



SPECIAL REPORT

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ABOUT THE REPORT

This report was completed by the author as a Jennings Randolph senior fellow at the U.S. Institute of Peace (USIP) during 2011–12. It highlights increasing dangers to U.S. citizens and international threats to peace from expected increases in the number and scale of extreme natural events across the globe. Population increases and concentrations, economic weaknesses and climate volatility, combined with the vulnerability of food, water, and public health systems, present risks of major casualties and disruptions. Political dysfunction and inaction compound the risk that popular anxieties will provoke protective political actions, which could lead to aggressive competition for scarce resources, heightened political tensions, and even violent conflicts.

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CONTENTS

Acts of God and Human Vulnerabilities	2
Local Catastrophes and Global Repercussions	4
Defensive Measures and Strategic Adjustments	7
Recommendations: National Security and Global Solidarity	11

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Natural Disasters as Threats to Peace

Summary

- Natural disasters and extreme environmental events are expected to increase in number and severity on a global scale, elevating levels of economic, social, and political stress that could provoke both civil and international conflicts.
- Population growth, urbanization, economic fragility, and climate change are major factors in an interactive pattern of growing global vulnerabilities, compounded by widespread political inaction to address them.
- Enlarged urban and coastal populations in strategically important locations are at heightened risk of massive casualties, political strife, and increased regional tensions from major earthquakes, floods, and disease.
- Large natural disasters could also degrade key dimensions of the global economy—food, water, energy, medicine, supply chains, livelihoods—arousing widespread popular anxieties that could provoke preemptive protective measures.
- Intelligence agencies, think tanks, and academic specialists should increase their focus on the potential for major disasters in various parts of the world to cause economic, social, and political “ripple effects” that lead to deadly conflicts.
- Reducing the direct harm of such disasters will require initiatives in three areas: increasing local resilience, improving relief capabilities, and, where unavoidable, facilitating relocation from the most vulnerable areas.
- Avoiding adverse secondary consequences to political stability and human security will require both national and international collaboration to elevate the priority of preventing violent conflicts that could arise from these “natural assaults.”

The relentless assaults of our earthly habitat are heightening the global risks of deadly conflict. Climate change is just one of the ongoing trends increasing the chances that natural disasters and extreme environmental events will lead to social disruptions, aggressive competition for scarce resources, serious political confrontations, and even war.¹ The fractious

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debates surrounding global warming—its pace, effects, and human contribution—have distracted public attention from population trends and other factors that already have made large numbers of people more vulnerable to even normal patterns of natural disasters: earthquakes, storms, floods, droughts, and epidemics. The cumulative effect of increased and overlapping extreme environmental events will likely stimulate popular and political insecurities that eventually shift the fiscal and security priorities of the United States and other countries. Hopefully these priorities will include a commitment by the United States and other major governments, as the UN Charter puts it, “to take effective collective measures for the prevention and removal of threats to the peace.”² Experts and officials have an urgent responsibility to anticipate and explain the security implications and larger global repercussions of this emerging profile of “natural assaults,” while emphasizing the importance of collaborating internationally to reduce vulnerabilities, avoid popular overreactions, and contain adverse political consequences.

Acts of God and Human Vulnerabilities

The legal system has a term for destructive natural phenomena deemed beyond the control and responsibility of human beings: “acts of God.” While most of us no longer regard these assaults of nature as deliberate acts by enraged or punitive deities, we have come to respect their often awesome and arbitrary effects. Modern science explains them as modulations in one of the three spheres of our planetary surroundings—the lithosphere, atmosphere, and biosphere. In the lithosphere, energy eruptions in the earth’s crust can cause earthquakes, tsunamis, and volcanoes. In the atmosphere, changing concentrations and distributions of temperature through water and air can cause hurricanes, tornadoes, floods, droughts, and wildfires. In the biosphere, the modulation and migration of microorganisms can cause epidemics that weaken and kill people, animals, and plants.

As the three spheres of our habitat evolve and erupt, human beings frequently get in the way. Natural hazards become humanitarian disasters when they expose and exacerbate human vulnerabilities—those characteristics of societies that limit their ability to avoid major damage and recover quickly.³ Such vulnerabilities range from very concrete weaknesses in infrastructure or the exposed locations of large populated areas to more intangible dimensions of economic fragility, social cohesion, and political capacity, which affect both preparedness and recovery. Although the recent historical pattern of major storms, droughts, and earthquakes can be traced (see map 1 at the end of this report), the extent of human vulnerabilities is a complex and subjective matter, often evident only after the fact.

Mortality figures are typically used as indicators of the severity of disasters. By that measure, the three worst disasters in the world since 1950 were the earthquake in Tangshan, China, in 1976 (250,000 dead), the earthquake and tsunami in the Indian Ocean in 2004 (240,000 dead), and the earthquake in Haiti in 2010 (316,000 dead).⁴ These three earthquakes were by no means the largest in that sixty-year time frame, but they occurred where large numbers of people were exposed and unable to protect themselves. Severity also can be measured by other direct effects: destruction, dislocation, and disease. The 2010 earthquake in Haiti not only killed more than 300,000 people but injured an additional 300,000, affected 3.7 million (30 percent of the total population), caused \$8 billion in damage, and was followed by 470,000 cases of cholera with 6,631 attributable deaths. The death rate from an earthquake, hurricane, or epidemic is generally much higher in poorer societies than in richer ones, where economic damage is usually the more numerically impressive consequence.

