THE YEAR THAT SHOOK THE RICH:
A REVIEW OF NATURAL DISASTERS IN 2011

The Brookings Institution –
London School of Economics
Project on Internal Displacement

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BROOKINGS

THE YEAR THAT SHOOK THE RICH: A REVIEW OF NATURAL DISASTERS IN 2011

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Bangkok, Thailand — Severe monsoon floods, starting in late July 2011, affected millions of people. A truck with passengers aboard drives through a heavily flooded street. Photo: UN/Mark Garten

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ACRONYMS

AusAID	Australian Agency for International Development
CAP	Consolidated Appeal Process
CERA	Canterbury Earthquake Recovery Authority
CERF	Central Emergency Response Fund
CRED	Centre for Research on the Epidemiology of Disasters
DFID	Department for International Development (UK)
DDR	Disaster Risk Reduction
EHAP	Emergency Humanitarian Action Plan
EM-DAT	Emergency Events Database (International Disaster Database)
EQC	Earthquake Commission
FEMA	Federal Emergency Management Agency
FEWSNET	Famine Early Warning Systems Network
FSNAU	Food Security and Nutrition Analysis Unit – Somalia
FSNWG	Food Security and Nutrition Working Group for East Africa
FTS	Financial Tracking Service
GDP	Gross Domestic Product
IAEA	International Atomic Energy Agency
IASC	Inter-Agency Standing Committee
ICVA	International Council of Voluntary Agencies
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displaced Person
IDRL	International Disaster Response Law
IHRC	Interim Haiti Reconstruction Commission
ILC	International Law Commission
IFRC	International Federation of Red Cross and Red Crescent Societies
IMF	International Monetary Fund
INES	International Nuclear and Radiological Event Scale
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IRIN	Integrated Regional Information Networks
ISDR	International Strategy for Disaster Reduction
NGO	Non-governmental Organization
NOAA	National Oceanic and Atmospheric Administration

NRC	Norwegian Refugee Council
OECD	Organization for Economic Co-operation and Development
OFDA	Office of Foreign Disaster Assistance (USAID)
PPP	Purchasing Power Parity
TEPCO	Tokyo Electric Power Company
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
UN OCHA	United Nations Office for the Coordination of Humanitarian Affairs
USAID	United States Agency for International Development
USAR	Urban Search and Rescue

Thousands of Kenyans, Somalis and Ethiopians are forced to take long arduous journeys in search of survival, as the Horn of Africa experiences the worst drought in 60 years. Credit: © IOM 2011 - MKE0405 (Photo: Lovorka Ikovac)

FOREWORD

It is with great pleasure that I introduce this report, *The Year that Shook the Rich: A Review of Natural Disasters in 2011,* by the Brookings-LSE Project on Internal Displacement. Since the devastation of the 2004 Indian Ocean tsunami, the Project has played a leading role in highlighting the human rights of communities affected by natural disasters and this report is intended to deepen understanding of current trends in both disasters and international disaster response.

As the Special Rapporteur on the Human Rights of Internally Displaced Persons, during my missions to the Maldives and Kenya in 2011, I have witnessed the terrible consequences of disasters as well as the looming threat that climate change poses to many countries. My first report to the UN General Assembly highlighted the relationship between climate change, displacement and human rights and this is an issue which I intend to prioritize during my mandate. Disasters pose unique challenges to our societies and to international response mechanisms. Governments, humanitarian actors and communities must strive to respond to disasters in ways that do not discriminate against the weak and vulnerable members of society and that uphold the full continuum of human rights of all those affected.

This *Review* provides a general overview of natural disasters which occurred last year and of the international humanitarian community's responses to them. In accordance with the title, the *Review* looks at the experience of developed countries with natural disasters in 2011. It was a particularly bad year for developed countries as evidenced by the Japanese earthquake/tsunami/nuclear accident, the earthquake in Christchurch, New Zealand, floods in Australia, and tornadoes, hurricanes and drought in the United States. These (and other) disasters remind us that natural hazards affect all regions of the world and even rich countries have much to learn about both disaster risk reduction and disaster response. The *Review* then looks at the intersection of drought, famine and conflict, with a particular focus on the Horn of Africa in 2011. Finally the report closes with a contribution about the impact of natural disasters on one particularly vulnerable – and resourceful – sector of society: the elderly.

Over the past decade, there has been increased awareness of the human rights dimensions of natural disaster response. Notably the *Operational Guidelines on the Protection of Persons in Situations of Natural Disasters* adopted by the Inter-Agency Standing Committee offers concrete guidance to agencies involved in disaster response. The revision of those *Guidelines* in 2009 further strengthens this guidance by, among other things, highlighting the need to adopt disaster risk reduction strategies which take human rights issues into consideration.

I hope that better understanding of natural disasters and their effects on our societies will help us to design more effective policies to address needs and uphold rights of all of those affected by natural disasters. In a warming world in which we will most likely see more frequent and intense natural disasters this is of upmost importance.

Chaloka Beyani
Special Rapporteur on the Human Rights of Internally Displaced Persons

EXECUTIVE SUMMARY

This *Review* analyzes some of the major events and trends related to natural disasters and humanitarian disaster response in 2011.

- **2011 was the most expensive year in terms of disaster losses in history, mostly because of a spate of disasters affecting developed countries**. Globally, the economic cost of disasters in 2011 was $380 billion, of which $210 billion were the result of the earthquake and tsunami in Japan. This was 72 percent higher than the losses in 2005, the second costliest year in history for disaster-related losses.
- **In terms of both the number of disasters and the number of people affected by them, 2011 was a below-average year in comparison with the previous decade.** With 302 disasters recorded by the International Disaster Database (EM-DAT), 2011 saw the lowest number of disasters since the beginning of the millennium. The number of disasters was almost 20 percent below the average annual figure of 384 natural disasters from 2001-2010. There were 206 million disaster-affected persons in 2011, which is about ten percent below the ten-year average.
- **Developed countries were particularly hard-hit by disasters in 2011 as evidenced by floods in Australia, earthquakes in New Zealand, an earthquake/tsunami in Japan and a series of disasters in the United States. While natural disasters result in higher economic losses in rich countries, fewer people tend to be affected and loss of life is less than in developing countries.** Higher levels of preparedness, resilience and good governance in many cases help richer countries to recover faster from natural disasters than poorer ones.
- **While developed countries generally have the resources to respond to the effects of natural disasters, when a major disaster strikes they still have to deal with responding to offers of international assistance.**
- **The post-tsunami Fukushima nuclear accident in Japan poses serious questions about preparedness for technological and industrial accidents caused by natural hazards as well as questions about the safety of nuclear technology.**
- **Examples from last-year's disasters in the rich world show that investment in disaster risk reduction and preparedness pay off and are cheaper than post-disaster reconstruction.** Still, high-impact low-probability events can overwhelm the best prepared society**.**

- **Disaster plans and defenses need to be adjusted to a new and shifting "normal."** Because of climate change, predictions are that intervals of heavy precipitation and extreme temperatures will likely become more frequent in the future. In other words, what was formerly a "once-in-a-century" disaster might become a "once-in-a-generation" disaster. Furthermore, new "once-in-a-century" disasters may simply overwhelm the current state of preparations.

- **Several positive trends in international humanitarian response were evident in the course of 2011, including promising developments in international disaster law, greater emphasis on disaster risk reduction and preparedness, and better communications during crises, including the use of social media in disaster response.**

- **Post-disaster recovery and reconstruction after a major disaster are long-term processes which need much more scrutiny and attention.** Examples from rich countries suggest that rebuilding processes can be participatory and can incorporate sound principles such as risk reduction and green technologies.

- **There are still major methodological difficulties in terms of measuring the effects of natural disasters, especially when it comes to measuring the economic costs of disasters and understanding the particular characteristics of slow-onset disasters such as drought.**

- **The first famine in twenty years was declared in Somalia in mid-2011, demonstrating the deadly interaction of conflict, political instability and drought that can result in a catastrophe with high human casualties.** Although there were warning signs in Somalia for almost a year before famine was declared, the international community was unable to prevent its outbreak due to continuing conflict and the resulting lack of humanitarian access to affected communities.

- **The interconnections between disasters (especially mega-disasters), media coverage and humanitarian funding means that humanitarian funding tends to be directed toward disasters that have higher media coverage rather than to those with disaster-affected populations in greater need of assistance.** Thus in 2011 almost half of humanitarian disaster funding reported through the UN's Financial Tracking Service was sent to Japan – where it made up only about a third of one percent of the total economic cost of the disaster. Overall, international humanitarian funding for disasters declined from almost $6.5 billion in 2010 to around $1.5 billion in 2011.

- **Global population is aging at an unprecedented scale and yet the special needs of older people in emergencies are often neglected.** In 1950 around eight percent of the world's population was over the age of 60 – a percentage projected to increase to 22 percent by 2050. In disasters such as the earthquake/tsunami in Japan and Hurricane Katrina, older people made up a disproportionate percentage of casualties. Given the fact that developing countries are also experiencing an increase in the per-

centage of elderly people, it is likely that a lack of focus on older persons in all phases, from planning to emergency management to post-disaster reconstruction, can result in higher fatalities among older people, long-term chronic health issues, psychosocial trauma and isolation. Treating older people simply as “normal” disaster victims denies the specific vulnerabilities that many older people face.

- **More work is needed to recognize the positive contributions which older people can make in reducing the risks from disasters, in disaster response and in recovery and reconstruction.**

The US was particularly hard hit as Mississippi River floods were followed by a string of deadly tornadoes, the worst drought in generations, and terrible wildfires. Photo: © Thinkstock.com

INTRODUCTION*

In terms of the overall number of disasters, 2011 was a quiet year with the International Disaster Database (EM-DAT) recording 302 disasters, 20 percent fewer than the average of 384 disasters in the last 10 years.[1] But for some developed countries, 2011 was a terrible year. The year began with once-in-a-hundred years floods in Australia, quickly followed by a devastating earthquake in Christchurch and a month later by a horrific earthquake/tsunami/nuclear accident in Japan. The US was particularly hard hit as Mississippi River floods were followed by a string of deadly tornadoes, the worst drought in generations, terrible wildfires and then Hurricane Irene which closed down much of the country's east coast for several days. With the exception of the Japanese tsunami, casualties in these developed countries were low – particularly in comparison with disasters in 2010 when the Haitian earthquake killed hundreds of thousands. But the economic damage was tremendous and millions of people were forced to confront the fact that their countries' wealth and security could not protect them from the effects of natural hazards. Ominously, the radioactivity released by the damaged Fukushima Daiichi nuclear plant introduced a whole new dimension to natural disaster response, raised questions about the Japanese government's otherwise effective response, and sparked a new set of concerns about the safety of nuclear technology. 2011 was indeed a year that shook the rich.

This *Annual Review* begins with an overview of the natural disasters that affected developed countries in 2011 and their consequences. This is followed by an overall assessment of natural disasters in 2011, a quick look back at recovery efforts following disasters in 2010 – particularly the earthquake in Haiti and the floods in Pakistan – and a review of some of the major disasters that happened outside the rich world, including some that didn't receive a lot of media coverage. We also examine some of the trends in the field of natural disaster response and preparedness, with a particular focus on encouraging developments in international disaster response law, growing recognition of the role of affected states in disaster response, and the not-so-encouraging efforts in the course of the year to clarify lead agency responsibility for protection in natural disasters.

This is followed by a third chapter focusing on one particular type of disaster – drought – and the way in which the intersection of drought and conflict led to famine in Somalia.

* The authors thank Megan Bradley and Leah Denman for their valuable assistance with this publication.

1 EM-DAT: The OFDA/CRED International Disaster Database, "2011 disasters in numbers," 18 January 2011, www.emdat.be - Université catholique de Louvain - Brussels - Belgium"; EM-DAT records disasters at country level meaning a hazard that strikes different countries receives several database entries for each affected country.

Natural hazards do not in themselves constitute disasters. Rather, it is the community's political system, social stability, social capital, preparedness and response that determine whether an event such as a drought or a cyclone will be a disaster or a nuisance. The fourth and final chapter in this *Review* focuses on one particular group of people affected by disasters – the elderly.

In terms of natural disasters, 2011 was indeed the year that shook the rich, but it was also a year of growing awareness that the devastation caused by natural disasters is linked with long-term climate change. While the dominant fault line in the international political order is between developed and developing countries, the disasters of 2011 are evidence that rich countries are vulnerable to natural hazards and share a common interest with developing countries to ramp up efforts to reduce the risk of disasters, prepare for disasters and strengthen the international response system to disasters when they occur. People living in evacuation centers in Japan enjoyed a higher standard of living than those taking shelter from the floods in Pakistani schools, but there were similar feelings of loss, fear, trauma and sometimes a shared sense of having been abandoned by their governments.

Governments of rich countries were faced not only with pressures to respond quickly to needs on the ground but also with the challenge of responding to the offers of aid that poured in from around the world. The fact that more than 160 countries offered assistance to Japan in the aftermath of the earthquake/tsunami was a touching manifestation of global solidarity. People from Mexico, Bangladesh and dozens of other countries wanted to respond to the needs of people affected by the disaster, even though they lived in a wealthy country. This expression of solidarity is a positive phenomenon which offers a temporary transcendence of the dominant North-South divide in global politics. For countries on the receiving end, these offers of aid don't just pose a logistical and administrative challenge to government bureaucracies. They also force rich countries to recognize that they are not invincible when disaster strikes. While few in developed countries can imagine widespread civil conflict in their communities, there is growing awareness of their vulnerability to natural hazards. In fact it is this recognition of shared vulnerability and interdependence that may be the most important consequence of the year that shook the rich.

