

# Climate Change and Conflict: The Migration Link

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**Cover Photo:** Cracked earth from lack of water and baked from the heat of the sun forms a pattern in the Nature Reserve of Popenguine, Senegal. ©Evan Schneider/UN Photos.

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## Foreword

Terje Rød-Larsen

*President, International Peace Academy*

The International Peace Academy (IPA) is pleased to introduce a new series of Working Papers within the program *Coping with Crisis, Conflict, and Change: The United Nations and Evolving Capacities for Managing Global Crises*, a four-year research and policy-facilitation program designed to generate fresh thinking about global crises and capacities for effective prevention and response.

In this series of Working Papers, IPA has asked leading experts to undertake a mapping exercise, presenting an assessment of critical challenges to human and international security. A first group of papers provides a horizontal perspective, examining the intersection of multiple challenges in specific regions of the world. A second group takes a vertical approach, providing in-depth analysis of global challenges relating to organized violence, poverty, population trends, public health, and climate change, among other topics. The Working Papers have three main objectives: to advance the understanding of these critical challenges and their interlinkages; to assess capacities to cope with these challenges and to draw scenarios for plausible future developments; and to offer a baseline for longer-term research and policy development.

Out of these initial Working Papers, a grave picture already emerges. The Papers make clear that common challenges take different forms in different regions of the world. At the same time, they show that complexity and interconnectedness will be a crucial attribute of crises in the foreseeable future.

First, new challenges are emerging, such as climate change and demographic trends. At least two billion additional inhabitants, and perhaps closer to three billion, will be added to the world over the next five decades, virtually all in the less developed regions, especially among the poorest countries in Africa and Asia. As a result of climate change, the magnitude and frequency of floods may increase in many regions; floods in coastal Bangladesh and India, for example, are expected to affect several million people. The demand for natural resources—notably water—will increase as a result of population growth and economic development; but some areas may have diminished access to clean water.

Second, some challenges are evolving in more dangerous global configurations such as transnational organized crime and terrorism. Illicit and violent organizations are gaining increasing control over territory, markets, and populations around the world. Non-state armed groups complicate peacemaking efforts due to their continued access to global commodity and arms markets. Many countries, even if they are not directly affected, can suffer from the economic impact of a major terrorist attack. States with ineffective and corrupted institutions may prove to be weak links in global arrangements to deal with threats ranging from the avian flu to transnational terrorism.

Finally, as these complex challenges emerge and evolve, “old” problems still persist. While the number of violent conflicts waged around the world has recently declined, inequality—particularly between groups within the same country—is on the rise. When this intergroup inequality aligns with religious, ethnic, racial and language divides, the prospect of tension rises. Meanwhile, at the state level, the number of actual and aspirant nuclear-armed countries is growing, as is their ability to acquire weapons through illicit global trade.

As the international institutions created in the aftermath of World War II enter their seventh decade, their capacity to cope with this complex, rapidly evolving and interconnected security landscape is being sharply tested. The United Nations has made important progress in some of its core functions—“keeping the peace,” providing humanitarian relief, and helping advance human development and security. However, there are

reasons to question whether the broad UN crisis management system for prevention and response is up to the test.

Not only the UN, but also regional and state mechanisms are challenged by this complex landscape and the nature and scale of crises. In the Middle East, for example, interlinked conflicts are complicated by demographic and socioeconomic trends and regional institutions capable of coping with crisis are lacking. In both Latin America and Africa, “old” problems of domestic insecurity arising from weak institutions and incomplete democratization intersect with “new” transnational challenges such as organized crime. Overall, there is reason for concern about net global capacities to cope with these challenges, generating a growing sense of global crisis.

Reading these Working Papers, the first step in a four-year research program, one is left with a sense of urgency about the need for action and change: action where policies and mechanisms have already been identified; change where institutions are deemed inadequate and require innovation. The diversity of challenges suggests that solutions cannot rest in one actor or mechanism alone. For example, greater multilateral engagement can produce a regulatory framework to combat small arms proliferation and misuse, while private actors, including both industry and local communities, will need to play indispensable roles in forging global solutions to public health provision and food security. At the same time, the complexity and intertwined nature of the challenges require solutions at multiple levels. For example, governments will need to confront the realities that demographic change will impose on them in coming years, while international organizations such as the UN have a key role to play in technical assistance and norm-setting in areas as diverse as education, urban planning and environmental control.

That the world is changing is hardly news. What is new is a faster rate of change than ever before and an unprecedented interconnectedness between different domains of human activity—and the crises they can precipitate. This series of Working Papers aims to contribute to understanding these complexities and the responses that are needed from institutions and decision-makers to cope with these crises, challenges and change.



Terje Rød-Larsen

## Introduction

In October 2003, a report to the US Department of Defense received wide public attention for presenting a grim future scenario with warring states and massive social disturbance as a result of dramatic climate change.<sup>1</sup> Although not intended to be a prediction, the authors nevertheless argued the plausibility of a scenario for rapid climate change which could result in a significant drop in the human carrying capacity of the earth's environment—food, water, and energy shortages, as well as extreme weather patterns. In turn, resource constraints and environmental damage could lead to geopolitical destabilization, skirmishes and even war.

Similar warnings can be found in numerous media statements and policy documents. The Christian Aid charity warns that 184 million people could die in Africa alone as a result of climate change before the end of the twenty-first century, through floods, famine, drought, and conflict. Similarly, Oxfam relates climate change to droughts in northern Kenya, in turn leading to conflict between the Turkhana pastoralists and their neighbors. The German Environment Ministry finds that “evidence is mounting that the adverse effects of climate change can, particularly by interaction with a number of socioeconomic factors, contribute to an increasing potential for conflict.” And in October 2006, the UK Treasury-commissioned *Stern Review* argued that climate change is likely to cause additional hundreds of millions to suffer hunger, water shortages, and coastal flooding. Although the report focused most directly on the economic consequences of climate change, it also foresaw mass migration and conflict in parts of the developing world. However, the link made between climate change and violent conflict that appears so frequently in the media and political discourse is rarely substantiated with direct empirical evidence. Some scholars, such as Jon Barnett and Neil Adger, caution that the link between climate change and conflict is not well established. Egbert Sondorp and Preeti Patel argue that both climate change and conflict may produce serious health consequences, but that there is insufficient evidence that climate change leads to violent conflict.

In this paper, we review the current state of knowledge regarding climate change and violent

conflict, paying special attention to the influential International Panel on Climate Change (IPCC) reports. We find that much of the literature is speculative and difficult to substantiate given data constraints. Indeed, current debates frequently focus on *possible* scenarios in the future, which are inherently difficult to test, although they should not be discounted. Then, we focus on what we believe to be a plausible link between climate shifts and problems for human security: mass migration. Climate change is likely to be a significant factor leading to mass exodus from increasingly uninhabitable areas, and population shifts stemming directly or indirectly from environmental pressures can place significant burdens on migrant-receiving areas. However, we emphasize the importance of good governance, local integration capacity, and international agents as mitigating factors, and discuss effective policy responses. We conclude that given the many serious warnings from prominent voices, climate change warrants consideration by the United Nations as a security threat, although not necessarily in the traditional sense of military security.