Because their constituents have come to recognize how much the damage from “acts of God” can be affected by the actions, or inactions, of human beings, political leaders

are increasingly being held accountable for minimizing the foreseeable risks of extreme events. “Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention” is the indicative title of one important report by the United Nations and the World Bank. Reducing the risks begins with the recognition of how vulnerable many people have become. Throughout the world, in both wealthy and poor countries, ever-larger concentrations of people live in exposed locations under fragile or unprotected conditions. Infrastructure is often inadequate or deteriorating, and there is little or no awareness or preparation even for likely natural events. Those most exposed include millions in low-lying shorelines or coastal wetlands, marginal urban slums, and huge “temporary” settlements of internally displaced persons or refugees. Many of these populations depend on international humanitarian agencies to provide food and medicine and to assist local authorities in assuring adequate water, sanitation, health services, and shelter. As urban populations grow and conditions deteriorate further, reliable access to these necessities is becoming increasingly problematic for more and more people.

Demographic trends best convey the scale of the challenges. In less than twenty years, the global population will rise from 7.1 billion to more than 8 billion. Key countries will grow even more rapidly. Between 2010 and 2025, Egypt is projected to grow from 81 million people to 106 million, Pakistan from 174 million to 234 million, and Nigeria from 159 million to 258 million.⁵ Many more people around the world will attain middle-class incomes, but a large percentage in many countries will be young and unemployed. Half the world’s population is already twenty-five years old or younger. Projections suggest that, by 2030, the world will need to provide fifty percent more food and additional fresh water equivalent to twenty new Nile Rivers.⁶ In that time frame, the needs of many countries, including India and China, will begin to exceed foreseeable water supplies for consumption and irrigation.

The growth of earthquake-prone megacities is perhaps most telling of all. In just over a decade, metropolitan Jakarta will go from 9.6 million to 12.8 million people, Mexico City from 20 million to 24.6 million, Delhi from 22 million to 32.9 million, and Tokyo from 37 million to nearly 40 million—and these are just four of the thirty-seven cities that will then have populations greater than 10 million.⁷ There were only twenty-three in 2011. One of every seven or eight people in the world will be living in one of these massive metropolises, many in huge urban slums that have few, if any, services or infrastructure. Such concentrated population centers are extremely vulnerable to even normal patterns of earthquakes, storms, drought, and disease (see map 2). Epidemics that spread within such populations are especially difficult to contain. Climate volatility adds a further dimension of growing risk. Current changes in the climate of key regions portend severe near-term effects, whether or not the consequences of global warming match the worst predictions for the longer term. Since the 1980s the number of recorded natural disasters related to weather and climate has roughly doubled. According to the above-mentioned United Nations-World Bank report, “If there is no conscious change in adaptation policies to extreme events, baseline damages [even] without climate change are expected to triple to \$185 billion a year from economic and population growth alone”⁸ (emphasis added). Nor are these risks confined to poor or middle-income countries. The world’s largest reinsurance companies, Munich Re and Swiss Re, warn of major increases in weather-related damage in both North America and Europe over the next decade.⁹

Contrary to critiques from global warming skeptics, the scientific and intelligence communities actually have been cautious in predicting the human effects of climate change. The April 2012 report of the Intergovernmental Panel on Climate Change (IPCC) is relatively conservative in forecasting future climate-induced disasters.¹⁰ Likewise, the National Intelligence Council handles climate change and natural disasters in a largely conventional and understated manner.¹¹ However, an increasing number of authoritative reports have begun

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to highlight the dire risks of current climate trends and the need to begin assessing the potential for plausible adverse scenarios. Both the World Bank and the UN Environment Programme warned recently that the likely rise in global mean temperatures will exceed key thresholds sooner than previously expected, with implications for both severe weather and ocean surges.¹² Security specialists are beginning to take these trends to heart. The Defense Science Board warned in its 2011 report that climate changes in key regions will interact with other vulnerabilities to become serious “threat multipliers.”¹³ The World Economic Forum highlights the interactive implications of climate changes with governance, fiscal, population, and technology vulnerabilities.¹⁴ A recent report of the National Research Council called on foreign policy experts to consider more systematically the political and security implications of foreseeable climate changes, suggesting that “it is prudent for security analysts to expect climate surprises in the coming decade, including unexpected and potentially disruptive single events as well as conjunctions of events occurring simultaneously or in sequence, and for them to become progressively more serious and more frequent thereafter, most likely at an accelerating rate.”¹⁵

Responsible policymakers must look not only to the familiar and most imminent threats but also to less likely but higher-impact scenarios that could be truly catastrophic for national security.

Despite the pervasive dysfunction of most governments in addressing “climate surprises” and other disaster vulnerabilities, we will no doubt see environmental risks beginning to shape the political expectations of senior officials and thought leaders. As in the Cold War or the current “war on terror,” responsible policymakers must look not only to the familiar and most imminent threats but also to less likely but higher-impact scenarios that could be truly catastrophic for national security, particularly if sudden and unanticipated.¹⁶ Not unlike other threats to peace and security, the inability to predict with certainty the location and timing of future natural disasters should not obscure a nation’s vital interest in assessing their likelihood and potential aftereffects.

Local Catastrophes and Global Repercussions

The challenge is to envision plausible threats and sequential patterns of potential danger—not to scare people but to anticipate potential consequences and devise strategies to prevent or reduce economic, political, and social damage. The National Research Council suggests using analytical “stress” tests of particular countries or regions to envision the effects of major disasters, or clusters of disasters, even if some of them should be considered unlikely.