Scales of disasters

It is often difficult for the human imagination to visualize the sheer spatial impact of natural disasters. We therefore have included an interesting attempt at visualization of scales of disasters by David McCandless and Miriam Quick (see following page).[2] The graphic shows differences in the geographic size of areas affected by floods in Australia (2010/11), Pakistan (2010) and Thailand (2011) and the size of areas affected by strong tremors in the Chile earthquake (2010), the Japanese earthquake (2011) and the Haiti earthquake

[2] David McCandless and Miriam Quick, "Scale of Devastation," 2011, www.informationisbeautiful.net

(2010). Another comparison is drawn between the scale of arable land destroyed by the Russian heat wave (2010), the area affected by wildfires during that heat wave, and the exclusion zone set up after the 1986 Chernobyl nuclear disaster. In addition, the graphic visualizes the scale of annual deforestation in the Amazon and Indonesia as well as the areas affected by the Exxon Valdez and Deep Water Horizon oil spills, and for comparative purposes it includes the surface of the United Kingdom.

Of course, the impact of a natural hazard on the population depends on many factors beyond the sheer scale of the affected area, including population size and density in the affected area, and usually much more importantly, how well prepared a society is for a specific disaster. The Table below provides data on casualties and economic damages for each of the disasters depicted in the graphic, illustrating that the geographical scale often does not correspond directly to the actual devastation experienced by affected communities.

Table 1 Disaster Statistics Corresponding to the "Scales of Devastation" Graph[3]

	Year	Total affected	Fatalities	Est. damage ($ bn.)
Haiti earthquake	2010	3,700,000	222,570	8.0
Chile earthquake	2010	2,671,556	562	30.0
Japan earthquake and tsunami	2011	405,719	19,846	210.0
New Zealand earthquake	2011	301,500	181	6.0[4]
Australia floods	2010/11	200,000	16	5.1-15.9[5]
Pakistan floods	2010	20,359,496	1,985	9.5
Thailand floods	2011	13,000,000+[6]	813	40.0

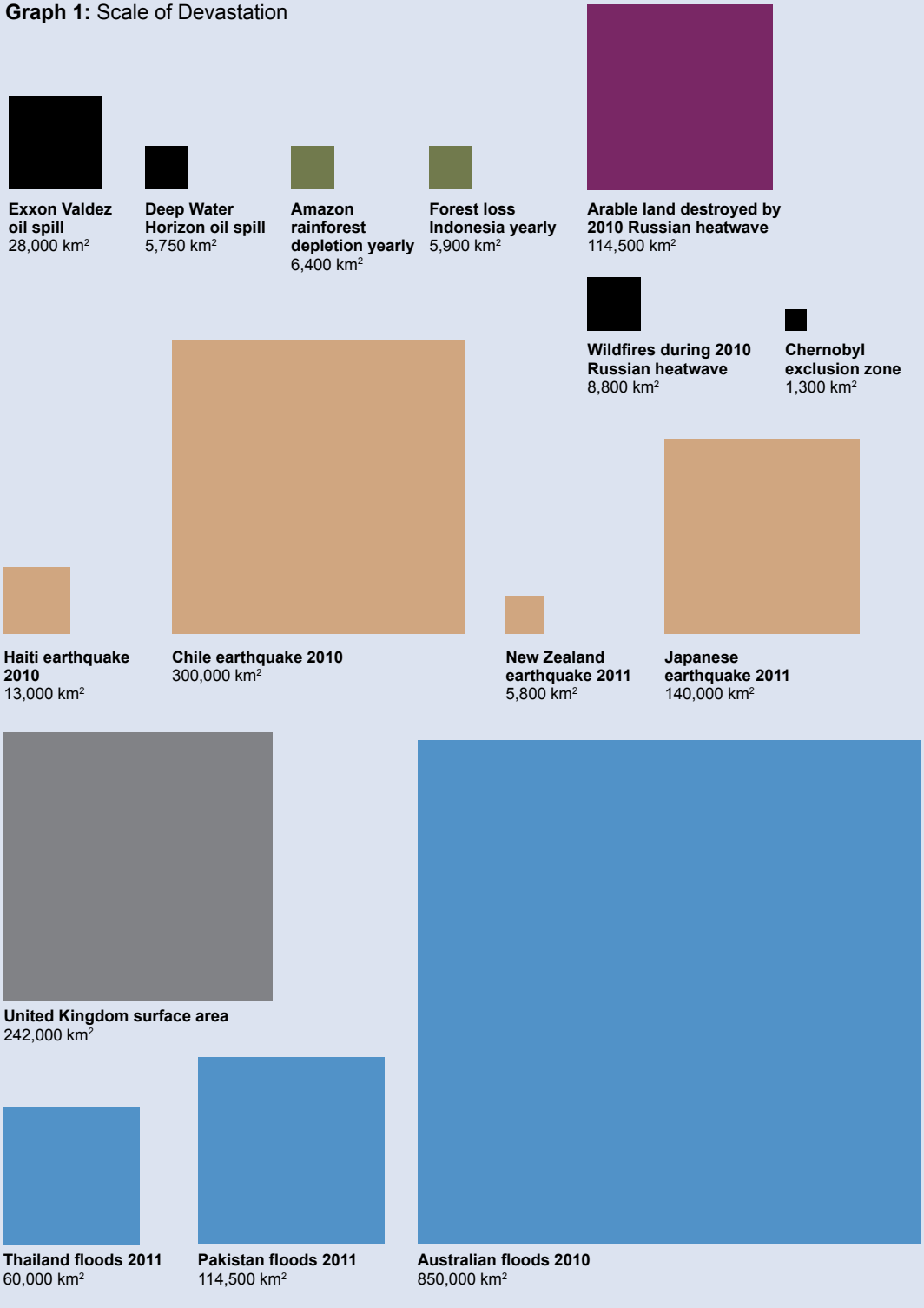
[3] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 17 January 2011, www.emdat.be

[4] Damage figures for February earthquake only. EM-DAT reports overall damages for the September 2010, February 2011 and June 2011 earthquake series at $16.5 billion.

[5] The low estimate is from EM-DAT. The high end damage estimation number of the Queensland Reconstruction Authority includes damages cause by the floods and a series of tropical cyclones hitting the area in late 2010-early 2011. See Chapter 1, Section 4 for more detailed information.

[6] Xinhuanet, "Thailand's flood death toll rises to 564," 16 November 2011, http://news.xinhuanet.com/english2010/world/2011-11/16/c_131250863.htm

Graph 1: Scale of Devastation



David Mc Candless & Miriam Quick / / informationis Beautiful.net
Sources: USGS, ScienceDirect. Wikipedia // data: bit.ly/scalesdev

A word on definitions and sources: Problems of definition, problems of methodology

Defining 'natural disasters'

> **Natural disasters:** "The consequences of events triggered by natural hazards that overwhelm local response capacity and seriously affect the social and economic development of a region."[7]

Natural hazards in of themselves – hurricanes, floods, droughts – are not disasters. Rather it is their consequences and the ability of the local community to respond to them that determine whether the event is characterized as a disaster. If a cyclone washes over an uninhabited atoll in the Pacific, it is not a disaster. If the effects of flooding are easily dealt with by local authorities, it is not considered a disaster.

This study relies on reporting by the International Disaster Database (EM-DAT)[8] in which an event is considered to be a disaster if at least one of the following criteria is fulfilled: "10 or more people reported killed, 100 people reported affected, declaration of a state of emergency, or an appeal for international assistance."[9]

There are various problems with both the terminology and the methodology used in describing the impact of natural disasters, beginning with the fact that it is particularly difficult at times to distinguish between "natural" and "human-made" disasters. Recognizing the impact that human action has on whether a natural hazard results in a disaster, some refer simply to disasters, others to disasters triggered by natural hazards. Some would go so far as to argue that there are no "natural" disasters – that a "disaster" is the result of the failure of authorities to either prevent or respond adequately to the negative effects of natural phenomena.[10] The devastating toll on Haiti of four hurricanes in 2008 was primarily the result of natural phenomena, but certainly their impact was exacerbated by

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7 Brookings-Bern Project on Internal Displacement, *IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters*, January 2011, http://www.brookings.edu/reports/2011/0106_operational_guidelines_nd.aspx

8 Since 1988 the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED) has maintained an Emergency Events Database EM-DAT. EM-DAT was created with the initial support of the WHO and the Belgian government. The main objective of the database is to serve the purposes of humanitarian action at the national and international levels. It is an initiative aimed to rationalize decision making for disaster preparedness, as well as to provide an objective base for vulnerability assessment and priority setting. EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be.

9 *Ibid.*

10 Naomi Klein, *The Shock Doctrine: The Rise of Disaster Capitalism*, 2007.

long-term deforestation and poor governmental policies. In fact, in that year, severe hurricanes struck both Haiti and Cuba, but while 700 people died in Haiti, only seven fatalities were reported in Cuba.[11]

Another definitional problem is the relationship between "sudden-onset" and "slow-onset" disasters. While floods, hurricanes and earthquakes occur with little advance warning, it may take months or years for droughts or environmental degradation to seriously affect the development of an area or to overwhelm local capacity to adapt. While the difference between the two makes intuitive sense, there is no consensus on the dividing line between sudden and slow-onset disasters. Nor are there even accepted definitions of the terms sudden and slow-onset disasters. For example, flooding – even though it is usually considered a sudden-onset disaster – sometimes occurs over a period of weeks or months as it did in Thailand this year.

Defining 'affected people'

> **Affected people:** "People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance. Appearance of a significant number of cases of an infectious disease introduced in a region or a population that is usually free from that disease." EM-DAT further qualifies that the term "can also include displaced or evacuated people." The category of "total affected" thus includes "people that have been injured, affected and left homeless after a disaster."[12]

In practice, there is considerable ambiguity in how the term "affected people" is used. National disaster management agencies and NGOs use different definitions and standards for estimating the effects of disasters. There might in certain cases also be incentives to inflate or deflate the numbers of disaster-affected persons. Sometimes the task of assessing how many people are affected is simply too great given the chaos of a disaster situation. Good governance and strong state capacity should increase the credibility of a country's disaster data, but then again, sometimes even the richest countries simply do not have systems in place to collect data in the aftermath of a disaster. Collecting reliable statistics on the displaced for example is a complicated task, as witnessed by the fact that estimates of the number of people displaced by Hurricane Katrina in the US in 2005 ranged from 1 to

[11] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be. In 2008, hurricanes Fay, Gustav, Hanna, and Ike killed 698 people in Haiti in August and September, while Hurricane Ike killed 7 in Cuba.

[12] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be: The EM-DAT Glossary, http://www.emdat.be/glossary/9 , and: Criteria and Definition, http://www.emdat.be/criteria-and-definition

1.5 million and there was existing no national tracking system to monitor the movements (including the returns) of those displaced throughout the country.[13]

It is even more difficult to measure the number of people affected by direct and indirect economic losses resulting from a disaster. For example, a tractor salesman in drought-affected Texas may find that his sales plummet because farmers cannot afford to buy tractors. Even though his income may fall significantly, he is not considered to be "affected" unless he needs immediate life-saving assistance, is injured or made homeless, according to EM-DAT's definition. The nuclear disaster in Japan, while directly affecting several hundred thousand people, is likely to have indirect consequences for virtually every Japanese citizen in terms of future energy use and costs. Nor does the category of "disaster-affected" even attempt to include such intangible but real effects such as fear, depression, shaken confidence in government authority, and personal risk-aversion.

In a globalizing world, disasters often have economic effects that ripple around the world. The floods in Thailand, for example, led to a huge disruption of global supply chains for products such as cars and microchips and almost certainly led to job losses in countries other than Thailand. People who lost their jobs in Japan or Italy because of the floods in Thailand are not covered in the numbers of those affected by the floods. We can therefore assume that the negative effects of disasters are much greater than the numbers of affected persons in the statistics we use suggest.

People who are displaced because of a natural disaster constitute one of the major challenges for both national authorities and international agencies. A 2011 study on disaster-induced displacement by the Internal Displacement Monitoring Center (IDMC) and the Norwegian Refugee Council (NRC) found that more than 42 million persons were displaced by sudden-onset natural hazards in 2010 out of a total of over 200 million affected by disasters during that year. It also showed that in 2010, over 90 percent of disaster displacement within countries was caused by climate-related hazards, primarily floods and storms.[14]

Defining 'drought'

Droughts present particular difficulties in data collection, beginning with the fact that there is no universal definition of what constitutes a drought. The World Meteorological Organization defines drought as "a sustained, extended deficiency in precipitation," while the UN Convention to Combat Drought and Desertification states that a drought is "the naturally

[13] See: International Organization for Migration, "Migration, Climate Change and the Environment," May 2009, http://www.iom.int/jahia/webdav/shared/shared/mainsite/policy_and_research/policy_documents/policy_brief_envmig.pdf, p. 3.; See also: Sandra Yin, Population Reference Bureau, "The Plight of Internally Displaced Persons," October 2005, http://www.prb.org/Articles/2005/ThePlightofInternallyDisplacedPersons.aspx

[14] IDMC and NRC, *Displacement Due to Natural-induced Disasters: Global Estimates for 2009 and 2010,* June 2011, available at http://www.internal-displacement.org

occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems." In contrast, the UN's Food and Agricultural Organization defines a drought hazard as "the percentage of years when crops fail from lack of moisture."[15] In comparison, EM-DAT defines a drought as a "long lasting event, triggered by lack of precipitation. A drought is an extended period of time characterized by a deficiency in a region's water supply that is the result of constantly below average precipitation. A drought can lead to losses to agriculture, affect inland navigation and hydropower plants, and cause a lack of drinking water and famine."[16]

Under EM-DAT's methodology, the starting date of droughts in the database is the day of the onset of drought-related losses rather than the moment when the hazard began (e.g. the first day in a three month-long drought period). If the date when these losses began is not available, then the date when the emergency is declared is taken as the starting date of the drought. If this is also not available, then the date of "report publication"[17] is used when entering data into the database. As with other disasters recorded in EM-DAT, the end date for a drought in the database is the year and month at which the hazard ceases to exist.[18]

As it is difficult to determine excess mortality and damage figures from droughts unless they cause famines, EM-DAT seldom provides those figures for droughts. This means that in most cases mortality figures are only available for sudden-onset disasters. Furthermore, EM-DAT only creates an entry for droughts in the starting year of the drought. Damage and casualty numbers, if available, are included for the entire period in that single entry. As explored further in Chapter 3, in spite of the methodological difficulties associated with tracking their effects, droughts are perhaps the deadliest form of disaster.