## Current Knowledge

The reports from the International Panel on Climate Change (IPCC) have largely set the agenda for the debate on climate change. These reports represent an effort to produce a consensus summary of the best available knowledge about the causes and effects of climate change. While a full consensus has not been achieved, the reports represent a majority viewpoint among scientists and one that is accepted by most governments, with a few significant exceptions such as the US. Figure 1—popularly called “the hockey stick”—depicts the best evidence regarding the long-term temperature deviations in the northern hemisphere. While there have been warm periods in previous centuries, the recent temperature rise is unprecedented and is hard to explain without reference to the influence of human activities.

Many of the predicted outcomes of climate change may leave areas uninhabitable or decrease the basis of subsistence because of changes in rainfall patterns, leading to drought and floods, extreme and unpredictable weather, the melting of the polar icecaps resulting in sea-level rise, and a temperature rise with heavy impact on the potential for agriculture.

<sup>1</sup> Peter Schwartz and Doug Randall, *An Abrupt Climate Change Scenario and Its Implications for United States National Security*, Washington, DC: Environmental Media Services, available at [www.ems.org/climate/pentagon\\_climate\\_change.html#report](http://www.ems.org/climate/pentagon_climate_change.html#report). In April 2007 a high-level panel of retired US Generals and Admirals also asserted (in less dramatic language) that climate change poses a serious threat to US national security: National Security and the Threat of Climate Change (Alexandria, VA: CNA Corporation), available at <http://securityandclimate.cna.org/>.

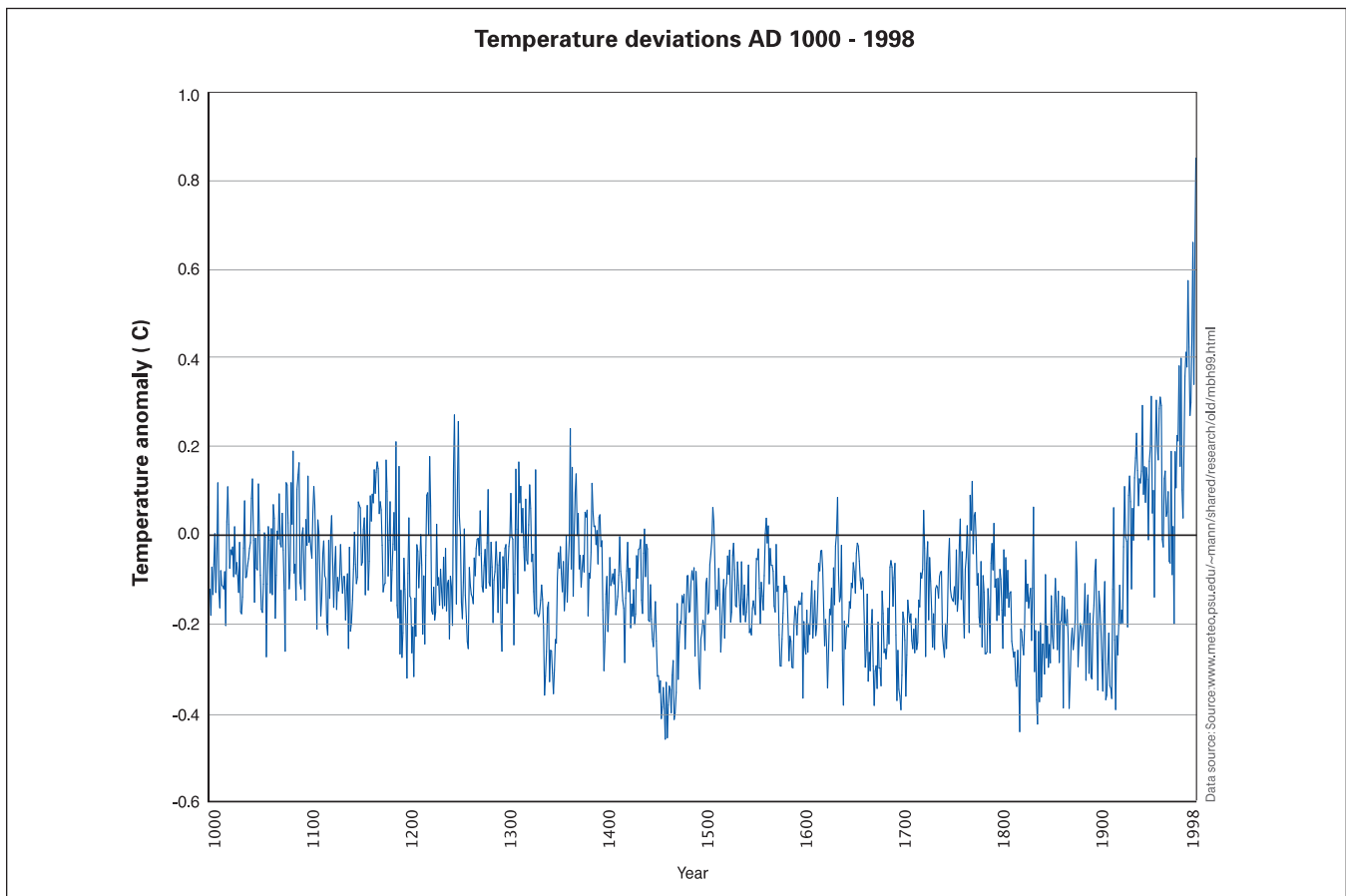


Figure 1. Temperature Deviations AD 1000–1998 for the Northern Hemisphere<sup>2</sup>

Although most areas are expected to become warmer, some will heat up more than others. Parts of the world may become more fertile and available for growing crops that traditionally would not survive in the current climate. Other areas may become too hot for human habitation. Total rainfall is predicted to increase, but at the local level trends are much less certain. The frequency and intensity of extreme weather events, such as storms and hurricanes, may rise. Most changes will be gradual, but rapid and unexpected climate transitions cannot be ruled out. One of the most dramatic changes would be a rapid collapse of the West Antarctic Ice Sheet, which would lead to a catastrophic rise in sea-level and changes in ocean circulation. Another would be a slowing or reversal of the Gulf Stream, which would make northern Europe uninhabitable.