History offers examples of catastrophes that illustrate the possible ripple effects from otherwise local disasters. The Lisbon earthquake, tsunami, and fire of 1755 destroyed that city and decisively degraded Portugal’s role as an imperial power.¹⁷ The Spanish flu epidemic of 1918–20 killed an estimated fifty million to one hundred million people worldwide and was particularly lethal among young adults, compounding the immense losses to that generation from World War I. More recently, the destruction from Hurricane Katrina on the U.S. Gulf Coast in 2005; the earthquake, tsunami, and nuclear shutdown in Fukushima, Japan in 2011; and Tropical Storm Sandy on the U.S. East Coast in 2012 exposed the interconnected vulnerabilities of coastal settlements, energy infrastructures, health-care facilities, and large-scale relief and recovery operations—a complex combination for which neither the United States nor Japan was adequately prepared. Major localized disasters do not always result in irreversible setbacks. The Chicago Fire of 1871, the Boston Fire of 1872, and the San Francisco Earthquake of 1906 resulted in the major reconstruction of all three cities, making each of them more economically vibrant and resilient.¹⁸ New York will undoubtedly be better prepared after Sandy, as New Orleans was after Katrina when it faced Hurricane Isaac in August 2012.

Yet both disaster specialists and mainstream media too often treat natural disasters as limited and local matters. Media focus has typically been more on immediate suffering than

larger implications, direct effects than long-term consequences, and infrastructure repair than major institutional reforms. Nevertheless, as the number and scale of natural disasters increases, we are likely to witness growing public awareness and anxiety about the vulnerability of certain areas, which will become a strong political factor adding to the wider and longer-term consequences of disasters. Internet technologies will facilitate not only the rapid dissemination of distressing information about natural disasters and severe environmental conditions but also the potential for exaggerated predictions, political incitement, conspiracy theories, or even popular panic. Worst-case scenarios may then become urgent political focal points, especially those that illustrate the fragility of economic necessities, social cohesion, or public safety.¹⁹

Economic Cascades

The most troubling scenarios of natural disasters involve those with simultaneous effects on major essentials: food, water, land, medicine, energy, or subsistence income. An overlapping series of earthquakes, floods, and food shortages affecting a megacity could overwhelm the capacity of national and international agencies to respond adequately. Other consequences could follow: The Fukushima nuclear meltdown, for example, led both the Japanese and German governments to announce the phasing out of their nuclear power industries—a major blow to any prospect of curbing global carbon emissions.²⁰ Disruptive disasters in major food-producing regions could have dire global consequences. Corn, wheat, and rice crop failures would lead to price hikes and shortages in far-flung locations. The worldwide collapse of one of these major staples—for example, from a new fungal infestation in one region and a drought in another—could lead to famines, export cutoffs, stockpiling and hoarding, or cartelized supply arrangements. Such developments could create new zones of instability, hostility, and populist pretexts for aggressive steps to secure new supplies or assure future access. The drive to guarantee food sources has already prompted the governments of China, Korea, Saudi Arabia, and others to buy land in Africa and Latin America for growing food that could be diverted from global markets during shortages.

Water shortages could be another cause of future conflicts. Recent intelligence analyses suggest that countries are unlikely to go to war over water,²¹ but the larger patterns of depletion and diversion—glacial melts in South Asia and the Andes; upstream dams in the Middle East, East Africa, and Southeast Asia; widening drought in sub-Saharan Africa—suggest that peacefully resolving some disputes over severe water shortages could be very difficult. The genocides in Rwanda and Darfur owed much to the pressures of land, food, and water competition in fomenting ethnic conflicts.²²

Medicine can be another life-and-death necessity in times of emergency. It is not difficult to imagine that the government of a state facing the prospect of a deadly epidemic would take steps to seize or intercept supplies of essential medicines. After European and U.S. laboratories cloned the lethal H5N1 virus, Indonesia demanded access to the vaccine formulas to assure adequate supplies for its huge population at reasonable cost. A global pandemic from that virus or a similar microorganism could lead to travel restrictions, news blackouts, and other isolationist reactions, but also to more aggressive measures to obtain lifesaving medicine. Massive casualties could undermine the standard protocols of global cooperation among international and national agencies, reducing global effectiveness in containing disease.²³

Natural disasters can also sever transportation and communication links and global supply chains—life lines for necessities—compounding the catastrophe where the disaster occurs and affecting employment even in distant locations. In 2011 both the Thai floods and the Japanese earthquake and tsunami disasters affected hard-disk and auto suppliers, causing factory shutdowns and end-product shortages on other continents. The volcanic

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dust cloud from Iceland in 2010 halted European air traffic for only a week or so but even then had significant effects on both business and tourism. Compare this with the massive 1883 eruption of Krakatoa and the 1815 eruption of Mount Tambora, both in Indonesia, which created longer-lasting effects around the world. The Tambora event led to what was then called “The Year Without a Summer,” because of the adverse effects on U.S. and European weather patterns.²⁴

Social Collapse

Major disasters can have social consequences when the intense stress of damage and recovery causes breaks along ethnic, religious, class, or geographic fault lines. A major earthquake in a megacity could produce violent confrontations among groups competing for scarce relief supplies and recovery assistance. Or the disaster might create reverse-urbanization pressures for millions of homeless and jobless people in suddenly uninhabitable slums.

Once again, the purpose of discussing such scenarios is not to suggest that social chaos following a disaster is a given but rather to consider ways to prevent, or at least reduce, that possibility. The major quake that struck Mexico City in 1985 produced not widespread strife but inspiring solidarity in local relief and recovery operations, even among the poorest citizens.²⁵ That city is now a prime candidate for even bigger quakes, affecting an even larger population. Joint planning for such a crisis by the United States and Mexico could reduce the possibility of greater casualties and infrastructure losses that might impel hundreds of thousands to seek entry into the United States.

Sudden large-scale migrations are an increasing prospect among the effects of climate change. Low-lying islands, flood-prone coastal areas, large refugee camps, and regions of prolonged drought could provoke major population movements. The possibility of Bangladeshis pouring into India to escape delta flooding has already led the Indian government to construct a 4,000-kilometer fence to forestall such influxes. Mass migration from Africa to Europe could also result from the droughts and floods affecting an increasing number of areas. Within the continent, such forced movement could compound urbanization trends. Such cataclysms are unlikely to occur without violence.