[15] Ashok K. Mishra, Vijay P. Singh, "A Review of Drought Concepts," *Journal of Hydrology* 391, 2010: 202-216, p. 206.

[16] EM-DAT, "Glossary", http://www.emdat.be/glossary/9

[17] EM-DAT does not comment on the specific meaning of this term.

[18] EM-DAT, *New Methodology for Tracking Drought Disaster Events, Drought data in EM-DAT*, http://www.em-dat.net/documents/MethodologyWebPage.pdf

Data sources

The most widely cited and reputable source of data on natural disasters is the International Disaster Database (EM-DAT), which is a global database on natural and technological disasters that contains essential core data on the occurrence and effects of more than 18,000 disasters around the world from 1900 to present. EM-DAT is maintained by the Centre for Research on the Epidemiology of Disasters (CRED) at the School of Public Health of the Université catholique de Louvain located in Brussels, Belgium. The database is compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies.[19]

This report also uses data from Munich Re's NatCatService, which is the world's largest database of natural catastrophe losses and contains more than 28,000 entries since as early as 79 AD, with a complete dataset available since 1980. The Munich Re NatCatService records up to 1,000 loss events per year. Depending on their financial and human impact, events are assigned to one of six loss categories – from a small-scale loss event to a great natural catastrophe.[20] Because it includes small-scale disasters NatCatService records a higher number of disasters than EM-DAT.

In terms of humanitarian funding for disaster response, this report relies on data from the Financial Tracking Service (FTS) run by the UN Office for the Coordination of Humanitarian Affairs (OCHA). The FTS is a global, real-time database which records all reported international humanitarian aid (including that for NGOs and the Red Cross/Red Crescent Movement, bilateral aid, in-kind aid and private donations). All FTS data is provided by donors or recipient organizations. FTS features a special focus on consolidated and flash appeals, because they cover the major humanitarian crises and because their funding requirements are well defined. This allows FTS to indicate to what extent populations in crisis receive humanitarian aid in proportion to needs.[21]

For disaster damage figures in this *Review* both EM-DAT and Munich Re NatCatService data are used. Definitions of disaster damage are discussed in more detail in Chapter 2 of this review. If not otherwise indicated, all financial data in this report are in US dollars ($).

The lack of clarity in defining disasters and in measuring their impact is a serious impediment to comparative analysis of disasters and to understanding the ways that they affect individuals and communities.

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19 EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be

20 Munich Re, "NatCatService," http://www.munichre.com/touch/naturalhazards/en/natcatservice/default.aspx

21 OCHA, Financial Tracking Service, "About FTS", http://fts.unocha.org/pageloader.aspx?page=AboutFTS-uctrlAboutFTS

The Great East Japan Earthquake. Photo: © Yoshiyuki Kaneko | Dreamstime.com

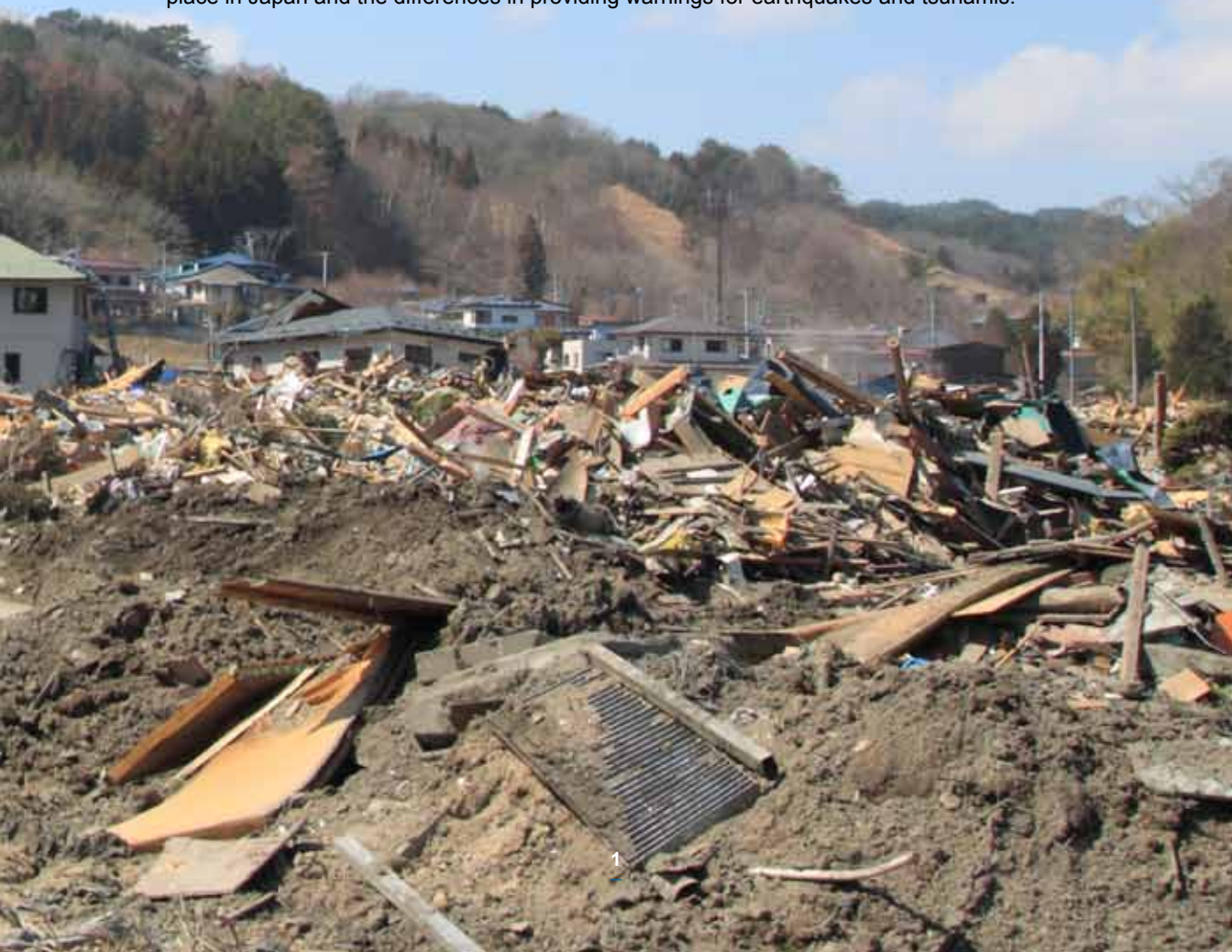
CHAPTER 1

THE YEAR THAT SHOOK THE RICH

2011 was the costliest year in history in terms of natural disaster damage, in large part due to major disasters which occurred in some developed countries. The earthquake and tsunami in Japan alone were estimated to have caused over $200 billion in damages.

This chapter looks in more detail at the disasters that shook developed countries in 2011, beginning with the Japanese earthquake/tsunami/nuclear accident – the most expensive disaster in history. While the earthquake occurred with a bit over a minute's warning, the consequences of that disaster will be felt for years, perhaps decades, to come.[22] In particular the nuclear accident at the Fukushima Daiichi plant not only raised troubling questions about the way the Japanese government handled this aspect of the disaster, but also generates disturbing concerns about the intersection of future natural hazards and technology.

[22] Technology Review, "80 Seconds of Warning for Tokyo," 11 March 2011, http://www.technologyreview.com/computing/35090/?p1=A3. This article gives an account of the early warning system in place in Japan and the differences in providing warnings for earthquakes and tsunamis.



Discussion then turns to the United States which experienced a string of costly and varied disasters in 2011. Unlike in Japan where energy and attention focused on a single mega-disaster, in the United States, different kinds of disasters occurred in succession, none of which caused more than 500 deaths. But after the snow, the tornadoes, the floods, the drought, the wildfires and the hurricane the country was wondering what could possibly come next. While residents of New York prepared for torrential flooding caused by Hurricane Irene, Texans and their neighbors battled record drought and devastating wildfires.

The flooding experienced by residents of Queensland in Australia in the early part of 2011 (though the waters actually began rising late the previous year) was on a physical scale greater than that of all other disasters occurring in 2011. And the earthquake that occurred very close to the center of Christchurch, New Zealand in February (itself one of 7,000 aftershocks to the September 2010 quake) caused major damage to half of the city center's buildings, leaving many of them beyond repair.

Although some of our analysis focuses on the economic costs of the disasters in developed countries, for too many people, economic losses paled in comparison with the loss of family members and homes and the disruption to their lives and livelihoods. For all of those affected by disasters – whether in rich or poor countries – it is hard to overstate the experience of personal loss. People died, were injured, lost family members and homes, lost jobs and/or faced a drop in income. Many were displaced to temporary shelters and faced the uncertainty of not knowing when or if they could return. Some chose to move elsewhere permanently to escape the potential dangers of future hazards.

People living in developed countries generally have better access to insurance and social safety nets than those living in developing countries; they expect their governments to respond when disasters occur. National disaster management agencies are, to varying degrees, well-staffed, well-trained and well-prepared. They have planned for contingencies, pre-positioned supplies and are usually able to respond effectively and promptly. Protocols are generally in place for mobilizing additional resources, such as military and police forces, when the needs so merit. This was generally the case in the four countries experiencing natural disasters considered here – Australia, New Zealand, Japan and the US. But responses in developed countries are not immune to problems of discrimination as sometimes evidenced, for example, in more robust programs of assistance to homeowners than to renters.[23] Disturbingly, in both developed and developing countries, the incidence of personal violence, such as domestic violence and child abuse, tends to increase in the aftermath of disasters.[24]

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[23] Elizabeth Ferris and Daniel Petz, *A Year of Living Dangerously, A Review of Natural Disasters in 2010*, Brookings-LSE Project on Internal Displacement, 2011, p. 67 ff.

[24] See: Canadian Red Cross, International Federation of Red Cross and Red Crescent Societies, *Predictable, Preventable: Best Practices for Addressing Interpersonal and Self-Directed Violence During and After Disasters*, 2012; See also: Elizabeth Ferris, "When disaster strikes: women's particular vulnerabilities and amazing strengths," *Keynote presentation, Women's Leadership Lunch, National Council of Churches Assembly*,10 November 2010, New Orleans, Louisiana,

As examined in more detail below, 2011 was the most expensive year in history for natural disasters – primarily because of the disasters in the rich world. Globally, economic losses attributed to natural disasters in 2011 reached $380 billion – of which the Japanese disaster alone accounted for more than 55 percent of the total (not even including nuclear-related damage).[25] Munich Re estimates the economic costs of the Japan earthquake and tsunami at $210 billion, with insured losses accounting for only $35-40 billion – about 18 percent of the total.[26] In contrast, damages from New Zealand's earthquake totaled $16 billion of which over 80 percent were covered by insurance. The difference in coverage between those two countries is explained by the fact that every house or contents insurance holder in New Zealand is automatically covered by the countries Earthquake Commission's insurance scheme, which insures up to NZD100,000 +GST (approximately US$83,000) for dwellings and up to NZD20,000 +GST for personal effects.[27] The Earthquake Commission's insurance not only covers earthquakes but all major disasters, such as tsunamis, floods, storms, etc. including fire damages caused by any of those.[28] Meanwhile, in Japan earthquake insurance is costly and therefore people and companies either opt not to take out insurance policies or select ones that do not cover the entire damage.[29]

Still, while many parts of the rich world were affected heavily by disasters in 2011, Europe was the outlier on all three of the major indicators of loss from natural disasters. As a region, it recorded the lowest numbers of fatalities, affected persons and the lowest economic damages since 1990.[30] But then, Europe had major problems of a different – economic and financial – kind in 2011. And while 2011 was relatively benign for Europe in terms of natural disasters, 2012 hit the region hard with a major cold wave.

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p. 4. There is no evidence yet about higher rates of domestic violence after the 2011 Japan earthquake and tsunami.

25 Munich Re, "The five largest natural catastrophes of 2011," Geo Risks Research, NatCatSERVICE, January 2012, http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.aspx

26 Note that the Japanese government initially estimated material damage at $190-300 billion but later revised it to $210 billion.

