications of Climate Change for the UN System* Woodrow Wilson Center, 2004 [cited July 8 2007]. Available from [http://www.wilsoncenter.org/topics/pubs/ecspr10\\_unf-purbus.pdf](http://www.wilsoncenter.org/topics/pubs/ecspr10_unf-purbus.pdf).

Reuters. 2008. *Burma cyclone death toll 'hits 22,000'* ABC News, May 7 2008a [cited July 18 2008]. Available from <http://www.abc.net.au/news/stories/2008/05/06/2237290.htm>.

Reuters. 2008. *US eyes humanitarian drills with Chinese military* July 16 2008b [cited July 20 2008]. Available from <http://www.reuters.com/article/latestCrisis/idUSN16372214>.

Revkin, Andrew. 2008. *Reports from Four Fronts in the War on Warming* New York Times, April 3 2007 [cited July 20 2008]. Available from <http://www.nytimes.com/2007/04/03/science/earth/03clim.html?pagewanted=1>.

Rieff, David. 2008. *Save us from the Rescuers* Los Angeles Times, May 18 2008 [cited July 20 2008]. Available from

<http://www.latimes.com/news/opinion/sunday/commentary/la-op-rieff18-2008may18,0,5635138.story>.

Salehyan, Idean. 2008. From Climate Change to Conflict? No Consensus Yet. *Journal of Peace Research* 45 (3):315-326.

Salehyan, Idean, and Kristian Skrede Gleditsch. 2006. Refugees and the Spread of Civil War. *International Organization* 60 (2):335-366.

Schwartz, Eric. 2008. *A Needless Toll of Natural Disasters* The Boston Globe, March 23 2006 [cited July 20 2008]. Available from [http://www.boston.com/news/globe/editorial\\_opinion/oped/articles/2006/03/23/a\\_needless\\_toll\\_of\\_natural\\_disasters/](http://www.boston.com/news/globe/editorial_opinion/oped/articles/2006/03/23/a_needless_toll_of_natural_disasters/).

Solana, Javier. 2008. *Climate Change and International Security: Paper from the High Representative and the European Commission to the European Council* European Commission, March 14 2008 [cited July 18 2008]. Available from [http://www.consilium.europa.eu/ueDocs/cms\\_Data/docs/pressData/en/reports/99387.pdf](http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/reports/99387.pdf).

Stoddard, Abby, Adele Harmer, and Katherine Haver. 2008. *Providing Aid in Insecure Environments: Trends in Policy and Operations -Summary of quantitative analysis* Center on International Cooperation, December 2006 [cited July 20 2008]. Available from [http://www.cic.nyu.edu/internationalsecurity/docs/aidworkers\\_final.pdf](http://www.cic.nyu.edu/internationalsecurity/docs/aidworkers_final.pdf).

UN Security Council. 2007. *Security Council Holds First-Ever Debate On Impact Of Climate Change On Peace, Security, Hearing Over 50 Speakers. New York, United Nations.* United Nations, April 17 2007 [cited July 8 2007]. Available from <http://www.un.org/News/Press/docs/2007/sc9000.doc.htm>.

UN/ISDR. 2003. *Living with Risk: A global review of disaster reduction initiatives.* Geneva: United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR).

UN/ISDR. 2008. *Disasters Statistics 1991-2005: Disasters Impact* UN/ISDR, 2008a [cited July 20 2008]. Available from <http://www.unisdr.org/disaster-statistics/impact-killed.htm>.

UN/ISDR. 2008. *Disasters Statistics 1991-2005: Disasters Impact - Number of people reported affected by natural disasters, 1991 - 2005* UN/ISDR, 2008b [cited July 20 2008]. Available from <http://www.unisdr.org/disaster-statistics/impact-affected.htm>.

UN/ISDR. 2008. *Disasters Statistics 1991-2005: Number of Natural Disasters Registered in EMDAT, 1900-2005* UN/ISDR, 2008c [cited July 20 2008]. Available from <http://www.unisdr.org/disaster-statistics/occurrence-trends-century.htm>.

UNFCCC. *UN Breakthrough on climate change reached in Bali* December 15 2007 [cited. Available from [http://unfccc.int/files/press/news\\_room/press\\_releases\\_and\\_advisories/application/pdf/20071215\\_bali\\_final\\_press\\_release.pdf](http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20071215_bali_final_press_release.pdf).

Warner, Koko. 2008. *PPPs and Disaster Risk Reduction: Economic Benefits and Success Factors* World Bank, February 22 2007 [cited July 20 2008]. Available from <http://siteresources.worldbank.org/INTDISMGMT/Resources/339456-1158594430052/2950719-1172605496630/warner.pdf>.

Watkins, Kevin. 2008. *Human Development Report 2007/2008*: UNDP, November 27 2007 [cited July 20 2008]. Available from <http://hdr.undp.org/en/reports/global/hdr2007-2008/>.

WBGU. 2007. *Climate Change as a Security Risk: Summary for Policymakers* Germany Advisory Council on Global Change, June 26 2007 [cited July 8 2007]. Available from [http://www.wbgu.de/wbgu\\_jg2007\\_kurz\\_engl.html](http://www.wbgu.de/wbgu_jg2007_kurz_engl.html).

World Bank. 2008. *Natural Disasters: Counting the cost* World Bank, March 2 2004 [cited July 20 2008]. Available from GDP.<http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,contentMDK:20169861~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>.

Xinhua News Agency. 2008. *Thailand to establish cyclone warning network system for Myanmar* ReliefWeb, July 7 2008 [cited July 20 2008]. Available from <http://reliefweb.int/rw/rwb.nsf/db900SID/KHII-7GC9VA?OpenDocument>.