Political Catalysts

Natural disasters can dramatically expose deep social inequities and government indifference or incompetence, fomenting opposition movements. In 1970, the government in western Pakistan responded so poorly to the cyclone that struck eastern Pakistan that it strongly contributed to the secession of what became Bangladesh. The Nicaraguan earthquake in 1972 fatally discredited the Somoza regime. The Myanmar government’s heartless response to Cyclone Nargis in 2008 was likely a further factor in the military regime’s political vulnerability and may have accelerated the recent transition there. An unprecedented drought in Syria from 2006 to 2010 disrupted agriculture in regions that then became strong supporters of the armed resistance.²⁶ The rise in global food prices that began with a severe drought in Russia in the summer of 2010 was a key factor in provoking popular uprisings in various Arab states the following year.²⁷

An earthquake and tsunami near Jakarta—40 percent of which is below sea level and frequently inundated by heavy rains—could render much of that city uninhabitable and set back Indonesia’s economic growth and democratic development for years. It could also reduce the country’s ability to cooperate on global issues, such as deforestation or pandemic prevention, on which its involvement has been crucial.²⁸ An earthquake in Karachi or Delhi or a major flood in Mumbai or Lagos could cripple the economies of their respective countries and further degrade the effectiveness of government authorities to avoid serious ethnic, sectarian, or even international conflicts. Major deterioration of any one of these

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cities could undermine the stability of their respective regions, with direct economic and possibly military consequences for the United States. Weak governments or failed states lack the capacity to prevent even moderate disasters from becoming severe crises.

For any of the above scenarios, it is insufficient for only government agencies to be aware or prepared. As the extent of global fragility in the face of natural disasters becomes more widely felt, the public may sense the start of a regional or even global slide toward scarcities of various kinds, leading to political pressures for more secure sources of necessities. Such pressures increase the risk of international confrontation and present opportunities for exploitation by terrorists, criminals, or fanatics who see increased mayhem as in their interest.²⁹

Defensive Measures and Strategic Adjustments

Efforts to reduce the severity of natural disasters and contain their larger consequences will require three kinds of initiatives: stoic, heroic, and “ecozoic.”

Stoic Resilience

Humans continue to cope with natural disasters largely as they always have, by “weathering” them: riding out storms, putting out fires, waiting out droughts, and helping out their neighbors. The capacity of societies to withstand catastrophes is generally referred to as resilience. Such resilience depends on physical, economic, cultural, and political factors that determine a society’s ability to plan for and recover from disasters without creating major social and economic fallout. These capabilities are almost entirely the “stoic” achievements of local people—namely, doing what is necessary to survive and prosper in the places they inhabit. As with all preventive efforts, the benefits of investing in resilient infrastructure and sensible preparedness far outweigh the costs of coping with the consequences after disasters strike. Strong and enforced building codes; zoning restrictions in coastal areas; prepositioned shelters and supplies; accessible hospitals, clinics, and health workers; well-publicized evacuation routes; and other aspects of public awareness all make a substantial difference in reducing casualties and damage. Media coverage can sometimes give the impression that those most affected by disasters depend mainly on responses from outsiders, but the reality in most cases is otherwise. People in the path of a natural event are almost always most effective in helping each other, comprising the overwhelming proportion of first and subsequent responders.³⁰

However, the United States is neglecting a range of major domestic vulnerabilities to natural hazards that could have catastrophic consequences.³¹ Stephen Flynn has most ably summarized these and other ominous features of what he calls our “brittle nation.”³² The vulnerability of coastal developments along the Eastern seaboard, so tragically demonstrated during Tropical Storm Sandy, is one continuing danger. On the opposite side of the country, earthquakes present the more ominous threat. As Flynn recounts, the deteriorating earthen levees that currently protect the massive farmlands of California’s Central Valley are vulnerable to seismic effects. If seawater were to breach the levees after a major earthquake, it would contaminate one of the country’s most important food and employment sources for years to come. Prolonged heat waves and drought in the Midwest, even worse than those in 2012, could permanently devastate croplands and damage the country’s strained and outdated electrical grid. As the U.S. public health infrastructure continues to degrade, deadly epidemics could severely reduce national economic performance and shake citizens’ confidence in the competence and reliability of government at all levels.

The current economic stress and political paralysis in the United States complicate the country’s physical vulnerabilities. Debt levels and ongoing deficits substantially reduce the capacity

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of government agencies at all levels to address infrastructure and preparedness investments that reduce disaster risks. In 2012, even normally routine federal appropriations for disaster relief after Sandy became a political football.³³ While most investments in community resilience, as well as in industrial and agricultural facilities, are state and local matters, congressional gridlock on many major issues indicates the difficulty that new assertions of federal authority or leadership would face in directing infrastructure changes or restricting flood zone settlements.