The IPCC *Third Assessment Report* (TAR), issued in 2001, points out that scarcity of clean freshwater

often constrains economic development and that changes in the cycling of water between land, sea, and air could have significant impacts across many sectors of the economy, society, and the environment. As a result of climate change, the magnitude and frequency of floods may increase in many regions; floods in coastal Bangladesh and India, for example, are expected to affect several million people. The demand for water will increase as a result of population growth and economic development, but some areas may have diminished access to clean water. Major cities such as Quito, La Paz, and Lima in South America may be at risk if Andean glaciers melt, since they currently serve as sources of freshwater during dry seasons. The *Stern Review* predicts that 40 million people in these areas may face such risks by 2025. Also, the glacier-fed rivers from the Himalayas provide freshwater to one third of the world's population, and these areas could potentially be hit by similar problems. More efficient

<sup>2</sup> This graph was computed by Ole Magnus Theisen from data posted at [www.meteo.psu.edu/~mann/shared/research/old/mbh99.html](http://www.meteo.psu.edu/~mann/shared/research/old/mbh99.html) for an article by Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes (in *Geophysical Research Letters* 1999). It shows temperatures for the northern hemisphere for AD 1000–1998, measured in °C as deviations from the 1902–1980 mean (indicated by a straight thick line). From 1902 the graph shows the trend in measured data, while for the earlier period the trend is reconstructed using proxies. Estimates prior to AD 1400 are considerably less reliable than the latter period, due to fewer available proxies. For a survey of the debate about the accuracy of this so-called “hockey stick,” see <http://news.bbc.co.uk/1/hi/sci/tech/3569604.stm>.

water utilization and desalination may mitigate this demand, but the capacity to adapt may vary across countries.

The IPCC asserts that the relative vulnerability of different regions to climatic change is largely determined by their access to resources, information, and technology, and by the stability and effectiveness of their institutions. Climate change is likely to increase world and country-scale inequity, as some countries and areas within states are better able to adapt. It is also expected to have wide-ranging consequences for human health through factors such as food, safe drinking water, secure shelter, and the increased spread of infectious diseases like malaria, dengue, cholera, and yellow fever. Large epidemics could have serious socioeconomic impacts, and alter the relations between communities and countries in terms of power and material resources. This could potentially lead to some level of instability or conflict, but large-scale violence seems unlikely. Past health epidemics such as H5N1 avian flu and SARS have not led to political violence.

Poverty is the factor that can most negatively affect a society's vulnerability to climate change. The IPCC finds that changes in global climate and atmospheric composition are likely to have an impact on ecosystems and economic sectors, such as forests, wetlands, and agriculture, with significant impacts on socioeconomic systems. In conjunction with other global changes, such as population growth and migration, the degradation of natural resources is likely to hinder increases in agricultural productivity and make it more difficult to satisfy the growing world demand for food. Developing countries are particularly vulnerable because of greater reliance on climate sensitive sectors, such as agriculture. Poverty also prevents long-term planning and provisioning at the household level. People and societies with poor finances and technical ability are less likely to be able to meet the challenge of climate change.

In addition to national wealth, political institutions are also likely to affect the adaptive capacity of societies. Possible coping mechanisms include moving settlements away from coastal regions, improving water conservation in drought-affected areas, and creating infrastructure in cities expected to face population inflows from affected regions. Poor, authoritarian, and corrupt states that are not respon-

sive to the needs of their citizens are unlikely to implement needed reforms. Reforms such as population relocation, energy conservation, and technological change may be politically costly in the short-term even if they provide long-term benefits. This time-inconsistency problem may require institutional changes that facilitate long-term planning and coordination at the international level.

The IPCC reports make only scattered comments about violent conflict as a consequence of climate change and these are largely based on secondary and politicized sources. While violent conflict may indeed be related to environmental changes, the few systematic studies show mixed evidence. Moreover, several mitigating factors are likely to complicate the relationship between climate change and conflict.

One concrete link between climate change and violent conflict is suggested by the TAR, which observes that "much has been written about the potential for international conflict (hot or cold) over water resources."<sup>3</sup> The report comments that a change in water availability has the potential to induce conflict between different users. But such disputes need not be violent; they could even stimulate cooperation. The sources cited by the IPCC provide weak support for the idea of conflict over scarce water resources. The writings of Peter Gleick, Michael Klare, and others suggest a potential for water wars but other scholars such as Peter Beaumont and Aaron Wolf argue that cooperation generally trumps conflict in handling shared water resources. Statistical studies have found that neighboring countries that share rivers experience low-level interstate conflict somewhat more frequently, but that they also tend to cooperate more. Whether conflict or cooperation will dominate is not a simple function of scarcity but depends on other variables such as mediation and dispute resolution mechanisms, the nature of property rights, and the ability to enforce agreements.

The overall impression from the IPCC report is that the link between climate change and conflict is unclear. Where such a link is mentioned, it is weakly substantiated with evidence. The *Stern Review* on the economics of climate change invites the same characterization. Its references to how conflict "may" occur as a result of climate change are mostly based on second-hand sources of the same nature as those used by the IPCC.<sup>4</sup> The expected causal link from climate

<sup>3</sup> Intergovernmental Panel on Climate Change, *IPCC Third Assessment Report: Climate Change, 2001* Vol. II (Cambridge: Cambridge University Press, 2001) p. 225.

<sup>4</sup> Some recent econometric work on the relationship between internal conflict and rainfall changes (as a proxy for economic instability) is also cited, but the implications of this work are not discussed at any length.

change to conflict seems to be cited uncritically from one source to the next.

The possible consequences of climate change are many and varied, and some of them potentially very serious. Impacts on biodiversity, agriculture, water supply, and so on, will certainly alter current patterns of consumption and production, as well as human settlement patterns. The economic consequences have been modeled in the *Stern Review* as well as by independent scholars such as William Nordhaus and William Cline. But the link to violent conflict has until very recently been largely unexplored. It is entirely plausible—though not predetermined—that violent conflict will emerge as the result of climatic shifts. One of the more likely and most discussed scenarios, as we explore below, is that conflict could emerge as a result of environmentally induced migration.

## Challenges: Environment-Induced Migration

In this section, we will discuss at some length population migration as one of the most plausible links from climate change to conflict. There is some relevant empirical research in this area, although conclusions are still tentative. As one example, the *Stern Review* cites an estimate that by the middle of the century, 200 million people may become permanently displaced “climate refugees” due to rising sea levels, heavier floods, and more intense droughts.

Migration may lead to conflict in receiving areas if not properly managed, but the motives for migration affect the propensity for violence. Figure 2

illustrates two causal pathways from environmental stress, to migration, and to conflict. First, environmental problems may lead to emigration directly. Secondly, environmental stress may lead to resource conflicts, and these conflicts may produce refugees. Each type of migration may lead to conflict in receiving areas; however, they may not have the same effects. Migration directly caused by environmental factors may lead to social tensions and sporadic violence in receiving areas, but is not likely to cause sustained, organized armed conflict. In contrast, political refugees from violent regions are more likely to become involved in militant activities, although even this is not a foregone conclusion.

Environmental change can contribute directly to migration by pushing people out of uninhabitable areas. Catastrophic events and disasters—such as hurricanes and floods—can serve as an immediate push; long-term changes—such as desertification—can lead to a decline in living standards that increase the costs of staying versus leaving.