27 Goods and service tax (GST).

28 Earthquake Commission, "EQC Insurance," http://www.eqc.govt.nz/insurance.aspx

29 David Zeiler, "Japan May Prove an Overall Boon for Insurers," Seeking Alpha, 21 March 2011, http://seekingalpha.com/article/259287-japan-may-prove-an-overall-boon-for-insurers

30 AlertNet, "Richer nations hit hard by disasters in 2011," 19 January 2012, http://www.trust.org/alertnet/news/richer-nations-hit-hard-by-disasters-in-2011/

A group of people evacuates from the flooded area at Sapan Mai district during the massive flood crisis on November 13, 2011 in Bangkok. Photo: © Cowardlion | Dreamstime.com

Section 1

Disasters in the "Rich" World, Some Numbers

Defining the "rich world" is not as easy a task as it appears. The most common indicator to measure a country's wealth is the Gross Domestic Product (GDP), but while the GDP is a good indicator to capture a nation's overall material wealth, it says little about broader categories such as income inequality, societal mobility, gender equality or the state of a country's environment. There have therefore been several attempts to develop broader benchmarks of human wealth and well-being, one of the major ones being UNDP's Human Development Index. To not get tangled up in this debate, we simply decided in this study to focus on those "rich" countries that are members of the Organization for Economic Co-operation and Development (OECD), which currently has 34 member states and includes all major large developed economies.[31] The 31 OECD members in 2010 (Estonia, Israel and Slovenia were only admitted in the second half of 2010 and so are not included in these figures) had a share of 51 percent of the global economy in 2010, a number illustrating the major economic power of OECD countries.[32] Within the OECD there are obviously also large differences in wealth, with Luxembourg having a GDP per capita of $81,466 while the corresponding figure for Mexico is only $14,406.[33] However, basing our analysis on OECD members excludes a number of rich states. For example, our analysis does not include oil-rich Middle Eastern countries such as Qatar, which leads the 2010 global GDP per capita in purchasing power parity (PPP) list with $88,222 per capita, and smaller highly developed countries such as Singapore which with a GDP per capita of $56,694 is the third most affluent country in the world.[34] Still, as it includes 22 out of 30 of the richest countries in the world in terms of GDP, focusing on the OECD member states allows us to get a strong sense of how wealthy countries have been affected by natural disasters over the last decade.

While wealthy countries generally have more resources to devote to disaster risk reduction and response, the poor and marginalized in those countries can be exposed to many of

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31 The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States, see: OECD, "List of OECD Member countries - Ratification of the Convention on the OECD," accessed 15 January 2012, http://www.oecd.org/document/58/0,3746,en_2649_201185_1889402_1_1_1_1,00.html

32 OECD, "Economy : Developing countries set to account for nearly 60% of world GDP by 2030, according to new estimates," 16 June 2010, http://www.oecd.org/document/12/0,3343, en_2649_33959_45467980_1_1_1_1,00.html

33 IMF, "World Economic Outlook Database, September 2011, Gross domestic product based on purchasing-power-parity (PPP) per capita GDP," www.imf.org

34 *Ibid.*

the same vulnerabilities encountered in developing countries. Those who were unable to evacuate New Orleans before Hurricane Katrina struck, for example, tended to be poorer than those who escaped. It's also important to recognize that wealthy people in poor countries also tend to fare better, both in terms of their vulnerability to natural hazards and their access to resources in disaster recovery.

OECD disaster data 2001-2010

In the decade from 2001 to 2010, around 37.3 million persons were affected by natural disasters in OECD countries, accounting for 1.61 percent of the total number of disaster affected persons in that decade. In other words, 98 percent of those affected by disasters in this period were from non-OECD countries. When we look at fatalities, the difference is not as stark, with OECD countries having around 8.12 percent of global disaster fatalities during that period (see Table 2). Interestingly, almost 83 percent or 71,422 fatalities come from one single disaster, the 2003 European heat wave.

Table 2 Disaster Affected, Fatalities and Damage – Comparing OECD and Global Totals 2001-2010[35]

	OECD countries	World	OECD countries as percentage of World total
Total disaster affected 2001-10	37,322,039	2,323,319,858	1.61%
Total disaster fatalities 2001-10	86,385	1,064,295	8.12%
Total disaster damage 2001-10	$607 bn.	$978 bn.	62.01%
Population 2009	1,221,410,000[36]	8,629,400,000[37]	14.15%

As also evident in Table 2, while a lower percentage than the global average of the population of OECD countries are either affected by or killed by disasters, roughly 62 percent of the cost of all global disaster damages was registered in OECD countries during the 2001-10 period. These damage numbers are closely comparable to data from the United Nations International Strategy for Disaster Risk Reduction (UNISDR) which showed that from 1991-2005 around 60 percent of costs due to disasters were incurred in OECD countries.[38] Although historic disaster damage figures have to be considered with a certain degree of caution (for a more detailed discussion see Chapter 2 of this review), it seems logical that the higher asset base in more

[35] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 25 January 2012, www.emdat.be

[36] OECD, "OECD StatsExtracts," accessed 5 January 2012, http://stats.oecd.org/Index.aspx?DatasetCode=MIG

[37] UNFPA, *State of World Population 2009 – Facing a Changing World: Women, Population and Climate*.

[38] UNISDR, CRED, "Disaster Statistics, Total amount of reported economic damages by level of development and type of disaster (2005 US$ billion): 1991-2005", 2005.

developed countries is likely to account for higher damage numbers.[39]

While we still lack comprehensive data for 2011 at this point, the currently available data clearly show that OECD countries were especially hard-hit in 2011. In terms of fatalities the three deadliest disasters in OECD countries (Japan earthquake and tsunami, Turkey earthquake, US April tornadoes) killed over 20,000 persons and caused almost 70 percent of global disaster fatalities in 2011, compared to a 10-year average of around 8 percent of global disaster fatalities in OECD countries (for more details see Chapter 2 of this review).[40] Even if we include casualty estimates from the Horn of Arica famine (approximately 50,000-100,000 victims) the percentage of fatalities in 2011 which occurred in the rich world is well above the average for the preceding decade.

As noted, 2011 was the most expensive year for losses from natural disasters in history, in large part because of disasters in OECD countries. Four out of the five most costly disasters in 2011 occurred in OECD countries; the earthquake and tsunami in Japan alone made up 55 percent of global disaster damage in 2011.[41] According to Munich Re, the New Zealand earthquake, the April tornadoes in the US and Hurricane Irene each caused damages of more than $15 billion dollars and as discussed in Section 3 of this chapter, the US alone faced 14 disasters in 2011, each of which resulted in more than $1 billion in damage.[42] These numbers indicate that disaster damage in the OECD countries in 2011 might be higher than the already substantial 62 percent they were in the 10-year average since 2001. (The thorny issue of measuring economic damage from disaster is addressed in Chapter 2 of this review).

Statistics are not yet available on the percentage of the 206 million persons globally affected by natural disasters in 2011 that lived in OECD countries, but the floods in Australia in late 2010 and early 2011 and the earthquakes in Christchurch in September 2010 and February 2011 were the biggest disasters in both countries in terms of affected persons for over a decade. The same is true for the earthquake and tsunami in Japan.

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39 Disaster damage datasets are often incomplete and estimates often vary widely. For example, for Hurricane Katrina, disaster damage estimates varied from US$82 billion to US$125 billion (see Neumayer et al., *The Political Economy of Natural Disaster Damage,* September 2011). As an example for the limit of datasets, EM-DAT provided disaster damage estimates in 2010 for fewer than 70 out of 373 natural disasters, therefore we can assume that the real cost of natural disasters in 2010 was much higher than the $108.5 billion reported (See: Elizabeth Ferris and Daniel Petz, *A Year of Living Dangerously, A Review of Natural Disasters in 2010*, Brookings-LSE Project on Internal Displacement, 2011).

40 The majority of fatalities from those three disasters were recorded for the Japanese Tohoku earthquake and tsunami, which according to EM-DAT left 19,846 persons dead or missing. Source: Debarati Guha-Sapir, "Disasters in Numbers 2011," CRED-UNISDR Press Conference, Geneva, 18 January 2012, CRED Université catholique de Louvain - Brussels – Belgium, www.emdat.be

41 For more detail see Chapter 2, Section 1 of this review.

42 Munich Re, "The five largest natural catastrophes of 2011," Geo Risks Research, NatCatSERVICE, January 2012, http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.aspx

A factory facility burns following an earthquake and tsunami in Sendai, northeastern Japan, March 11, 2011. Photo: © Mainichi/AFLO/Nippon News/Corbis

Section 2

Japan: The Most Expensive Disaster in History, the Tohoku Earthquake and Tsunami

The facts of the Great East Japan or Tohoku earthquake are well-known: a powerful 9.0 earthquake on 11 March 2011 was followed minutes later by a tsunami with waves reaching as high as 30 meters, destroying or damaging some 138,000 buildings and causing $210 billion in economic damages. 19,846 people are known to have died or are still missing.[43] It is a testament to Japan's pioneering work in developing earthquake-resistant construction techniques that only an estimated 100 people were killed in the earthquake itself.[44] Many of the 5.6 million residents of the three prefectures worst hit by the disaster lost their homes and the number of evacuees peaked at more than 475,000 a few days after the quake. A notable feature of members of the affected communities was their age. The population in the hard hit northeastern part of the country was older on average than the Japanese population as a whole, with over a quarter of the population over the age of 65. The specific needs of older people in disasters are considered in Chapter 4 of this review.

Table 3 Top 10 Natural Disasters in Japan by Fatalities since 1900[45]

Disaster	Date	Fatalities
Earthquake	1/9/1923	143,000
Earthquake, tsunami	11/3/2011	19,846
Earthquake	17/01/1995	5,297
Earthquake	28/06/1948	5,131
Storm	26/09/1959	5,098
Storm	09/1917	4,000
Storm	18/09/1945	3,746
Earthquake, tsunami	2/3/1933	3,064
Storm	21/09/1934	3,006
Storm	09/1923	3,000

While Japan has a long history of earthquakes, this was the most powerful earthquake the country ever experienced although it was not the deadliest. The 1923 Great Kantō earthquake resulted in far higher casualties, with over 140,000 dead. In 2011, the combination of the powerful earthquake and the tsunami – whose scale had not been predicted – caused

43 EM-DAT: The OFDA/CRED International Disaster Database, accessed 13 January 2012, www.emdat.be

44 Interviews conducted by Elizabeth Ferris, Tokyo, May 2011.

45 EM-DAT: The OFDA/CRED International Disaster Database, accessed 24 January 2012, www.emdat.be; The number of casualties for the 2011 earthquake and tsunami is adjusted to the number presented by CRED on 18 January 2012: "Disasters in Numbers 2011."

massive destruction. The devastation to infrastructure – roads, trains, ports, and communications systems – was widespread as was the destruction of factories, homes, schools, and other buildings, particularly in the prefectures of Iwate, Myagi and Fukushima. Dams ruptured, electricity went off, about 11 percent of Japan's ports were closed and 2.6 percent of Japan's farms were washed away or submerged.[46]

Over 1,000 aftershocks hit the region in the period immediately following the earthquake, at least three of which measured over 7.0 on the Richter scale, increasing fear and uncertainty among the population. But it was the tsunami which was triggered by the earthquake which caused by far the most damage. In fact, at least 100 tsunami evacuation sites were destroyed, indicating that the scale of the waves of this tsunami had not been anticipated.[47] The Pacific Tsunami Warning Center issued a tsunami warning for the entire Pacific region shortly after the earthquake but while some waves were reported as far away as the Philippines, Hawaii and Oregon, casualties were few and economic damages were minor.[48]

The nuclear risk

While the earthquake and tsunami were responsible for the large-scale loss of life and damage to infrastructure, it was the threat posed by damage to nuclear reactors that caused the greatest fear – and the greatest criticism of the Japanese government's response. The earthquake and tsunami created the worst global nuclear crisis since the 1986 Chernobyl disaster. The three active reactor units, reactors 1, 2 and 3 at the Fukushima Daiichi Nuclear Power Station suffered meltdowns after the quake knocked out the plant's power and the tsunami disabled the backup generators meant to keep the cooling systems working. (Reactor units 4-6 were shut down for planned maintenance when the disaster happened.)[49]

The day after the earthquake/tsunami, the Japanese government evacuated nearly 80,000 residents living near the plant. Under a special nuclear emergency law, people entering the zone were subject to fines of up to 100,000 yen ($1,200) or possible detention of up to 30 days.[50] There were immediately questions about the scale of the evacuation area, particularly as some foreign governments warned their residents to leave areas much further away than the Japanese-declared evacuation zone. In the months following the accident, some people were resettled elsewhere and some returned to their communities, while

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46 AlertNet, "Japan rebuilding effort in numbers," 22 August 2011, http://www.trust.org/alertnet/news/factbox-japan-rebuilding-effort-in-numbers/

47 Japan Times, "Tsunami hit more than 100 designated evacuation sites," 14 April 2011, http://www.japantimes.co.jp/text/nn20110414a4.html

48 New York Times, "Away From Japan, Tsunami's Effect Is Diffuse," 11 March 2011, http://www.nytimes.com/2011/03/12/world/asia/12tsunami.html?partner=rss&emc=rss

49 Richard Black, "Reactor breach worsens prospects," BBC News, 15 March 2011.

50 The Washington Times, "Japan declares no-go zone around nuclear plant," 21 April 2011, http://www.washingtontimes.com/news/2011/apr/21/japan-declares-no-go-zone-around-nuclear-plant/?page=all

others never left the evacuation zone. By the end of the year 160,000 people remained displaced, many of them in evacuation centers.[51]