The domestic vulnerabilities of the United States are further compounded by the global risks to vital U.S. interests resulting from the vulnerabilities of critical infrastructure and large populations around the world. While national development strategies increasingly emphasize “disaster risk reduction” and “sustainable economies”³⁴ and certain countries, such as Bangladesh, Vietnam, and Mozambique, have successfully lowered their casualty rates from recurrent flooding through better preparedness and infrastructure changes, their examples are not widely imitated. Even their successes may be overwhelmed eventually by the expected scale of storms and ocean surges. Ethiopia and Rwanda have implemented food security policies that have increased their ability to cope with drought and other environmental challenges. But despite initiatives such as the U.S. Agency for International Development’s (USAID) Feed the Future program, the global prospects for substantial increases in food production are uncertain at best. Worldwide expenditures on health care, including infrastructure and training, experienced an exceptional increase over the last decade, especially from the U.S. government. However, both health and agricultural improvements depend on continued donor assistance, which has already fallen significantly since the global recession.³⁵

Most fundamental to stoic readiness is the political capacity of societies to mobilize in the face of crises. Such capacity includes the ability to make decisions quickly and cohesively, to redirect funding rapidly without corruption, and to deliver supplies and support efficiently. Even effective democratic governments, such as those of Turkey or Indonesia, might find regional, ethnic, or religious diversity becoming a source of conflict in the wake of a massive natural disaster. More troubled federal polities, such as Pakistan or Nigeria, could unravel, although Pakistan has handled three successive seasons of massive flooding with remarkable resilience. In failed or failing states, government capabilities are especially lacking, and such political capacity is the most difficult set of skills and institutions to improve, even with major development assistance from outsiders.³⁶ International organizations and financial institutions increasingly promote disaster risk reduction. Both the World Bank and the agencies of the UN system, led by the United Nations Development Programme, advocate investments that increase resilience to environmental challenges. But the resources to back up these recommendations are not commensurate. For example, under the impetus of the 1997 Kyoto Protocol on climate change, an adaptation fund to assist with risk reductions was initiated in 2001. But that fund was not actually launched until 2007, and despite the creation of a similar green climate fund at the Copenhagen climate change summit in 2009, both initiatives remain woefully underfunded—as highlighted in the latest global gathering on climate change in Doha.³⁷

Both the World Bank and the agencies of the UN system, led by the United Nations Development Programme, advocate investments that increase resilience to environmental challenges.

With a huge imbalance between growing global risks to large populations and declining investments in resilience, U.S. leaders will be forced to make difficult choices. U.S. policies on development assistance will likely have to adopt a form of preventive triage, placing scarce assistance dollars where they will have the most enduring effects on resilience and adjustment, rather than where the needs of poverty reduction and other objectives of the UN’s Millennium Development Goals (MDGs) might otherwise seem greatest. Already the efforts to set a new agenda for development after the deadline for the MDGs in 2015 include some recognition of the need for a more pragmatic view of sustainability. But as with the MDGs, the political dimensions of resilience continue to receive little emphasis in current drafts of these global manifestos.

Heroic Relief

Increased resilience must be matched with enhanced capabilities for effective relief. Improving the scale and effectiveness of assistance to the victims of disasters is an essential priority not only for limiting immediate effects but also for containing political fallout. In the United States, specialized national agencies, such as the Federal Emergency Management Agency (FEMA) and the American Red Cross, are the principal organizers of emergency support, supplemented by state-level agencies, the National Guard, and countless local and national non-governmental organizations (NGOs).³⁸ Since Hurricane Katrina in 2005, all these actors have demonstrated improved capacities to deal with storms, even as available resources for future crises are in decline. Most other developed countries have similar, though mainly national, agencies to lead relief operations. In poorer countries, capacities are more variable, often either completely localized or highly dependent on national military agencies, as evidenced during the 2004 tsunami in the Indian Ocean. The National Disaster Management Authority of Pakistan, in its response to the massive floods of 2010 and 2011, has been one of the notable civilian exceptions. Assistance to the most at-risk countries to increase their own capacity for humanitarian relief should be a donor priority.

Resources for humanitarian assistance from national donor agencies have seen major growth in the past twenty years. In the United States, funding for foreign disaster assistance has had strong bipartisan support in Congress for many years, and humanitarian relief resonates strongly with large portions of the U.S. electorate. The Office of Foreign Disaster Assistance (OFDA) within USAID has had a record of operational excellence and effectiveness. Other governments also have made international humanitarian assistance a high priority. Scandinavian ministries, the United Kingdom's Department for International Development (DFID), and the European Commission's Solidarity Fund have been especially generous contributors to relief operations in recent times, both directly and through UN agencies. The role of major international NGOs, corporate philanthropy, and foundations has also grown, with resources that sometimes exceed those from official sources. With the expansion of heroic generosity, the delivery of disaster assistance has become a major international industry. Large companies and suppliers sell their goods and services in the wake of each major event. NGOs similarly follow devastation and suffering from place to place. Many take advantage of public attention and sympathy for disaster victims to raise large amounts of money for relief.

However, the effectiveness of relief operations, and especially the transition from relief to recovery, often has been less than optimal. Repeated proposals have been made to create a more centrally coordinated system, and UN agency leaders have made major advances over the past two decades in coordinating and funding major international relief operations. In 1991, the General Assembly created an Inter-Agency Standing Committee (IASC) of UN agencies, a Central Emergency Revolving Fund (CERF), and an Emergency Relief Coordinator (ERC) within the UN secretariat. The latter evolved by the end of the 1990s into the Office for the Coordination of Humanitarian Affairs (OCHA), headed by the ERC with the rank of under-secretary-general. In 2005, following the Indian Ocean tsunami, IASC members agreed on an intensified approach to collaboration, dubbed the "cluster system," which divided relief operations into major functional components and designated lead agencies in each sector to coordinate the work of both international organizations and NGOs. The current ERC, Valerie Amos from the United Kingdom, has undertaken further efforts to improve the performance of the relief community, in the process raising billions of dollars through consolidated appeals, including urgent "flash appeals" to donors.