Research on global climate change suggests several possible mechanisms through which people may be forced out of their current habitat. Sea-level rise caused by a reduction in glacial coverage may lead to the flooding of coastal areas. Low-lying, coastal regions may be evacuated as water encroaches upon human habitats. Desertification may cause people to migrate out of unproductive and water-scarce areas. Greater variability in weather patterns lead to dramatic climate events such as hurricanes, typhoons, and extreme cold which may disrupt human settlements. And unpredictable rainfall will lead to periods of flooding and drought, making certain areas uninhabitable.

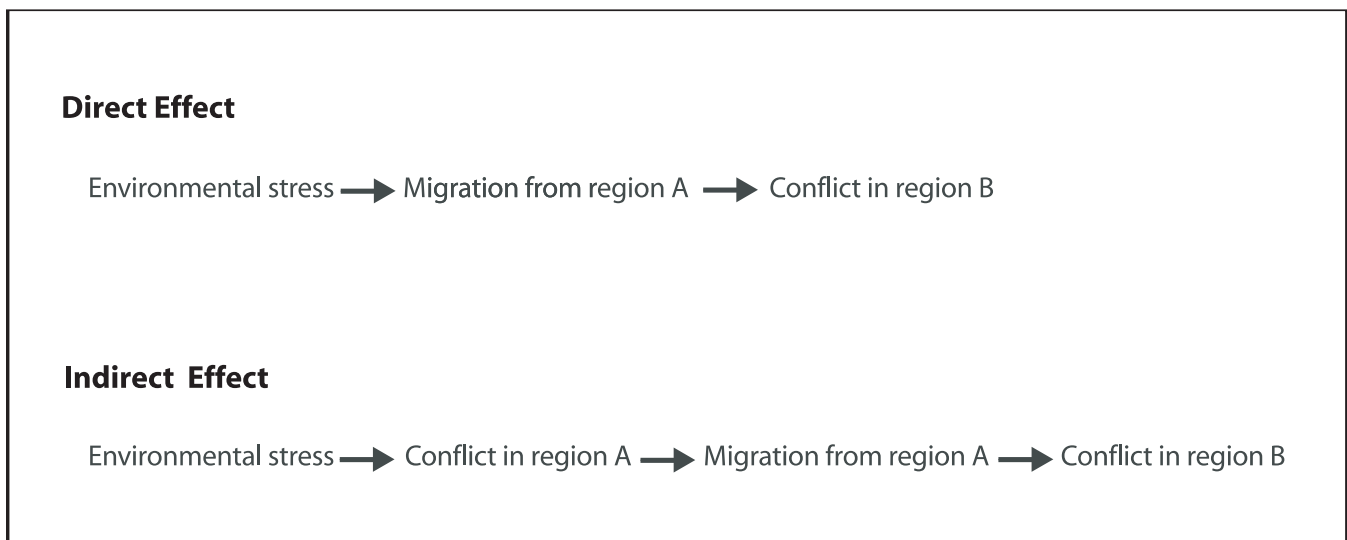


Figure 2. Environmental Stress, Migration, and Conflict: Direct and Indirect Pathways

Environmental stresses may also lead to migration indirectly. Resource scarcity and competition can lead to conflict within a country or region, and such conflict may increase emigration. Grievance models of conflict argue that people will fight if they see a decline in their living conditions, particularly in relation to others. For example, people working in agriculture may be more affected by drought or floods than people in urban areas, leading to higher income inequality within societies and greater relative deprivation. Furthermore, if certain ethnic groups are concentrated in particular regions adversely affected by climate change, they may demand compensation or redress to counter growing inequalities. Ethnic divisions need not be conflictual, but when they are coupled with income inequality between ethnic groups, violence is more likely. Eventually, the scarcity of resources such as water, farmland, and timber may lead to Malthusian conflict between people competing over the same limited supply goods.

A large body of literature in political science and economics suggests, however, that while grievances may be important, they are not sufficient explanations for conflict. Grievances and resource competition, combined with lack of representative institutions, economic redistribution mechanisms, and poor state capacity to deter violence, present the greatest risk of conflict. For example, although Botswana faces many characteristics that are typically associated with violence in Africa—HIV/AIDS, poverty, ethnic divisions, and diamond resources—democratic institutions have prevented violent outbreaks by providing alternative dispute resolution mechanisms.

There is some limited statistical evidence to suggest that environmental problems have led to conflict in the past. A frequently cited study by Wenche Hauge and Tanja Ellingsen found a positive link between environmental degradation and violence; while they suggest that this effect is quite small, future climate change may make environmental stress a more substantively significant predictor of violence. The Phase II Report of the US State Failure Task Force concluded that the link is weak and a recent study by Ole Magnus Theisen failed to replicate the Hauge and Ellingsen results. Nevertheless, environmental conflicts may emerge in the future if climate change exacerbates conflict patterns. Several studies have found a relationship between conflict and variations in the pattern of rainfall. For example,

pastoral conflicts are heightened during downturns in environmental conditions, and aridity and resource depletion in West Africa has led to greater tensions.

If climate change does lead to an increase in armed conflict, emigration is likely. A large body of statistical research confirms a strong relationship between civil conflict and refugee migration (although most of these conflicts do not have direct roots in environmental problems). Sometimes, these migration flows can be substantial. For example, conflicts in Mozambique, Afghanistan, Israel/Palestine, and Iraq have each generated millions of refugees. For receiving areas, the sudden influx of large numbers of people can be especially burdensome and disruptive. The size of refugee communities relative to the host society can be very large (1:3 in Jordan in 2001, 1:11 in Lebanon)<sup>5</sup>; such flows can significantly impact labor market conditions and the demographic balance between ethnic groups. Thus, if environmental pressures do lead to conflict, it is quite likely that these conflicts will lead to substantial population dislocations.

### **Links between Migration and Conflict in Receiving Areas**

Several studies have suggested that internal as well as international migration can lead to tensions in receiving areas. However, immigrants can also add economic skills and cultural vibrancy to their receiving areas. Nevertheless, at times conflicts have arisen from migration inflows, particularly if the inflow is large-scale and disorderly. For instance, the Chittagong Hill tribes in Bangladesh have been involved in violent conflict with the state over the influx of Bengalis from the plains, whom they view as a threat. Bengali migration to the north-east Indian region of Assam has also contributed to social frictions. Increased migration rates can further fuel social tensions in these regions, particularly as Bangladesh is a frequently mentioned victim of future sea-level rise and vast population dislocation.