Having very limited fossil fuel reserves, Japan has for decades invested in nuclear energy to minimize dependency on fossil fuels, most of which it needs to import. In an age of climate change, nuclear power was also seen as a low-carbon alternative energy source. Before the accident, nuclear energy from the country's 54 reactors provided almost 30 percent of Japan's electricity, with plans underway to increase that to 40 percent by 2017.[52] The Fukushima accident led the government to shut down many of the reactors for testing and with other reactors undergoing regular maintenance, by the summer of 2011 only 19 of the country's 54 reactors were running, causing electricity shortages in many parts of the country and leading to a government campaign urging Japanese to save energy. While the campaign was quite successful, the lack of electricity also had negative consequence. With people and companies cutting down on the use of air conditioning, the government reported that around 6,880 people suffering heatstroke were taken to hospitals by ambulance in June, more than three times the number a year earlier. Fifteen of them died after reaching a hospital. People aged 65 or older accounted for 52 percent of the total.[53]

One of the problems linked to the nuclear accident was widespread uncertainty among the population about whether the government was accurately reporting the scale of the damage and the potential harm to human life. In April, Japan raised its assessment of the accident from 5 to 7, the worst rating on the International Atomic Energy Agency's (IAEA) International Nuclear and Radiological Event Scale (INES), putting the accident on a par with the 1986 Chernobyl explosion. However, it also reported that the amount of radiation released was less than 10 percent of that released from Chernobyl. In early June, reports that the amount of radiation released in the first days of the crisis might have been more than twice the original estimate strained the credibility of the government and the nuclear industry.[54] In late November, new analyses of the accident indicated more extensive melting probably occurred at the Unit 1 reactor than previously thought.[55]

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51 New York Times, "Japan — Earthquake, Tsunami and Nuclear Crisis (2011)," Updated: 10 February 2012, http://topics.nytimes.com/top/news/international/countriesandterritories/japan/index.html

52 Bloomberg, "Tokyo Electric Tries to Cool Unstable Atomic Reactor; Thousands Evacuated," 12 March 2011, http://www.bloomberg.com/news/2011-03-12/explosion-destroys-walls-of-japan-reactor-building-nhk-reports.html

53 Japan Times, "Heatstroke surge feared as people save power," 10 July 2011, http://www.japantimes.co.jp/text/nn20110710a3.html

54 New York Times, "2011 Japan Nuclear Crisis: Overview," updated: 31 January 2012, http://topics.nytimes.com/top/news/business/energy-environment/atomic-energy/index.html

55 World Nuclear News, "Fukushima units enter decommissioning phase," 21 December 2011, http://www.world-nuclear-news.org/WR-Fukushima_units_enter_decommissioning_phase-2112114.html

In mid-December, Japanese Prime Minister Yoshihiko Noda declared that the nuclear crisis was over as technicians gained control of the reactors at the Fukushima Daiichi Nuclear Power Plant. The government announced it would now focus on removing the fuel stored at the site and eventually dismantling the plant – a process that is expected to take at least four decades.

More than 160,000 people remain displaced because of the nuclear accident and many of the evacuees are refusing to return to their homes even though the government has declared some of the areas to be safe.[56] Unlike the case of Chernobyl, where affected communities were relocated to other areas, the Japanese government announced that it planned to clean up the area contaminated by radiation, but given the scale of the task and the long timeframe, it remains to be seen how many of the affected people will be able or willing to return.[57]

The Japanese government initially delayed giving information to the public about the state of affairs at Fukushima's nuclear plant – perhaps because it didn't have the information, or

[56] New York Times, "Japan's Prime Minister Declares Fukushima Plant Stable," 16 December 2011, www.nytimes.com/2011/12/17/world/asia/japans-prime-minister-declares-fukushima-plant-stable.html

[57] New York Times, "2011 Japan Nuclear Crisis: Overview," *op. cit.*

The giant wave tossed cars and boats like toys, transforming thriving towns into waterlogged wastelands. Japan, March 11, 2011. Photo: © Dreamstime.com

because it was waiting to get more information before passing it on, or because it wanted to avoid panic. For whatever reason, it was slow to acknowledge publicly the scale – or potential scale – of the nuclear crisis. The report of an internal investigation released on 26 December 2011 found that authorities had grossly underestimated tsunami risks, delayed giving information to the public, and that workers at Tokyo Electric Power Company (TEPCO) were untrained to handle emergencies such as the powerful shutdown that struck when the tsunami destroyed backup generators. The study found that a better response might have reduced core damage, radiation leaks and the hydrogen explosions that followed at two reactors and disseminated plumes of radiation. The report further criticized officials' use of the term "*soteigai*," meaning unforeseeable. The internal investigators said the term implied that authorities were shirking responsibility for what had happened.[58]

In January 2012, Japan said it would set new 40-year age limits on the legal lifespan of nuclear reactors, which could be a step toward fulfilling a government promise to eventually phase out nuclear power in the country.[59] However, as discussed below, at this stage Japan's future use of nuclear energy is uncertain.

The disaster response

Most observers give the Japanese government and Japanese civil society high marks for its rapid and efficient response to communities affected by the earthquake and tsunami – but decidedly lower marks for its response to the nuclear meltdown. Within weeks, most of the key infrastructure such as highways and airports had been restored.[60] Within six months of the earthquake about half of the estimated 23 million tons of rubble had been moved, although the disposal of all of the rubble is expected to take until early 2014. The government enacted a $50 billion emergency budget in May 2011, followed by an additional emergency budget of $25 billion in July, and in November the Japanese parliament passed a set of bills hiking taxes and generating other funds for rebuilding from the quake, bringing the supplementary budget for reconstruction up to $157 billion.[61] Total spending of 19 trillion yen (almost $250 billion) is planned over the next five years to rebuild northeastern coastal areas devastated by the disaster.[62]

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58 The Guardian, "Fukushima investigation reveals failings," 26 December 2011, http://www.guardian.co.uk/world/2011/dec/26/fukushima-investigation-reveals-failings?INTCMP=SRCH

59 Washington Post, "Japan plans to scrap nuclear plants after 40 years to beef up safety after Fukushima disaster'," 7 January 2012, http://www.washingtonpost.com/world/asia-pacific/japan-plans-to-shut-down-nuclear-reactors-after-40-years-of-use-to-beef-up-safety/2012/01/07/gIQAcqpKgP_story.html

60 OCHA, "Japan Earthquake and Tsunami, Humanitarian Situation Report No. 16," 1 April 2011, https://community.apan.org/hadr/japan_earthquake/m/sitreps/63918.aspx

61 AlertNet, "Japan rebuilding effort in numbers," 22 August 2011, http://www.trust.org/alertnet/news/factbox-japan-rebuilding-effort-in-numbers/

62 CNBC, "Japan Lower House Passes Reconstruction Funding Bills," 24 November 2011, http://www.cnbc.com/id/45425687/Japan_Lower_House_Passes_Reconstruction_Funding_Bills

The outpouring of response from Japanese civil society and NGOs was impressive. The Japanese Red Cross alone deployed over 600 teams to affected areas in the initial weeks. More than 119,000 emergency service personnel responded within eight days. In the week following the earthquake, 102 governments and 14 international organizations offered their assistance to Japan.[63] OCHA deployed a team to work with Japanese authorities in coordinating international assistance. Twenty international search and rescue teams from 15 countries responded. Over time the scale of international solidarity increased to 163 countries and regions and 43 international organizations offering assistance.[64]

The rapid engagement of the Japanese military in the days following the disaster was widely appreciated. This was the first time that Japan's Self Defense Forces were used on such a large scale and could in the longer term lead to broader public support for defense spending and to increased Japanese military assistance to disasters outside its territory. Shortly after the earthquake, the Japanese government dispatched 107,000 of its 230,000 troops for disaster relief and for the first time established a joint command of its ground forces, marines and air force. The Japanese military coordinated its efforts well with roughly 20,000 US service members who were called in to respond to the earthquake. This experience contrasts with that of the 1995 Kobe earthquake where the local government and prime minister were reluctant to summon the Self Defense Forces for help.[65]

In November, the Japanese government approved the creation of a reconstruction agency to speed up the rebuilding of areas hit by the disaster. The agency will be headed by the prime minister, who will be supported by a minister in charge. The agency, headquartered in Tokyo, will have branch offices in the three disaster-stricken prefectures of Iwate, Miyagi and Fukushima and will be active for 10 years through March 2021.[66] While there will be a reconstruction agency, the main administrative actors in the reconstruction will be the municipalities. The basic guidelines for the region's reconstruction published in July focus on rebuilding in a way that meets the challenges of a declining population and aging society. The plan promises to support community-led efforts to enable a new model of community building in the Tohoku area, giving due consideration to the elderly, children, women, persons with disabilities, public transportation, renewable energy, etc. The plan also places a strong emphasis on full implementation of both physical and social disaster risk reduction measures.[67]

As of November 2011, there were a total of 330,000 internally displaced persons from the disaster, with only 780 remaining in evacuation centers. Over 310,000 were accommo-

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63 Ministry of Foreign Affairs of Japan, 15 March 2011.

64 Government of Japan, "Road to Recovery," December 2011.

65 Chico Harlan, "A pacifist nation comes to depend on the service of its troops," Washington Post, 3 April 2011, p. A12.

66 NHK World, "Govt approves reconstruction agency bill," 1 November 2011, http://www3.nhk.or.jp/daily/english/01_16.html

67 Reconstruction Headquarters in response to the Great East Japan Earthquake, *Basic Concept for Reconstruction,* decided by the Reconstruction Headquarters on 29 July 2011, revised 11 August 2011, http://www.reconstruction.go.jp/english/topics/2011/12/000355.html

dated in public housing, emergency temporary housing, rental housing, and hospitals, with approximately 17,000 staying with relatives or friends.[68] Reconstruction of infrastructure and debris removal were well underway towards the end of the year, with 96 percent of electricity supply in the affected areas restored, 98 percent of water supply restored, major national roads and expressways and major rail connections almost completely rebuilt, as well as 68 percent of damaged ports restored.[69]

Longer term consequences

It is still early to evaluate the full array of consequences of the earthquake/tsunami/nuclear accident in Japan, but there are concerns about the long-term economic, political and energy impacts on the country.

Most economists do not expect the economic costs of the disaster to be long-term, especially given that the disaster did not hit Japan's industrial heartland and Japan has a strong institutional framework, which is usually seen as important for the long-term success of recovery from disasters.[70] The tsunami-hit area accounts for about six to seven percent of Japan's economic output. While the immediate impact of the disaster led to a further shrinking of the Japanese economy, which had been in recession, in the third quarter of 2011 the Japanese economy started to grow again.[71] In the case of the 1995 Kobe earthquake, Japan's trade slowed for only a few quarters, imports recovered fully and exports rebounded to 85 percent of pre-quake levels within a year.[72] In fact, policy-makers and economists are counting on the reconstruction effort to give the economy a jolt to keep it from sliding back into recession. But while the overall economic prognosis seems positive, the affected sub-region faces serious challenges. More than 38,000 residents left the area between March and August. Of those that remain, 180,000 have reportedly filed jobless claims – 70 percent more than the corresponding figures for 2010.[73] As in developing countries, solutions for IDPs and evacuees depend on restoration of livelihoods.

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68 Government of Japan, "Current situations of evacuees in the aftermath of the Earthquake," 17 November 2011.

69 Secretariat of the Reconstruction Headquarters, "Recovery Status of Major Infrastructures," 30 November 2011. Only 111,000 households from 2,558,000 affected in March remained without electricity most of those because their houses had been completely destroyed or they remained in the restricted area after the nuclear accident.

70 For studies on the long-term effects of natural disaster see for example: Aaron Popp, "The Effects of Natural Disasters on Long Run Growth," *Major Themes in Economics*, Vol. 8, Spring 2006; see also: Chul-Kyu Kim, *The Effects of Natural Disasters On Long-Run Economic Growth*, 2010.

71 New York Times, "Economy in Japan Shows Signs of Strength," 13 November 2011.

72 The World Bank, "Impact of quake on Japan's growth likely to be 'temporary'; 'Limited impact' on strong regional economy, says World Bank East Asia and Pacific Economic Update," 21 March 2011, http://www.worldbank.org/en/news/2011/03/21/impact-of-quake-on-japan-growth-likely-to-be-temporary-limited-impact-on-strong-regional-economy

73 AlertNet, "Japan's post-tsunami revival plan reaches tipping point," 14 December 2011, www.trust.org/alertnet/news/analysis-japans-post-tsunami-revival-plan-reaches-tipping-point/

There has been considerable discussion about the political consequences of the disaster. Naoto Kan, Japan's prime minister since June 2010, resigned in August 2011 after just 15 months in office. He was replaced by Yoshihiko Noda, Japan's finance minister, reportedly in part because of Kan's failure to galvanize the country after the earthquake and the nuclear accident. In the immediate aftermath of the earthquake, political bickering seemed to give way to unity, but it didn't last long.[74] There were particular concerns around the way the government handled the nuclear issue and about the future of nuclear energy in the country. While Mr. Kan called for ending Japan's dependence on nuclear power, Mr. Noda followed the business community in saying that Japan needs nuclear power to prevent electrical shortages.