The January 2010 earthquake in Haiti, which received huge publicity and donations, highlighted both the best and worst features of the international cluster system—and of

Improving the scale and effectiveness of assistance to the victims of disasters is an essential priority not only for limiting immediate effects but also for containing political fallout.

heroic relief efforts in general.³⁹ Assistance followed a familiar pattern of initial energy and compassion that dissipated once the atmosphere of emergency and improvisation shifted to the long-term demands for major reconstruction and local government control. The influx of supplies and aid workers during the first year of relief was overwhelming. One year later, agencies reluctantly faced the need to shift their promises from “building back better” (as former President Clinton likes to put it)⁴⁰ to the harsher choices involved in satisfying donors that their resources were accomplishing more immediate concrete effects. Addressing short-term basic human needs for water, food, and shelter—often to people living in large tent cities—is a different task from that of rebuilding basic infrastructure, restarting large and small businesses, and forging political institutions that endure after agencies depart. As all too often happens, the initial humanitarian response to Haiti was overly romantic, inconsistent, and insufficiently attuned to the unique features of the local culture, economy, and political system.⁴¹ With intense economic pressures on virtually all major donors, disillusionment with relief operations may result in political pressures to reduce assistance. Popular support for even the most sympathetic causes may begin to wither, including among generous Americans, especially if foreign crises multiply, or if the U.S. homeland itself is struck by major natural disasters that divert attention and resources to domestic priorities.

The multilateral institutional cushions needed to mitigate the social, economic, and political fallout from extreme events remain ad hoc and undeveloped. G-8 and G-20 summit agendas pay some attention to these issues but with little evident follow-through from national governments.⁴² The UN Security Council, despite one famous session to address the security implications of HIV/AIDs in early 2000, has been erratic and unfocused in dealing with the broader security challenges of disease and disasters. As the council is the principal global institution responsible for addressing international “threats to the peace,” such neglect will need to be remedied. International financial institutions have standard approaches for assisting with disaster recovery, such as the emergency response programs of regional development banks, as well as the World Bank’s Emergency Recovery Loan program, Hazard Management Unit, and Global Facility for Disaster Reduction and Recovery (GFDRR). The International Monetary Fund has an emergency assistance facility designed to ease the fiscal effects of major disasters.⁴³ But these economic mechanisms are not scaled for the size of the challenges ahead, and the international diplomatic and intelligence channels needed to address urgent political and security risks are relatively undeveloped. Even the example of the successful global efforts led by the World Health Organization in responding to pandemic threats from the SARS and avian flu viruses may not prevent national budget cuts in preventive and public health capacity.⁴⁴ The same budgetary fate could befall otherwise promising initiatives to reduce food insecurities, such as those which the G-20 governments have endorsed. The international community deserves great credit for its recent heroic efforts to aid societies affected by natural disasters. But it is highly unlikely that multilateral relief operations are prepared to work at the necessary scale when disaster incidents multiply. As with future investments in resilience, some form of priority setting or triage may become the imposed standard for major international relief as well.

Ecozoic Relocation

Even the most effective combination of stoic and heroic efforts will not sustain vulnerable populations indefinitely. As sea levels and storm surges continue to rise, as key fisheries are contaminated or extinguished, as certain regions become inhospitable to agriculture, or as earthquakes or epidemics degrade the capacity of megacities to provide for their citizens, some currently inhabited parts of the planet will have to be scaled back, or even abandoned, for large-scale settlement. Particularly if global warming trends fulfill some scientific projections, the planet may impose wholesale and dramatic adjustments to the locations, dimen-

As sea levels and storm surges continue to rise . . . some currently inhabited parts of the planet will have to be scaled back, or even abandoned, for large-scale settlement.

sions, and lifestyles of human settlements on a scale akin to the major migrations imposed by ancient ice ages. Anticipating future adaptations of this magnitude, some scientists and philosophers have begun to refer to a coming “ecozoic” age of human adaptation.⁴⁵

In the United States, such speculation will likely surface initially as more intense versions of familiar controversies over development or rebuilding in coastal areas or floodplains. These issues involve decisions about zoning, taxes, subsidized flood insurance,⁴⁶ and the various publicly funded programs that promote or sustain coastal growth, such as beach reclamation or the building of wave barriers and dikes.⁴⁷ Developers and local politicians often downplay disaster risks and the pressures from local citizens are almost always to rebuild rather than to abandon or relocate. Yet even the most stoic impulses must confront difficult choices. New Orleans is a prominent case in point regarding resettlement and reconstruction in areas prone to further flooding, such as the lower Ninth Ward. Hurricane Isaac demonstrated that the huge post-Katrina investments in floodwalls and levies involved decisions to protect certain areas at the expense of others. Such choices now confront officials and citizens on the Jersey Shore, Staten Island, and Long Island in the wake of Tropical Storm Sandy.

The same issues will be replicated around the world. Government subsidies for hazard insurance or expensive engineering for stopgap measures, such as dikes, imported water supplies, or beach reclamation, will at some point no longer protect exposed populations enough to justify the resources needed to maintain them. As media coverage and public discussion increasingly focus on the most exposed areas, many people will begin to vote with their feet and look to resettle their families and businesses in areas less exposed to the hazards they witness across the globe. Real estate prices and infrastructure investments will increasingly reflect the realities of that new marketplace. Obvious areas of special exposure already justify “exit strategies” or migratory transitions. The former president of the Maldives, Mohamed Nasheed, has become a prominent spokesman for the fundamental threats of sea level increases to small island states.⁴⁸ In other exposed areas—such as low-lying estuaries of Bangladesh, Burma, and Vietnam, as well as large areas of Africa—desertification, erosion, or salinization could render agriculture or adequate supplies of potable water infeasible. Water shortages may make areas of Central Asia and the Middle East impractical for continued settlement. On an even larger scale, some experts suggest that the expected growth of certain megacities will reach practical ceilings because of the physical and economic limitations of distributing food and water.⁴⁹ Major epidemics could accelerate these pressures to limit or reduce some urban populations.