Conflict and human security are frequently used as catch-all terms to describe a wide array of issues, but political violence involving migrants and locals may take a variety of forms. Unorganized interpersonal violence such as assault, property damage, murder, and riots rarely develop into sustained campaigns. By contrast, rebellions and full-blown civil wars involve long-term organization and substantial

<sup>5</sup> However, the two largest refugee streams recorded in 2001 (over two million) went to large countries, where they made up a smaller proportion of the population, 1:26 in Iran and 1:72 in Pakistan.

resources. All violence is disruptive, but organized rebellion has a much more deleterious impact on economic and social conditions because it often endures for a long time and places greater strains on state resources.

While migration has the potential to provoke a violent reaction, there are important differences between conflict patterns stemming from “environmental migrants” versus “classic” refugees. Migrants fleeing directly from natural disasters such as flooding, hurricanes, and desertification are not likely to contribute to organized violence, although sporadic violence may arise. Many environmental stresses relating to climate change are gradual and will lead to small, though sustained migration streams. Desertification and sea-level rise, for instance, are processes that will develop over several decades, if not centuries, and are not likely to provoke massive emigration over the short-term. Receiving areas can adapt to gradual migration. Even massive emigration sparked by environmental disasters has not led to widespread, sustained fighting. Hurricanes Mitch and Katrina, and the Asian Tsunami (which was caused by a geological, not a meteorological phenomenon) each led to the displacement of thousands of people. But in those cases receiving areas did not experience organized violence.

Classic refugees pose a different set of challenges. In some circumstances the emergence of refugee communities has generated violent conflict in receiving areas, as Idean Salehyan and Kristian S. Gleditsch have found. While a majority of the countries with an influx of refugees since the 1950s remain peaceful, the probability of armed conflict (that generates at least 25 battle-related deaths) is more than tripled by the presence of refugees. Migrants from conflict areas have a direct stake in the outcome of fighting in their home country, especially the *ex post* distribution of resources. Many refugees also have a personal experience of victimization or persecution and therefore demand the removal of the regime in power, or significant political concessions. Furthermore, during periods of civil conflict, the hyper-politicized political environment encourages refugee mobilization for one side or the other. Thus, Tamil refugees in India, Afghan refugees in Pakistan, Rwandan refugees in DR Congo, to name but a few examples, maintain ties with combatant factions in their countries of origin. These refugees are often recruited directly into militant groups and are often relied upon for material support. Along with migrants themselves, receiving areas often “import” arms,

organizational structures, resources, and ideologies conducive to violence. Refugees can expand rebel social networks to receiving areas and may serve as conduits for the spread of armed conflict.

Refugees from conflict zones frequently engage in cross-border attacks against their home government, and pursuit by state forces jeopardizes national security and the safety of local populations. Burmese refugees in Thailand and Nicaraguan refugees in Honduras, for example, often launched attacks on their home countries, and these were frequently met with government raids across the border. As such, refugee flows can threaten relations between sending and receiving countries. Receiving countries are accused of harboring militants and sending countries are blamed for imposing a refugee burden on their neighbors. Thus, cross-border fighting between refugee communities and sending states has the potential to drag the receiving country into the war. In extreme cases, the presence of militarized refugee communities across the border has led to large-scale invasions of neighboring territory. For instance, in 1982 Israel invaded and held part of Lebanese territory in order to deprive the Palestine Liberation Organization of its external bases, and Rwanda became involved in the Congo after Hutu refugees began to organize opposition groups in the camps. Forced migration following internal violence can also cause a conflict to spread to new areas.

Purely environmental migrants, on the other hand, often do not have political agendas in their home region and they do not necessarily regard themselves as victims of persecution deserving justice. If people flee for economic or environmental reasons rather than because of armed conflict, the risk of importing organized and sustained conflict should be lower. Current migration patterns are instructive in this regard. Across Europe and North America, hundreds of thousands of economic migrants gain access each year. Although racist attacks, ethnic riots, and murders do occur, such incidents have generally been short-lived and without large-scale organization. The 2005 riots in ethnic ghettos across France have highlighted the potential for interethnic violence. In the British cities of Bradford, Oldham, and Burnley racial tensions erupted into widespread riots in the summer of 2001, and the July 2005 terrorist attacks on the London transportation system created widespread fear of inter-communal conflict involving Muslim immigrants and their children born in the UK. Yet, these incidents primarily underscore the importance of social and economic integration. Economic

migrants have also caused strains in other immigrant receiving countries such as Saudi Arabia (South-East Asians), South Africa (other Africans), Indonesia and Malaysia (Chinese), and Costa Rica (Nicaraguans), but these migrant streams have not generated sustained, organized violence. Astri Suhrke argues that whether or not environmentally induced migration produces conflict in the receiving area depends on the role of the state in the host community. The potential for social tensions stemming from environmentally-induced migration should not be dismissed, but the likelihood of sustained armed conflict is low. Moreover, effective immigrant integration and incorporation can greatly reduce social friction.

The link between climate change, migration, and conflict remains conjectural. Because it is difficult to isolate different causes of migration, it is unclear whether specific population movements have occurred as a direct result of environmental stresses rooted in climatic shift. There is good evidence linking conflict and emigration in sending areas and immigration and conflict in receiving areas. On the other hand, there is a lack of consensus and systematic data on the effects of climate change on migration and on the effect of climate-induced migration on conflict. Clearly identifying the sources of environmentally-induced migration and environmental conflicts is a difficult, yet much needed endeavor.

Empirical evidence can only reveal patterns of social behavior that have already occurred. Much of the debate about climate change involves future forecasts and possible scenarios. It is quite possible that the most disruptive effects of climate change will occur at some point in the future. Thus, preparation for future events must be rooted in an analysis of best and worst case scenarios and firm theoretical foundations.

## Capacities

Migration challenges can be met at different levels, and dealt with differently depending on states' capacities. Wealthy states in firm control of their borders are more likely to be able to control immigration than states with more limited resources. The capacity to control the large influx of immigrants from Africa to Europe by way of the sea is currently being tested, as Shada Islam's Working Paper in this series indicates.<sup>6</sup> European states exert diplomatic pressure on the sending countries to limit migration. Southern

European states have also started using satellites, surveillance planes, naval vessels, and border fences to hinder refugees from entering their territory, as has the US in its attempts to control immigration from Mexico and the Caribbean. Again, in the event of large flows of immigrants due to climate change, rich countries in the West are likely to have the capacity to adopt policies to counter immigration, and those responses may become increasingly harsh. Countries that have limited capacity to regulate the influx will be confronted with the challenges that occur once refugees settle within their borders.

In meeting the challenge of environmental migration and the possibility of conflict, three layers of responses are likely to be important. First, migration is most acutely felt at the local level, and local governmental agencies are often the first to respond. Local governments must be equipped with the capacity to deal with the needs of both internal and international migrants. This will include standard responses to population growth such as increased electricity and water provision, housing, sanitation, and public services. Migrants may also pose special challenges as local service providers must deal with new languages and customs. Refugees from conflict zones often have faced physical and psychological trauma, and local health care providers must also have the ability to respond to these needs.