TEPCO, as the company responsible for managing the nuclear power plant, has come under particular criticism and heavy economic pressure. In December 2011 the Japanese government told TEPCO to consider accepting temporary state control in return for a much-needed injection of public funds – both to pay compensation and to clean up and decommission the reactors. Japan's nuclear crisis minister, Goshi Hosono, acknowledged that no country has ever had to clean up three destroyed reactors at the same time. And there are lingering doubts about whether the plant has in fact undergone a cold shutdown.[75]

More broadly, the accident at Fukushima raises concerns about the future of nuclear energy in a country which depends on nuclear reactors for at least a third of its electricity. In its current Strategic Energy Plan, launched in March 2010, Japan indicated its intention to increase its dependence on alternative energy sources to 70 percent of which 50 percent would be from nuclear energy.[76] The Fukushima accident shook confidence in the government-business alliance which has historically been responsible for nuclear policy and which has been criticized for its lack of transparency. But the crisis also led to an overhaul of nuclear energy governance to increase both oversight and transparency. However, Jamil notes that even with the changes, it is still "not totally clear who truly wields authority in the (nuclear governance) structure."[77] Nor is it clear whether Japan will continue its path towards greater reliance on nuclear energy in the future.

Internationally, the fallout of Fukushima for the future of nuclear energy has been mixed. While Germany decided to close all its nuclear reactors by 2022 and Switzerland decided to phase out nuclear energy by 2034, other countries that rely heavily on nuclear power such as the US, France, Russia and South Korea plan to continue their reliance on nuclear power as a major energy source (even though few reactors are under construction in these

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74 New York Times, "Naoto Kan," 29 August 2011, http://topics.nytimes.com/top/reference/timestopics/people/k/naoto_kan/index.html?scp=1

75 New York Times, "2011 Nuclear Crisis: Overview," *op. cit.*

76 Sofiah Jamil, "Falling from Grace: Nuclear Energy in Japan Post-Fukushima," *NTS Alert,* November 2011 (Issue 1), p. 1.

77 *Ibid.,* p. 3.

countries).[78] China, with by far the largest number of nuclear plants under construction in the world, announced after the Fukushima accident that it would temporarily suspend construction of nuclear power plants, but by late 2011 construction work at some plants had resumed.[79] Table 4 gives a picture of operational nuclear plants as well as plants under construction in selected countries.

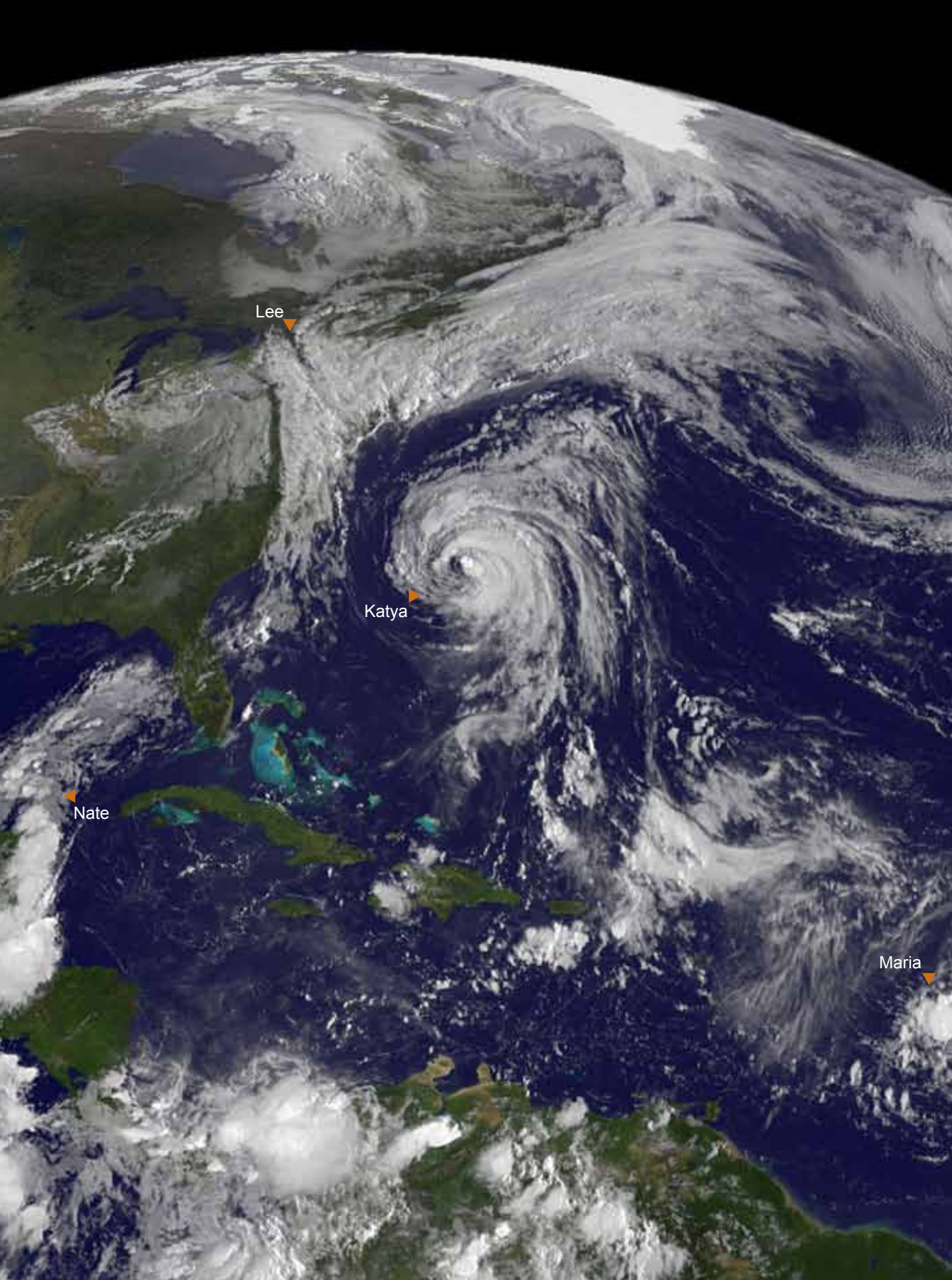
Table 4 Nuclear Plants in Selected Countries, 2011[80]

Country	Nuclear plants (in operation)	Nuclear plants (under construction)
USA	104	1
France	58	1
Japan	50	2
Russian Federation	33	10
Korea Rep.	21	5
India	20	6
China	16	26
Germany	9	0
Switzerland	5	0

78 See: Huffington Post, "Switzerland Nuclear Power Phaseout Approved By Lawmakers," 8 June 2011, see also: BBC News, "Germany: Nuclear power plants to close by 2022," 30 May 2011.

79 Kevin Voigt, Irene Chapple, "Analysis: Fukushima and the 'nuclear renaissance' that wasn't," CNN News, 1 June 2011, www.edition.cnn.com/2011/BUSINESS/04/11/japan.fukushima.nuclear.industry/index.html, see also Penn Energy, "China may restart suspended nuclear power plant construction by end of 2011," 18 November 2011, http://www.pennenergy.com/index/power/display/2566624541/articles/pennenergy/power/nuclear/2011/november/china-may_restart.html, see also: Business China, "China May Soon Resume Approvals for Nuclear Power Plants," 18 January 2012, http://en.21cbh.com/HTML/2012-1-18/3NMjY4XzIxMTU3NQ.html

80 European Nuclear Society, "Nuclear power plants, world-wide," 4 January 2012, http://www.euronuclear.org/info/encyclopedia/n/nuclear-power-plant-world-wide.htm



Tropical cyclones or remnants plaguing the Atlantic Ocean on Sept. 8, 2011, and one satellite has captured all four in one image: Katia, Lee, Maria and Nate. Photo: NASA/NOAA Project

Section 3

USA: Fourteen Billion Dollar Disasters

2011 was a devastating year for the US in terms of natural disasters, in spite of the fact that it was a fairly calm year for hurricanes. On 99 separate occasions, the federal government declared that a major disaster existed – breaking the previous record of 81, which was itself set in 2010. This figure of 99 declared disasters is nearly triple the average of 34 per year dating back to 1953.[81]

The frequency of severe weather-related events was striking, as was the variety of disasters. From snowstorms, floods and tornadoes to drought and wildfires, 2011 seemed to be the year of extremes. While the number of casualties for the 14 biggest US disasters was less than 600 (small in comparison with 2005, when Hurricane Katrina alone resulted in 1,833 deaths), economically it was an extremely costly year.[82] According to the National Climatic Data Center, the US has experienced 114 weather/climate disasters since 1980 in which overall damages reached or exceeded $1 billion. Fourteen of those disasters occurred in 2011. The previous record for billion dollar disasters was set in 2008 when nine disasters were recorded. To put the severity of the year's events in context, 2011 had more billion dollar disasters than the entire decade of the 1980s.[83]

Some observers have suggested that these figures actually understate the number of disasters. A Weather Underground meteorologist adds two events to this list: severe thunderstorm/tornado outbreaks 19-21 April (0 deaths, $1 billion) and the 29 October snowstorm (27 deaths and $3 billion in damages).[84] The costs of these disasters will be felt for years.

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81 Insurance and Financial Advisor Web News, "Insurers' lost $32B from natural disasters in first nine months of '11," 3 January 2012, http://ifawebnews.com/2012/01/03/insurers-lost-32b-from-natural-disasters-in-first-nine-months

82 EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be

83 National Oceanic and Atmospheric Administration, "Extreme Weather 2011," 5 February 2012, http://www.noaa.gov/extreme2011/

84 See for example: Weather Underground, "Severe Weather Headlines," www.wunderground.com/resources/severe/severe.asp. Note too that there are differences in the number of deaths and estimates of the economic costs of the disasters.

Table 5 Billion Dollar Disasters in the US in 2011[85]

Disaster	Date	Fatalities	Economic costs ($ billions)
Groundhog Day Blizzard	29 Jan-3 Feb	36	1.8+
Midwest/Southeast tornadoes (46 tornadoes)	4-5 April	9	2.8+
Southeast/Midwest tornadoes (50 tornadoes)	8-11 April	0	2.2+
Midwest/Southeast tornadoes (177 tornadoes)	14-16 April	38	2.1+
Southeast/Ohio Valley/Midwest tornadoes (343 tornadoes)	25-28 April	321	10.1
Midwest/Southeast tornadoes (180 tornadoes)	22-27 May	177	9.1+
Midwest/Southeast tornadoes and severe weather (81 tornadoes)	18-22 June	3	1.3
Rockies and Midwest severe weather	10-14 July		1+
Southern Plains/Southwest drought and heat wave	spring-fall		10+
Mississippi River flooding	spring-summer	2-7	3-4
Upper Midwest flooding	summer	5	2[86]
Hurricane Irene	20-29 August	45	7.3+[87]
Tropical Storm Lee	early September	21	1+
Texas, New Mexico, Arizona wildfires	spring-fall	5	1+
Total			**54.7+**

Why so many weather-related disasters in the US?

While variability in weather is always to be expected, scientists make the case that 2011 was a particularly bad year because of two factors: La Niña and global warming. La Niña typically triggers certain extreme weather conditions, such as heavy precipitation in Australia and drought in Texas – but this year global warming has amplified them from bad to record levels.[88] And 2011 was a particularly bad year in terms of rising greenhouse gases, melting Arctic sea ice and global temperatures the tenth highest ever recorded. In July, the National Oceanic and Atmospheric Administration (NOAA) reported that the last 300 months had all been above average temperature and that the 13 warmest years had all occurred in the 15 years since 1997.[89] (We will discuss questions pertaining to La Niña and climate change in more detail in Chapter 2 of this report.)

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85 National Oceanic and Atmospheric Administration, "Extreme Weather 2011," 5 February 2012, http://www.noaa.gov/extreme2011/

86 The floods caused another billion dollars in damage in Canada.

87 Munich Re estimates the damage of Hurricane Irene in the US and Caribbean to be $15 billion (See Chapter 2, Section 3 of this Review.)

88 Huffington Post, "U.S. Natural Disasters: 2011 An Extreme And Exhausting Year," 3 September 2011, http://www.huffingtonpost.com/2011/09/03/diasters-in-us-an-extrem_n_947750.html

89 The Guardian, "Environment world review of the year: '2011 rewrote the record books'," 22 December 2011, http://www.guardian.co.uk/environment/2011/dec/22/environment-2011-year-review

Floods and a hurricane

The US has a long history of flooding of the Mississippi River and an elaborate system of dykes or levees has been constructed over the years along the river.[90] But particularly heavy rains in the US Midwest in April led to large-scale flooding downstream. For the first time since 1973, the Morganza Spillway in Louisiana was opened, deliberately flooding part of the state in order to protect the urban center of New Orleans. The New Madrid Floodway was activated by detonating portions of a Mississippi River levee for the first time since 1937. Shortly after the country finished dealing with the massive flooding along the Mississippi River basin, another billion dollar flood unfolded in the upper Midwest, due to a heavy snow season, the melting of a late May snowpack in the northern Rockies and the wettest May on record in the north-central states. Flooding along the Missouri and Souris Rivers led to the evacuation of 11,000 residents from Minot, North Dakota while the floods breached or overtopped levees in parts of Missouri, Iowa and Nebraska.

Although 2011 was a light year for hurricanes in the US, the damage caused by Hurricane Irene was substantial. The hurricane battered Puerto Rico and portions of the Bahamas before making landfall in North Carolina on 27 August. It then weakened into a tropical storm before landing in New York City on 28 August, where authorities had ordered the unprecedented evacuation of about 370,000 residents in low-lying areas as well as for the first time in history shutting down the city's entire transit system because of a weather event.[91] But in spite of the storm's weakened state, torrential rainfall caused catastrophic flooding in the Northeastern US. Seven million people lost electric power, 45 people died and the economic costs were calculated at more than $7.3 billion.[92]

And then there were the tornadoes

The spate of tornadoes that hit the US in 2011 was unusual and accounted for half of the billion dollar disasters in 2011. Typically, some 800 tornadoes are reported nationally every year, in which an average of 80 people are killed.