The political and social dimensions of massive shifts in environment and population are difficult to predict, but the likelihood is that over time large groups of people will become ecologically displaced persons or “environmental refugees,” forced from their historic homelands and needing relocation to more hospitable places within or beyond national boundaries.⁵⁰ Such transitions will present large political and economic challenges, both for long-term humanitarian support and for immigration laws and enforcement. If these movements involve millions of desperate people, geographic and political boundaries will become increasingly problematic.

Recommendations: National Security and Global Solidarity

The incidence of military conflicts between states is at a historic low; even the number of conflicts within states has declined steeply since the twentieth century.⁵¹ However, both trends could be slowed or reversed by increased vulnerabilities to natural disasters and the limits of political and economic capacity to deal with them. How should the challenges ahead be framed in terms of U.S. national security and the larger “threats to the peace”?

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Citizen Safety

Most governments place their highest priority on national security, which begins with ensuring the physical safety of their citizens, or as John Jay famously put it in *The Federalist*: “Among the many objects to which a wise and free people find it necessary to direct their attention, that of providing for their *safety* seems to be the first.”⁵² While they are used to thinking of such safety in terms of protection from attacks by military or terrorist adversaries, Americans also regard their fundamental security as dependent on access to reliable supplies of air, water, food, medicine, and shelter.⁵³ All would likely place these subsistence needs above any threat currently on the horizon, foreign or domestic. However, it is leaders—thought leaders as well as political leaders—who define the priorities for government policy and expenditures in dealing with what they perceive as the greatest threats to the country and its citizens. Such definitions of national security generally arise as narratives developed in the course or aftermath of major international attacks or threats of attack. Historical turning points in these narratives over the last hundred years include, for example, the German attacks on U.S. shipping that provoked the country into World War I; the Japanese attack on Pearl Harbor that plunged the United States into World War II; the Berlin crisis, Korean War, and Soviet nuclear tests that intensified the Cold War; and the September 11, 2001, attacks that provoked the U.S. War on Terror. Whether or not all Americans agreed with the security rationales their leaders offered at those times, they provided bold assessments of the threats confronting the country, which gained wide acceptance. Each narrative was a necessary, and apparently sufficient, political basis to enlist political support for executive orders, policies, legislation, appropriations, treaties, and other international commitments that were consistent with the leaders’ justifications.

At present there is no reasonable prospect that U.S. leaders would create a national security narrative focused on the cumulative threats from an overstressed planet.⁵⁴ To mobilize popular support for the major initiatives necessary to reduce foreseeable risks, U.S. leaders would eventually have to shift their characterizations of such threats from environmental to existential and from futuristic (after 2050) to imminent (before 2020). That shift is unlikely until Americans experience a pattern of severe crises that would shift popular perceptions and political attitudes in decisively different directions. No one wants to contemplate the horrific disasters that might drive such a shift in attitudes, especially when the destruction from Katrina and Sandy seem not to have had such an effect on most political leaders.

Political resistance to the recognition of these likely threats is reinforced by a suspicion that those who highlight them are also seeking to justify major government interventions and expenditures, involving severe changes in lifestyles. References to global warming, or even to obvious climate changes, sound to some audiences as code words to justify carbon caps and oil taxes. Therefore this report assumes that such mitigation programs are not foreseeable in time to avoid the climatic, economic, and demographic consequences of current trends. Indeed, it is because these trends will not be changed in time that steps must be taken to adapt to their likely effects. U.S. political and thought leaders need to fulfill their highest responsibility—for the safety of citizens—by beginning to consider a range of risk reduction policies, infrastructure investments, and preparedness strategies, including the necessary legislative and budgetary changes, that might constitute an approach to national security aimed at reducing the direct and secondary consequences of natural disasters. Whether or not the necessary stoic and heroic steps are all politically palatable, the larger arguments for them should at least be actively under current debate. As Stephen Flynn has emphasized, most of these steps would not only reduce U.S. vulnerability to extreme natural events but would also reduce the opportunities for terrorists to exploit the same vulnerabilities.⁵⁵

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How these competing political pressures will play out depends not only on the timing and locations of disasters but also on how soon the growing public perception of our vulnerabilities becomes a political reality. The combination in 2012 of major tornados, midwestern drought, Texas floods, Hurricane Isaac, western wildfires, Arctic ice depletion, and Tropical Storm Sandy could mark the beginning of a sea change in the electorate's expectations of present and future exposure to natural disasters. In that event, the hardest challenge for U.S. leaders may well be to prevent the country from turning inward to focus on domestic priorities and resisting involvement in the crises of other countries or regions. Such isolationism could be expressed through intensified calls for energy independence, food self-sufficiency, foreign assistance cutoffs, and even military retrenchment. Reversing decades of generosity and pragmatism, donor fatigue and domestic needs could generate a new version of an "America First" constituency that opposes all such international engagement and punishes at the polls any politician who supports it.

Collective Containment

U.S. leaders also cannot ignore the national security implications of the most serious risks of disaster beyond our borders. The safety of U.S. citizens is inextricably bound through the global economy with the course of environmental events in other parts of the world. Disasters or extreme conditions that degrade major agricultural areas (Russian, Australian, or Argentinean wheat fields, Japanese, Burmese, Philippine rice), disrupt for prolonged periods key manufacturing, transportation, or communications infrastructure (greater Bangkok, Bosphorus, European airspace), or create immense casualties among large stressed populations (pandemics in Pakistan, Brazil, Nigeria) could affect the stability of entire regions. The severe degradation of a megacity could snowball into wider instability and conflict if not managed collaboratively. The sooner and more deliberately U.S. leaders can articulate geographic, cultural, or economic justifications for targeting scarce assistance, the sooner they are to be persuasive to U.S. citizens.