Second, national-level capacities can also be improved to deal with migration. National governments can work to coordinate and systematize local responses rather than having local regulations apply haphazardly. States are also tasked with immigration and customs enforcement. National agencies will be responsible for determining which migrants deserve access to the state, where immigrants are allowed to settle, the types of jobs and services they are able to pursue, citizenship policies and so on. Wise immigration and integration policies may dampen potential conflicts in receiving countries.

Third, international agencies such as the United Nations High Commissioner for Refugees (UNHCR) and the International Organization for Migration can assist national and local authorities in developing their capacities to respond to migration when resources are insufficient. Wealthy donor states can use such organizations and their technical expertise to assist developing countries, which often lack the ability to effectively deal with mass immigration. Aside from direct humanitarian relief, such

<sup>6</sup> See Shada Islam, "Europe: Crises of Identity," *Coping with Crisis Working Paper Series*, International Peace Academy, New York, March 2007.

agencies have also proven effective in developing employment programs, health care facilities, and education for youth. In addition, the UNHCR often works with national immigration and border enforcement agencies to improve the capacity of such actors to screen migrants and regulate the admissions process.

## Scenarios

The long and uncertain causal chains from climate change to social consequences like conflict leave policy advocates to tend toward speculation—some of it irresponsible or with special agendas in mind. Predictions about the future of climate change vary from the apocalyptic to the reassuring. Future scenarios vary on two dimensions: one is whether or not the models of the IPCC accurately reflect reality. A minority of skeptics question whether the long-term temperature rise is reliably estimated and whether the man-made contribution to climate change has a significant impact over and above natural variation. The second dimension concerns the ability of the international community to cope with the challenges of climate change—in order to slow it down and/or mitigate some of the consequences through adaptation and technological change. The timescale over which climate change and such dramatic consequences as severe sea-level rise occurs is crucial for societal adaptation. The worst case or catastrophic scenario discussed below assumes that climate change will be severe and that there will be an inadequate response to the challenge. The best case or golden scenario applies if either the model's results are exaggerated or the response is adequate. In the middle scenario (“muddling through”), the environmental challenge will be present, while the responses will vary with the willingness and ability to act.

### Worst Case: The Catastrophic Scenario

A dramatic scenario for how climate change could lead to internal and external conflict is found in the widely-publicized report to the Pentagon by Peter Schwartz and Doug Randall, who start from a worst-case reading of the IPCC and do not consider adaptation mechanisms. The report points to the possibility of relatively abrupt changes in temperature and outlines how wealthy nations would fortify their borders in order to preserve their resources. Less

fortunate countries, especially those involved in disputes with their neighbors may initiate struggles over access to food, clean water, or energy resulting in unlikely alliances as defense objectives and priorities change from abstract issues, like religion or national honor, to resources for survival. These authors even foresee skirmishes within the EU over food and water supplies and a conflict between Germany and France over the Rhine for commercial purposes—as well as southward population movements to countries such as Algeria, Morocco, Egypt, and Israel. As famine, disease and weather-related disasters strike due to the abrupt climate change, many countries' needs will exceed their carrying capacity, generating a sense of desperation and the likely proliferation of nuclear weapons as countries respond to diminishing global oil reserves by turning to nuclear energy.

The Schwartz and Randall report argues that it is not unlikely that we are rapidly approaching a threshold of climate change, where the pace of change will pick up dramatically. With its potentially apocalyptic visions, it belongs to a tradition of environmental doomsday scenarios inspired by Thomas Malthus. Climate change fits nicely into this apocalyptic tradition because its possible consequences are so wide-ranging and drastic. Tim Flannery, for instance, argues that non-adaptation to climate change is equivalent to genocide and that if we pursue business as usual for the next fifty years, “the collapse of civilization due to climate change is inevitable.”<sup>7</sup>

The *Stern Review* seems on somewhat firmer ground when discussing model-based assessments of the economic impacts of climate change. While formal models have generally concluded that 2-3°C warming would involve a loss of 0-3 percent of global GDP (more in poor countries), Stern assumes that “business as usual” policies may lead to 5-6°C warming by the end of this century, corresponding to 5-10 percent loss of global GDP. When taking into account a wider set of risks (health and social and political instability, amplifying feedbacks in the climate system, and assigning a greater relative weight to the effects on the poor), the economic effect of climate change could approach 20 percent of global GDP.

During the last two years the possibility of a “tipping point” appears more frequently in the climate change literature—the idea that after a certain threshold there might be unexpected system responses, and changes in climate will accelerate

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<sup>7</sup> Tim Flannery, *The Weather Makers: How Man is Changing the Climate and What it Means for Life on Earth*, (New York: Atlantic Monthly Press, 2005) p. 208.

rapidly and irreversibly. One very drastic climate change scenario is the collapse of the West Antarctic and Greenland Ice Sheets, events that could conceivably raise sea levels by more than 15 meters, and the possibility of another catastrophic event, the failure of the Gulf Stream. Should the larger and more stable East Antarctic Ice Sheet also melt, this would raise the earth's sea-levels by another 60 meters according to research by Peter Clark and his colleagues. In the absence of adequate countermeasures, this could flood dozens of main cities, including London and New York, putting millions of people at risk.

The worst-case combination—cataclysmic climate change and little adaptation—also affects the migration-conflict dynamic. The Stern Review foresees an additional 200 million climate change migrants. Widespread resource scarcity will lead to mass migration to areas with better opportunities. Attempts to limit or manage migration will be swamped by the sheer numbers of environmental refugees. Attempts to seal off wealthier regions will lead to social conflict as the “have-nots” attempt to enter.

The worst-case scenario is possible, but unlikely. It involves uncertainty both in the degree and speed of climate change and in the success or failure of adaptation. It is impossible at this stage to assign credible probabilities to the extreme outcomes.

### The Best Case: The Golden Scenario

A small, but vocal minority of scholars argue that climate change scenarios are still fraught with too many uncertainties for us to act upon them at present. They suggest that the evidence for a long-term temperature rise is not persuasive, that a forecast of a 6 °C temperature rise is too high, and that the man-made contribution to such a rise remains uncertain. Other contrarians basically accept the climate change scenarios, but argue that the costs of the conventional countermeasures are too high. Limiting or reversing carbon (CO<sub>2</sub>) emissions to the atmosphere is likely to dampen economic activity. It is better to let economic growth continue and use part of the gains to alleviate the consequences of climate change, if and when they occur. Current forecasts of world growth, and even the IPCC's own scenarios, foreshadow a world that will be so much richer in, say, 2050 that it will be able to cover the cost of global warming—assuming that industrialized countries are willing to take on some of the costs of developing countries. Many leading economists argue that human welfare would be better served by giving priority to combating HIV, providing

clean freshwater to poor countries, or engage in other health measures that promise to save thousands of lives at low cost. At present money would be better spent on solutions for these problems and until more productive proposals emerge, action to reverse climate change should remain lower on the agenda.