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90 For a fascinating account of the impact of economic and political interests in developing this system, see John M. Barry, *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America*, 1997.

91 New York Times, "With Hurricane Irene Near, 370,000 in New York City Get Evacuation Order," 26 August 2011, http://www.nytimes.com/2011/08/27/nyregion/new-york-city-begins-evacuations-before-hurricane.html?pagewanted=all

92 Chris Dolce, "2011 Billion-Dollar Disaster Tally Continues to Climb," *The Weather Channel*, 7 December 2011, http://www.weather.com/outlook/weather-news/news/articles/2011-year-of-billion-dollar-weather-disasters_2011-12-07

A word of background

A tornado is defined as a "violently rotating column of air extending from a thunderstorm to the ground." Thunderstorms develop in warm, moist air in advance of eastward-moving cold fronts. These thunderstorms often produce large hail, strong winds and tornadoes. In the winter and early spring, tornadoes are often associated with strong, frontal systems that form in the central states and move east. Tornadoes also occasionally accompany tropical storms and hurricanes that move over land. Almost 70 percent of all tornadoes are considered weak with winds less than 110 mph and lasting less than 10 minutes. Violent tornadoes account for only 2 percent of all tornadoes but 70 percent of all tornado deaths and can last for more than an hour. Tornadoes can occur at any time of the year although in the south, peak tornado occurrence is March-May while peak months in the northern states are during the summer.[93]

[93] National Severe Storm Laboratory, "Tornadoes…," accessed 17 January 2012, http://www.nssl.noaa.gov/edu/safety/tornadoguide.html

2011 was an exceptionally destructive and deadly year for tornadoes in the US. Photo: Thinkstock.com

The greatest tornado outbreak in world history hit the southeast US during a four-day period from 25-28 April 2011 when 334 tornadoes touched down. This more than doubles the previous record for most tornadoes in a four day period, which was 162. The prior record was set just two weeks earlier, during the 14-16 April 2011 Southeast US outbreak. Before 2011, the greatest tornado outbreak in history was the 3-4 April 1974 Super Outbreak which had 148 twisters and led to the deaths of 315 people.[94] The Joplin, Missouri tornado on 27 May was the costliest tornado in history with damages expected to reach $3 billion and 160 deaths recorded. Before 2011, the most damaging tornado was the 3 May 1999 Oklahoma City tornado, which did $1 billion in damage (1999 dollars).[95]

Overall, the number of deaths from tornadoes has decreased dramatically since 1875 as a result of the deployment of weather radar in the 1950s and 1960s. In fact, the warning system was "absolutely as good as it could be" according to Stan Gedzelman of the City College of New York. Joplin residents were given a 24 minute warning before the tornado touched down, but the force of the tornado and the destruction it caused were "beyond

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94 Weather Underground, "Severe Weather Headlines," accessed 17 January 2012, www.wunderground.com/resources/severe/severe.asp

95 *Ibid.*

belief."[96] Patrick Michaels suggests that one of the reasons the casualties were so high in both Joplin and north central Alabama is the fact that these areas are not traditionally tornado-prone and thus people are less aware of the tornados and drills – unlike in the Oklahoma-Texas "tornado alley."[97]

Writing before the 2011 outbreak, Sutter and Simmons analyzed fatalities from tornadoes in the US and found that only 347 of the almost 21,000 tornadoes in their data set resulted in one or more fatalities. In fact, 98 percent of tornadoes had no fatalities and 91 percent caused no injuries. They also looked at measures expected to reduce fatalities, including the question of lead time – the number of minutes between the time a warning is issued and the beginning of the tornado. They found that while warnings reduce injuries, greater lead time does not always translate into fewer deaths. In fact, lead times greater than 15 minutes increase fatalities relative to no warning. This may be because most tornado warnings turn out to be false alarms (three out of four cases) and it may be that when people have more warning, they are apt to take more risks, e.g. "run to the store before the tornado hits."[98]

Drought and wildfires

Beginning in December 2010, Texas and other parts of the southwest began to experience drought. That drought, coupled with the fact that it was one of the hottest summers on record across the southern plains, had devastating economic consequences. Total direct losses to crops, livestock and timber resulting from the drought were estimated at some $10 billion. In turn, the drought set the stage for some of the worst wildfires ever experienced in the United States.[99] The Bastrop fire in Texas was the most destructive fire in Texas history, destroying over 1,500 homes and 500 million trees, and burning three million acres. The Wallow Fire consumed over 500,000 acres, making it the largest on record in Arizona while the Las Conchas Fire in New Mexico was also the largest fire in that state's history, burning over 150,000 acres and threatening the Los Alamos National Laboratory.[100] Texas governor Rick Perry declared a state of disaster every month since December 2010;

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96 Anthony Mason, "Deadliest tornado season in 50 years – but why?" CBS News, 23 May 2011.

97 Patrick Michaels, "The Great Tornadoes of 2011 Put In Perspective," *Forbes,* 26 May 2011, http://www.forbes.com/sites/patrickmichaels/2011/05/26/the-great-tornadoes-of-2011-put-in-perspective/

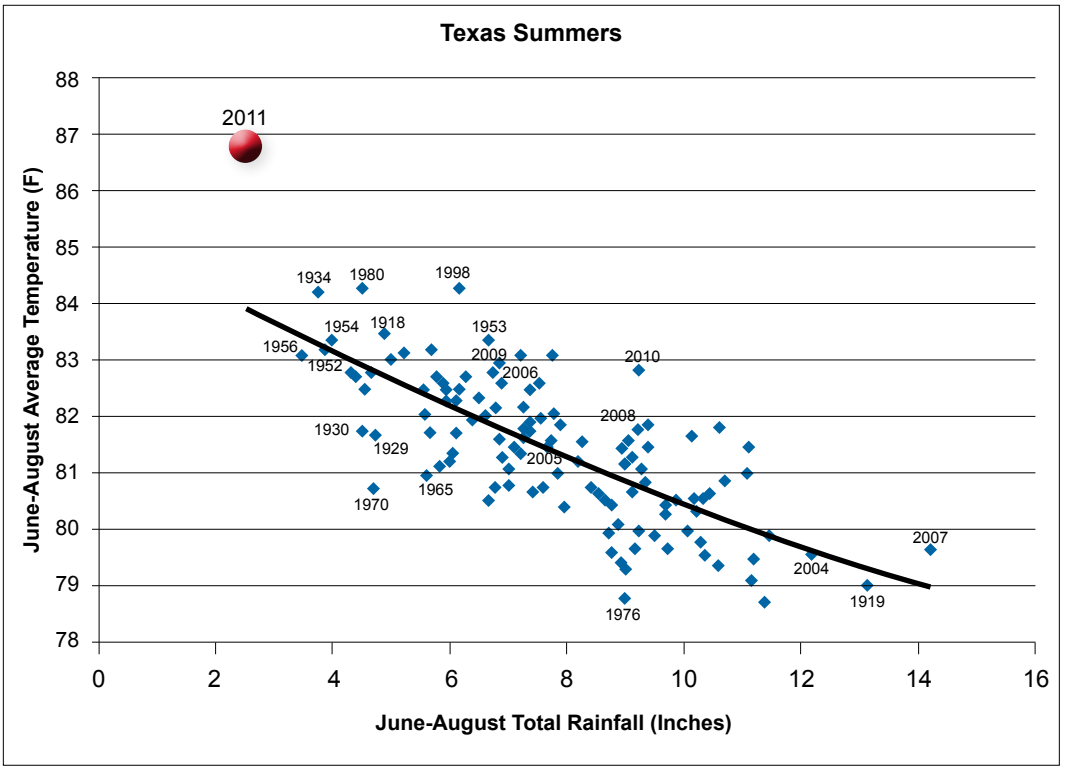
98 Daniel Sutter and Kevin M. Simmons, "The Socioeconomic impact of tornadoes," pp. 103-132, in William Kern, ed., *The Economics of Natural and Unnatural Disasters*, Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, 2010. Note that they also suggest that it is not cost-effective to invest in tornado shelters as violent tornadoes occur too infrequently to justify the cost. According to their calculations, the cost of constructing such shelters per life saved in Oklahoma, in the heart of Tornado Alley would be over $50 million, p. 121.

99 For a discussion of the relationship between wildfires and climate change and for an overview of measures to prevent wildfires, see Johann Georg Goldammer and Brian J. Socks, "SR10: Specification for a state of science review – wildland fires," UK Government's Foresight Project, Migration and Global Environmental Change, 2011.

100 National Climatic Data Center, "Billion Dollar U.S. Weather/Climate Disasters," 7 December 2011, www.ncdc.noaa.gov/oa/reports/billionz.html

by 28 June 2011, over 90 percent of Texas was in extreme drought, with 47 percent of the state qualified as having exceptional drought, the most severe category.[101]

While rains fell in some parts of Texas in December 2011, almost 98 percent of the state continued to experience severe drought by the end of the year and projections are that the drought will continue well into 2012 and perhaps beyond.[102] The graph below illustrates the deadly combination of higher-than-average temperatures coupled with dramatically lower than average rainfall.[103]



[101] Weather Underground, "Severe Weather Headlines," accessed 17 January 2012, www.wunderground.com/resources/severe/severe.asp

[102] For a description of the Texas drought by the state climatologist, John Nielsen-Gammon, see: Houston Chronicle Blog, "Texas Drought: The Executive Summary," 4 November 2011, http://blog.chron.com/climateabyss/2011/11/texas-drought-the-executive-summary/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+houstonchronicle%2Fclimateabyss+%28reader+blog%3A+Climate+Abyss%29

[103] John Nielsen-Gammon, "Texas Drought: Spot the Outlier," *Houston Chronicle Blog*, 29 August 2011, http://blog.chron.com/climateabyss/2011/08/texas-drought-spot-the-outlier/

A man and child stand on a dry lakebed during the Texas drought of 2011.
Photo: © Enigmacypher | Dreamstime.com

It is hard to overstate the negative effects of the drought in Texas and other states. Over the course of the year, the number of cows in Texas dropped by about 600,000 – a 12 percent decrease from the five million cows in the state at the beginning of the year. This is a greater annual percentage decrease than at any time since the Great Depression of the 1930s. While some ranchers moved their cattle to greener pastures outside the state, about 200,000 more cows were slaughtered in 2011 than in 2010 – a 20 percent increase. This means that there will be fewer calves next year and overall, beef production nationally is expected to be down four percent and beef prices are expected to increase.[104]

But again, the costs of the drought and the wildfires go beyond the cattle losses. Texas lost half of its cotton crop which could affect the price of clothing assembled in Asia. The entire hay crop was lost which will make feeding the surviving cattle more expensive in the future. Texas and Oklahoma produce a third of the country's wheat; the fall 2011 planting season was affected as winter-wheat requires rain for the seeds to germinate.[105] There are concerns about the region's water supply as lakes and reservoirs fall below normal ranges and possible shortages of electricity may further limit economic growth. Businesses which rely on sales to farmers and ranchers are also affected. As one Texas car dealer commented "The bottom has fallen out of tractor sales. People just aren't buying farm equipment because there's nothing to farm."[106]

The variety and severity of weather-related disasters in the United States during the course of 2011 is striking. Given predictions that such disasters will increase in intensity in the future as a result of climate change gives rise to the disturbing possibility that the experiences of 2011 may in fact be the "new normal."

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[104] Betsy Blaney, "Texas drought takes cow numbers down by 600K," *Yahoo News*, 16 December 2011, http://news.yahoo.com/texas-drought-takes-cow-numbers-down-600k-082208305.html

[105] Time Magazine, "Forget Irene: The Drought in Texas Is the Catastrophe That Could Really Hurt," 31 August 2011, http://www.time.com/time/nation/article/0,8599,2091192-2,00.html

[106] David Self, interview, 24 December 2011.

Brisbane Flood 2011 Photo: © Thinkstock.com

Section 4

Australia: Submerged in Queensland

After years of prolonged drought, the northeastern state of Queensland, Australia in December 2010 and January 2011 experienced one of the largest floods in Australian history, affecting an area of about 850,000 square kilometers (an area larger than the size of Pakistan). Around 200,000 persons were affected, 16 people died and over 70 towns were evacuated. In terms of the number of people affected, it was the largest natural disaster in the decade. The floods were preceded and followed by three cyclones, Tasha (December), Anthony (January), and the strongest of the group, Category 5 Cyclone Yasi which made landfall on 2 February.[107] Both the floods and storms were very likely influenced by a particularly strong La Niña weather pattern, making 2010 the third wettest year on record for Australia. With estimates of up to US$15.9 billion in losses and damages, the floods and cyclones of 2010/11 were also one of the largest disasters in Australian history in terms of disaster damage. These disasters damaged more than 6,700 km of state roads and 4,700 km of rail network and damaged and disrupted the province's important coal industry. As of November 2011, 130,666 insurance claims were filed as results of the floods and Cyclone Yasi, for a value of AUD$3.73 billion of which 66 percent had been paid.[108]

Table 6 Number of Total Disaster Affected Populations in Australia 2001-2011[109]

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010[110]	2011	Total
Extreme temp.	0	0	0	0	0	0	0	0	2,000	0	0	2,000
Flood	4,001	0	470	3,620	3,000	1,100	5,000	8,400	9,200	211,000	217	246,008
Storm	207	129	2,070	645	1,200	9,030	820	12,000	15,400	0	7,300	48,801
Wildfire	4,400	244	2,650	0	220	141	0	0	9,954	0	0	17,609
Total	8,608	373	5,190	4,265	4,420	10,271	5,820	20,400	36,554	211,000	7,517	314,418

The Federal government and the Queensland state authorities responded swiftly with the help of Australia's Emergency Management system as well as the Australian Defence Force to effectively coordinate the evacuation, relief efforts and recovery support.