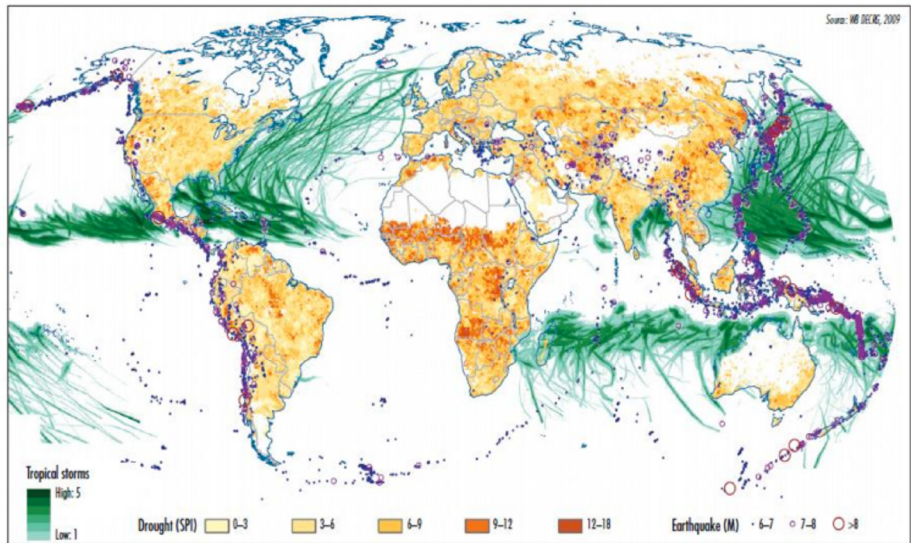
Political preparation is equally required of other governments and populations. If disasters multiply, U.S. influence with these countries will likely depend on the level of U.S. engagement, generosity, and leadership in promoting a sense of global solidarity through an agenda for collaboration on resilience, relief, and relocation options. For this purpose, the U.S. government will need to complement its domestic security rationale with a compelling diplomatic narrative that advocates the needs and priorities for dealing with events that might otherwise spark major confrontations. The alternative could well be aggressive measures by governments, desperate for necessities, to bypass market allocations or seize supplies by intercepting transports, deploying covert operations, or even initiating outright invasions. A series of functionally focused collaborations to identify and manage key risks could be indispensable to contain the political consequences of future extreme events. Whether the Security Council, the G-20, the World Health Organization, or some new or combined political coalition would be the locus for such negotiated understandings is unclear. But the likelihood is that all international institutions will have to elevate their focus and resources to address disaster scenarios and environmental vulnerabilities.

The security agendas of politicians, policymakers, and intelligence personnel will likely be distracted, for the time being, by perceived dangers from rogue states armed with nuclear weapons, failed states and ungoverned areas as safe havens for terrorists, and economic criminals, such as cyberburglars, unfair traders, and intellectual property thieves. Meanwhile, the safety and prosperity of the United States, as well as peace throughout the world, increasingly will be endangered by unaddressed vulnerabilities to natural disasters and extreme environmental crises. Contention and conflict could also result from the sudden realization—or opportunistic exaggeration—among large groups of alarmed citizens that

The safety of U.S. citizens is inextricably bound through the global economy with the course of environmental events in other parts of the world.

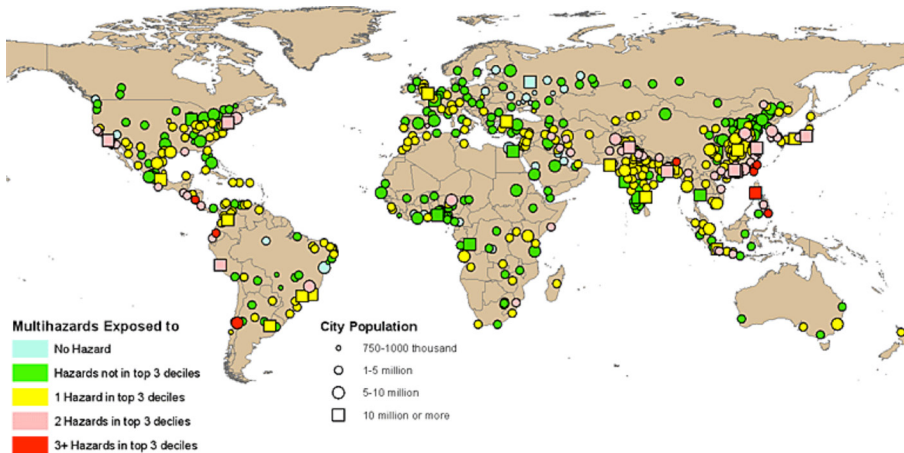
such vulnerabilities are both existential and irreversible. Given demographic and environmental trends, and the increasing vulnerabilities and probable shortages to be expected within this decade—and certainly before 2030—the threats to the peace from Mother Nature may soon come to dwarf any of the threats posed by mere mortals.

Map 1. Where Hazards Have Struck



Source: World Bank staff. Earthquakes above magnitude 6 on the Richter scale for 1950 to February 2010 (from Northern California Earthquake Data Center, www.ncedc.org); tropical storm tracks for 1975–2007; droughts based on standardized precipitation index (SPI, larger values indicate a higher probability of precipitation deficits) compiled for the Global Assessment Report 2009 (from www.preventionweb.net/english/dyogo/gar).

Map 2. Urban Agglomerations by Size Class and the Potential Risk of Natural Disasters: 2025



Source: United Nations Department of Economic and Social Affairs, Population Division.

Notes

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31. See National Research Council, *Adapting to the Impacts of Climate Change* (Washington: National Academies Press, 2007).
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50. See Elizabeth Ferris, *The Politics of Protection: The Limits of Humanitarian Action* (Washington, DC: Brookings Institution, 2011), chapter 7.
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