The *Stern Review's* migration projections are based on an estimate that more than 200 million people currently live in coastal floodplains at less than one meter elevation. However, a one-meter sea level rise is above the IPCC's highest estimate for 2100 and no consideration is given to possible countermeasures, such as dikes. Of course, even if climate change produces a much smaller number of environmental refugees or none at all, there will still be a large number of people who migrate for traditional economic or political reasons, and so climate change migration does not present a new category of concern.

The best case scenario for climate change and for the human-induced component clearly represents a minority opinion among the leading experts. But even some of those who are greatly concerned about climate change (such as Al Gore and the *Stern Review*) remain optimistic about our capacity to counteract it, if the political will can be mobilized.

### The Middle Scenario: Muddling Through

If the majority position of the scientific community is correct, we are likely to see a substantial temperature shift and sea-level rise approaching one meter in this century, and in part this will be caused by human activity. The uncertainties surrounding the degree of global warming, the potential effects for human civilization, and the costs of prevention and mitigation, pose a cruel dilemma, which William Nordhaus has formulated as follows: Should we be ultraconservative and preserve nature at the expense of economic development? Or, should we put human betterment above the preservation of natural systems and trust human ingenuity to find a solution?

There is no easy answer to this dilemma, but in this third scenario we assume that global warming is accurately depicted in Figure 1, that a substantial element of the warming is due to human activities, and that the challenge needs to be addressed, even if it has less dramatic consequences than those envisaged in the worst-case scenario. Finding ways to preserve economic growth and meet people's basic needs while mitigating the negative effects of environmental change is the key issue.

The response to climate change may in part be

technical. A partial solution may lie in technological innovation and cleaner energy sources such as solar, nuclear, and wind power. More efficient irrigation, soil conservation, and food production techniques may also be developed. Technological transfers to developing countries will be important in this regard, allowing poor countries to leapfrog the polluting production techniques used in the last century by industrialized states.

Other responses will be political. International cooperation with a view to reducing the emission of greenhouse gases is one such strategy for tackling this problem. The Kyoto Protocol is far from satisfactory in this regard because of its arbitrary target (reducing emissions of high-income countries to 1990 levels), because it punishes efficiency and rewards slow growth, and because too many important countries remain outside the protocol. Strong global leadership by major powers, particularly the US, will be needed to foster international collective action. Writers like Jon Barnett and Thomas Homer-Dixon also emphasize the importance of proper governance at the national and local level in order to mitigate the effects of global warming. A common theme is that effective governing institutions can reduce some of the negative effects of environmental change and improve adaptive capacity. Yet, time-inconsistency problems may hamper needed reform. Changes in current policies are likely to be costly in the short-term—particularly for economic actors who have an interest in maintaining the status quo—and political leaders may not be willing to make necessary changes now in order to avert future dilemmas.

In the short term, the poorest governments will have the least capacity to engage in efforts to mitigate the effects of climate change. While natural disasters affect rich and poor countries alike, floods, typhoons, and earthquakes cause more severe destruction of life and property in the developing world. Thus, poverty and environmental stresses interact to create severe outcomes not experienced in areas with better resources for crisis management. Therefore, the assistance of wealthy donor states will be necessary to improve local adaptive capacity and to facilitate the training of local service providers in developing countries. Doing so is not merely an altruistic endeavor. Because environmental disasters in developing countries may lead to greater migration, providing generous assistance programs will serve to limit emigration at its source and is likely to be more

efficient than reactive (and often unsuccessful) border enforcement.

In addition to tackling environmental problems, the governance of migration flows when they occur will be vital in preventing the adverse consequences of population dislocations. Many migrant communities co-exist peacefully among local populations and make important contributions to their host societies. While conflict can certainly emerge as the result of migration, this is by no means a given fact; policies to effectively integrate migrants into society and the economy are likely to be a decisive element in determining its consequences. Countries that adopt effective policies, some of which we consider below, will face much less of a risk from mass migration than those which do not.

## Policy Recommendations

Our recommendations focus on what can be done to prevent environment-induced migration from leading to conflict. Because of the wide nature of negative effects that are foreseen in climate change scenarios, some of which are very serious, we think that the United Nations should be centrally involved. Climate change is essentially an international problem, since greenhouse gases cannot be contained and limited to a particular part of the globe. There is considerable uncertainty about the geophysical scenarios, even more so on the social and economic consequences. Although the dramatic scenarios outlined in the Pentagon report and in the *Stern Review* are by no means universally accepted, the emerging consensus among scientists is that some degree of climate change will occur and that changes in human settlement patterns and economic production will follow.

In order to foster a global dialogue, it would be useful to call a special session of the UN General Assembly. Such special sessions have been called to discuss disarmament (1978), small island states (1999), the situation of children (2002), and to commemorate the sixtieth anniversary of the liberation of the Nazi concentration camps (2005). Climate change would certainly warrant special attention in the General Assembly. For a more extended discussion, the matter might be referred to the Economic and Social Council. However, it would have considerably greater weight if the issue could be put on the agenda of the Security Council as it has “primary responsibility for the maintenance of international peace and security.”<sup>8</sup>

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<sup>8</sup> See Article 24, UN Charter. As this paper goes to press, a first such session was held on April 17th at the request of the Security Council chair from the UK. The Secretary-General has said that the UN is also considering a “high-level meeting” on climate change (*Agence France Press*, April 12, 2007).

For the Council to discuss the consequences of climate change implies a new and wider interpretation of security. Such a reinterpretation has been made by the governments of many member states, by international organizations such as NATO, by the Norwegian Nobel Committee (which awards the Nobel Peace Prize), and others. The UN should face the issue of climate change as a crisis that threatens the security of its member states and humanity, even if armed conflict is not a major component of that threat. Some scholars have argued that the UN should broaden its security agenda and the Secretary-General's High-Level Panel on Threats, Challenges, and Change (2004) also offers some cautious support for such a view.

With reference to climate change specifically, relevant policy measures might include encouraging people to move out of flood plains and assisting with relocation costs; the development and use of cleaner energy technologies; fostering more efficient irrigation and water consumption; improving shelters to prevent damage during severe weather events; and improving disaster preparedness and response strategies.

As noted, wealthy industrialized democracies are more likely to be able to adopt these recommendations than poor, corrupt, and non-democratic states. Therefore, the UN—through existing agencies or new ones—should make technological transfers to developing states a key priority. Where political transparency is lacking, providing oversight mechanisms to ensure that new technologies and donor funds are used appropriately for their intended purpose is also critical. Dealing with the sensitive issue of intellectual property rights must also be addressed in a comprehensive manner.

Even in developed democracies, however, implementing needed reforms may be difficult for politicians with immediate reelection pressures, especially if such changes will be politically costly. Moving the discussion on climate change up to the UN level, providing positive leadership and inducements, and giving decision-making rights to actors who are independent of electoral pressures could help bridge this gap in priorities.

For mitigating the risks of refugee flows associated with environmental conflicts, several measures are in order. These include locating refugees away from conflict zones, particularly border regions; preventing the infiltration of arms and combatants into civilian refugee communities and encampments; providing meaningful alternatives to violence to refugees by

allowing productive employment; and fostering dialogue with local communities to address the economic and social concerns of receiving areas. Furthermore, assistance from donor states and agencies such as the UN High Commissioner for Refugees will be important for developing countries that lack the capacity to adequately govern refugee communities.

In dealing with environmental migrants as well as “classic” refugees, receiving areas can also engage in a number of additional positive measures to prevent hostilities. Cases where violence has emerged have generally suffered from a lack of cultural awareness and sensitivity by locals and immigrants, as well as barriers to the full incorporation of migrants in their receiving areas. Steps to address these problems may include preventing discrimination against immigrants in the workplace; insuring access to government services and social activities; revising citizenship laws to allow immigrants to become naturalized citizens and full participants in the political life of the community; promoting tolerance and respect for diversity through public education programs; and facilitating language acquisition and civic awareness among immigrant communities.

Along these lines, the UN sorely needs a new international agreement on migration, as Bimal Ghosh has argued. An international regime on migration must include comprehensive legal measures on the rights of migrants, refugees from combat zones, migrants interdicted at sea, and environmental migration. The current UN Refugee Convention is outdated and is fraught with ambiguities which have led to the uneven application of refugee and asylum policies. Given that migration pressures are likely to rise as the result of climate change, and the haphazard and inconsistent policies of numerous receiving countries, the UN must exercise leadership on this issue.

In sum, climate change is likely to be a real problem in the coming decades. Even if the emission of greenhouse gases is reduced now, a certain degree of climate change is inevitable. International migration, which has already become a hot political issue in many states, is likely to be exacerbated by climatic shifts. However, human adaptability, technological planning, and foresight promise to assuage the most severe effects. Therefore, developing appropriate responses to environmental pressures and preparing for shifting settlement patterns now should be high on the UN's agenda.

## Further Reading

There are many “must read” publications on climate change and we list only a few of them, but there are very few on its possible consequences for conflict. In addition to the works listed below, we have compiled a more extensive list of references as well as references to our data sources. This document can be found on our replication page at [www.prio.no/cscw/datasets](http://www.prio.no/cscw/datasets). A number of papers relevant to the topic of this paper were presented at the Workshop on Human Security and Climate Change at Holmen Fjordhotell, Asker, Norway on 21–22 June 2005, see [www.cicero.uio.no/humsec](http://www.cicero.uio.no/humsec). Particularly relevant are the papers by Barnett & Adger; Hendrix & Glaser; Levy et al.; Meier & Bond; Niase; Nordås & Gleditsch; Obioha; Patnaik & Narayanan; Raleigh & Urdal; Reuveny; and Salehyan. A selection of revised papers will be published as a special issue of *Political Geography* in the fall of 2007.

Flannery, Tim. *The Weather Makers: How Man is Changing the Climate and What It Means for Life on Earth*. New York: Atlantic Monthly Press, 2005.

*A masterful popular survey of the environmental aspects of climate change written by a paleontologist inspired by the Gaia hypothesis.*

Gleditsch, Nils Petter. “Armed Conflict and The Environment: A Critique of the Literature.” *Journal of Peace Research* 35, no.3 (1998): 381–400.

*A critical review of the literature on environmental conflict on theoretical, empirical, and methodological grounds. Relevant to the climate change debate but does not deal with it directly.*

Homer-Dixon, Thomas. *Environment, Scarcity and Violence*. Princeton, NJ: Princeton University Press, 1999.

*A classic work drawing on theory and cases relating resource scarcity to civil violence, particularly where it interacts with social and distributional factors.*

Intergovernmental Panel on Climate Change. *IPCC Third Assessment Report: Climate Change, 2001*. 5 Vols. Geneva: Intergovernmental Panel on Climate Change & Cambridge: Cambridge University Press, 2001. Available at [www.ipcc.ch](http://www.ipcc.ch).

*The authoritative synthesis of the best available science, although it has also been criticized for political compromises. A Fourth Assessment Report, Climate Change 2007, is in the process of being finalized for publication in 2007 and will set a new agenda for the discussion of climate change.*

Lomborg, Bjørn, ed. *Global Crises, Global Solutions*. Cambridge: Cambridge University Press, 2004.

*An ambitious attempt to have academic experts review the major challenges of our time, including climate change, and put forward proposals for tackling them. Less skeptical of the mainstream climate change literature than Lomborg’s earlier work (*The Skeptical Environmentalist*, Cambridge University Press, 2001), but in a review by a panel of prominent economists the specific proposals for reducing climate change gain scant support relative to proposals for improvements in public health and nutrition.*

Nordhaus, William D. and Joseph Boyer. *Warming the World: Economic Models of Global Warming*. Cambridge, MA: MIT Press, 2000.

*A basic text on modeling the economic effects of climate change. In a recent critique of the Stern Review (available at <http://nordhaus.econ.yale.edu/>) Nordhaus argues that its radically much larger economic*

*effects are driven by an extreme assumption about discounting, i.e., the relative weight of future and present payoffs.*

Salehyan, Idean and Kristian Skrede Gleditsch. "Refugee Flows and the Spread of Civil War." *International Organization* 60, no.2 (2000): 335–366.

*The authors find that part of the explanation for the observed geographic clustering of civil wars lies in refugee flows and transnational rebel networks. While the emphasis is not on environmental migration per se, this study suggests that environmental conflict can spread to other states given large-scale refugee migration.*

Schwartz, Peter and Doug Randall. *An Abrupt Climate Change Scenario and Its Implications for United States National Security*. Washington, DC: Environmental Media Services, 2003. Available at [www.ems.org/climate/pentagon\\_climate\\_change.html#report](http://www.ems.org/climate/pentagon_climate_change.html#report).

*The best-publicized apocalyptic scenario linking climate change to conflict. Gained wide publicity and provides a useful illustration of a view found in much neomalthusian writing about environmental change, but should be read critically.*

Stern, Nicholas et al. *The Economics of Climate Change (The Stern Review)*. Cambridge: Cambridge University Press, 2007. Available at: [www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm).

*The most widely-publicized work to date on the economic effects of climate change. Some background documents can be found at [www.tyndall.ac.uk/](http://www.tyndall.ac.uk/) and critiques have been circulated by Lomborg, Nordhaus, and others.*

Suhrke, Astri. "Environmental Degradation, Migration, and the Potential for Violent Conflict." In *Conflict and the Environment*. Nils Petter Gleditsch et al., eds. Dordrecht: Kluwer Academic, 1997.

*An early and balanced assessment of the interaction of environmental, political, and social factors in conflict, with direct reference to climate change and migration. Draws on extensive case evidence from Asia and Africa in particular.*

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