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107 BBC, "Flooding in Australia's Queensland 'to last weeks'," 3 January 2011, http://www.bbc.co.uk/news/world-asia-pacific-12107131

108 Queensland Reconstruction Authority, *Monthly Report,* December 2011.

109 EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 5 January 2012, www.emdat.be

110 To avoid double counting, EM-DAT registers a disaster at the onset of the hazard. Therefore the Queensland Floods are recorded as a 2010 disaster in the database.

In February 2011, the Queensland Reconstruction Authority was established to oversee and coordinate the recovery and reconstruction efforts. The Government of Australia indicated that it would invest AUD$5.6 billion (US$5.7 billion) in rebuilding flood-affected regions and the Government of Queensland pledged AUD$2.1 billion for recovery and reconstruction. Immediately after the flood, the Australian government initiated a "social safety net" emergency program, disbursing Australian Disaster Recovery Payments and Income Recovery Subsidies. The authorities used an advance payment mechanism to swiftly transfer funds to local governments which expedited disbursements. Financial support was provided immediately to the beneficiaries. By June more than 630,000 Australian Disaster Recovery Payments had been made, totaling AUD$725 million of which 60 percent were flood-related and the rest storm-related.[111] In addition, AUD$278 million were contributed by the Australian public to the Premier's Disaster Relief Appeal providing assistance to disaster-affected persons.[112] The Government of Australia also incentivized the inclusion of disaster mitigation measures in reconstruction by making full disbursal of reconstruction funding to state and local governments contingent upon the development and implementation of appropriate natural disaster mitigation strategies. The Queensland Reconstruction Authority also declared building resilience as an overarching goal for disaster reconstruction based on the framework provided by Australia's National Strategy for Resiliency of 2011, especially focusing on coastal management, integrated watershed management and flood risk reduction.[113]

The Reconstruction Authority has also put a strong focus on strategic communication with stakeholders by developing a user-friendly websites as well a "build back navigator" providing advice on insurance, getting damage assessments and building quotes, finding temporary accommodation, accessing disaster relief grants, other financial support avenues and information about what factors people need to consider when they are ready to start rebuilding.[114] Media reports around the one year anniversary of the floods generally see reconstruction as well on track, while noting that only ten percent of the billions of dollars set aside for natural disaster recovery had been paid out although authorities reported that projects worth AUD$3.6 billion were in the pipeline.[115]

Social media, including Twitter and Facebook, played an important role in the crisis communication during the flood crisis. More than 35,000 tweets containing the #qldfloods hashtag were sent during the height of the emergency, from 10-16 January 2011, sharing directly emergency information, relevant situational information, advice, news media and multimedia reports.[116]

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111 The World Bank and Queensland Reconstruction Authority, *Queensland Recovery and Reconstruction in the Aftermath of the 2010/2011 Flood Events and Cyclone Yasi,* June 2011, p. 7f.

112 Queensland Reconstruction Authority, *Monthly Report,* December 2011, p. 47.

113 The World Bank and Queensland Reconstruction Authority, *op. cit.*, p. 3.

114 *Ibid.,* p. 27f.

115 ABC News, "Flood reconstruction on track one year on," 1 January 2011, http://www.abc.net.au/news/2012-01-11/flood-reconstruction-on-track-one-year-on/3767310

116 Media Ecologies Project et al., "#qldfloods and @QPSMedia: Crisis Communication on Twitter in

Given Australia's vulnerability to climatological and hydrometeorological disasters the instigation of a climate tax in November 2011 by the Australian Government was an important step to foster climate change mitigation in one of the world's highest per capita CO_2 polluters (each Australian emitted 18.6 tons of CO_2 in 2008, which is higher than the per capita emissions in the US and most other major economies.)[117] The law sets a fixed carbon tax of AUD$23 per ton on the top 500 polluters from July 2012, then moves to an emissions trading scheme from July 2015.[118]

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the 2011 South East Queensland Floods," Research Report, January 2012.

117 World Bank, "CO2 emissions (metric tons per capita)," accessed 12 January 2012, http://data.worldbank.org/indicator/EN.ATM.CO2E.PC?order=wbapi_data_value_2008+wbapi_data_value+wbapi_data_value-last&sort=asc

118 Reuters, "Australia passes landmark carbon price laws," 8 November 2011, http://www.reuters.com/article/2011/11/08/us-australia-carbon-idUSTRE7A60PO20111108

2011, Flooding in Brisbane. Photo: © Thinkstock.com

Earthquake damage, Christchurch, New Zealand.
Photo: © Alexandra1977 | Dreamstime.com

Section 5

New Zealand: The Canterbury Quakes

New Zealand experienced one of its largest disasters in history, when an earthquake on 22 February 2011 struck the country's second largest town, Christchurch, which is located in the Canterbury Region on South Island.

Table 7 Number of Total Disaster Affected Populations in New Zealand 2001-2011[119]

	2001	2002	2003	2004	2005	2006	2007	2010	2011	Total
Earthquake	0	0	0	0	0	0	0	300,002	301,847	601,849
Flood	0	300	0	5,350	400	1,200	0	0	0	7,250
Storm	0	0	0	0	100	0	300	0	0	400
Total	0	300	0	5,350	500	1,200	300	300,002	301,847	609,499

The Canterbury region and Christchurch had previously been hit by a strong 7.1 magnitude quake in September 2010, with the epicenter about 40 km west of Christchurch City at a depth of 10 km, which caused severe damage to houses and infrastructure but resulted in no casualties. The 6.3 magnitude February aftershock centered 10 km outside of Christchurch at a depth of 5 km, causing many of the already-weakened building structures to crumble and collapse. The February earthquake, which struck four times closer to the city's center, was also much closer to ground level and it occurred at lunch time during the work week rather than during the middle of the night as the September earthquake did. This meant that 181 people died in the 22 February aftershock, even though it was much weaker than the original quake which hit on September 4.[120]

For New Zealand the February quake was the most deadly natural disaster since the 1931 Hawke's Bay earthquake. In terms of the number of persons affected, both the 2010 and 2011 earthquakes top the list of disasters since at least 1900.[121] For the first time in the country's history a state of national emergency was invoked for a civil defense emergency and the New Zealand Defence Forces mounted their largest ever operation on New Zealand territory.[122] Urban Search and Rescue (USAR) teams from New Zealand and Austra-

[119] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 5 January 2012, www.emdat.be

[120] Guardian, "Christchurch Earthquake: At Least 65 dead and 100 Trapped in 'Darkest Day'," 22 February 2011, www.guardian.co.uk/world/2011/feb/22/christchurch-earthquake-65-dead-100-trapped

[121] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 5 January 2012, www.emdat.be

[122] Earthquake Commission, *Annual Report 2010-2011*, 2011, p.9., available at: http://www.eqc.govt.nz/

lia, UK, USA, Japan, Taiwan, China and Singapore tried to rescue survivors in the days after the February quake, but as in most developed countries, the broader recovery efforts were almost exclusively covered by resources within New Zealand. And while there were certainly offers of international assistance, the UN's financial tracking service shows that only around $9.8 million in international disaster assistance was disbursed for the New Zealand earthquakes in 2011.

As in most earthquake areas, thousands of aftershocks hit the area. In Christchurch, over 7,000 aftershocks were recorded. Among them, the strong aftershocks on 13 June 2011 (5.8 and 6.3 magnitude) were particularly frightening as they injured 46 people and affected many structures that had already previously been damaged. The most recent series of aftershocks on December 23 (5.8 and 6.0 magnitude) led to the collapse of several unoccupied buildings as well to the evacuation of the city's airport.[123]

The September and February earthquakes damaged more than 100,000 homes in and around Christchurch – a city with a total population of 350,000. In addition to homes, the earthquake damaged sewer lines, water pipes, farms and roads and led to power outages. In addition to the collapse of structures, a main cause of damage was soil liquefaction,[124] especially in riverside areas, which means that many plots will have to be abandoned and people resettled elsewhere. More than 60 percent of the businesses in the central business district, which employed 50,000 people, needed to relocate because of the quake, although fortunately there was no significant rise in unemployment.[125] Most of the affected households and businesses were expected to file claims with their insurers and the Earthquake Commission (EQC) making it one of the highest-insured major disasters in history.[126] New Zealand possesses a unique disaster insurance scheme. The EQC, formed in 1944 as the "Earthquake and War Damage Commission" has since then collected a premium from all holders of domestic fire insurance. When a disaster strikes, these funds are disbursed to citizens who own private or government insurance for their buildings and/or personal effects and damages up to NZD100,000 (+GST) to buildings and NZD20,000 (+GST)

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123 GeoNet, "Dec 23 2011 - Christchurch hit again at Christmas," 24 December 2011, http://www.geonet.org.nz/, Guardian, "New Zealand's Christchurch hit by series of earthquakes," 22 December 2011, http://www.guardian.co.uk/world/2011/dec/23/new-zealand-earthquake-christchurch

124 Liquefaction is a physical process that takes place during some earthquakes that may lead to ground failure. As a consequence of liquefaction, clay-free soil deposits, primarily sands and silts, temporarily lose strength and behave as viscous fluids rather than as solids. Liquefaction takes place when seismic shear waves pass through a saturated granular soil layer, distort its granular structure, and cause some of the void spaces to collapse. USGS, "FAQs - Earthquake Effects & Experiences," http://earthquake.usgs.gov/learn/faq/?categoryID=8&faqID=100

125 Canterbury Earthquake Recovery Authority, *Draft Recovery Strategy for Greater Christchurch*, September 2011, p. 10.

126 Businessweek, "New Zealand's Key Pledges Subsidies on Visit to Earthquake Zone," 7 September 2010, www.businessweek.com/news/2010-09-07/new-zealand-s-key-pledges-subsidies-on-visit-to-earthquake-zone.html; BBC News, "New Zealand Earthquake Damaged 100,000 Homes," 6 September 2010, www.bbc.co.uk/news/world-asia-pacific-11191105

to personal effects are covered. Any further damage above that threshold will be covered by the policyholder's insurance company depending on their insurance policy. The disaster affected population was therefore one of the best insured in history, with estimated 80 percent of the entire disaster damage covered by the Earthquake Commission and private insurance companies.[127]

The September and February Canterbury earthquakes combined were the largest and most costly insurance events in New Zealand's history, generating more than 360,000 claims with the Earthquake Commission (consisting of over 550,000 individual contents, building and land exposures) as of 30 June 2011. In comparison, before 4 September 2010, the Inangahua earthquake of 1968 had generated the most claims from a single event with a comparatively tiny 10,500 claims.[128] By 26 January 2012 the EQC's insurance had paid out over NZD2.8 billion.[129]

Table 8 New Zealand Earthquake Insurance Claims for Christchurch Earthquakes 2010/11[130]

	Sep 4 + aftershocks	Feb 22 + aftershocks	June 13 + aftershocks	Other claims	All events
Building exposures	172,076	139,139	20,764	2,901	334,880
Contents exposures	59,942	82,940	10,143	442	153,467
Land exposures	28,176	40,990	6,038	2,473	77,677
Total claims	185,016	161,126	23,825	4,164	374,131

Following the 4 September earthquake, government legislation – the Canterbury Earthquake Recovery Act (CER Act) – was passed, which established the Canterbury Earthquake Recovery Authority (CERA) to lead and coordinate the ongoing recovery effort. The authority developed a draft recovery strategy for Greater Christchurch which was then broken down into more specific sectoral plans. Major tasks such as damage assessments (done by the Earthquake Commission), demolition of unsafe properties, and provision of temporary shelter for displaced persons were overseen by the Recovery Authority. The task of the authorities was multiplied by the massive destruction caused by the February aftershock, calling into question plans for reconstruction after the September quake and making it necessary to assess and reassess the safety of almost 200,000 buildings. By June 2011, 5,100 residential buildings were deemed to be in red zones (completely damaged) and the government offered to purchase insured buildings from the residents.

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127 Munich Re, "The five largest natural catastrophes of 2011," Geo Risks Research, NatCatSERVICE, January 2012, http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.aspx

128 Earthquake Commission, *Annual Report 2010-2011*, *op. cit.*

129 Canterbury Earthquakes Recovery, "Statistics," http://canterbury.eqc.govt.nz/news/progress/statistics

130 A claim can consist of more than one exposure. Source: Earthquake Commission, Annual Report 2010-2011, 2011, p. 20., available at http://www.eqc.govt.nz/

Another 10,000 buildings had been deemed orange, meaning they needed further assessment.[131] By November around 6,500 buildings had been declared to be in red zones, while around 180,000 buildings were deemed to be in the green zone, indicating that they were safe for repair or reconstruction.[132]

Christchurch's Central City was especially hard hit by the earthquake. With more than 50 percent of all inner city buildings severely damaged, the task of long-term reconstruction is a major one. More than half of the listed heritage buildings within Christchurch (more than 250) were in the Central City, of which 113 had been demolished by November 2011 due to the amount of damage sustained.[133] A classification of residential homes into red houses (unsafe), yellow (restricted access) and green (safe) found that 800 of 2,000 residential properties in the inner city fell into the first two categories.

Given the enormous transformation the quake would bring to the city center, the authorities opted for a highly participatory planning process for the reconstruction. The reconstruction plan was inspired by 106,000 ideas received from the general public as part of the initial "Share an Idea" initiative and from key stakeholder feedback. It was further refined by almost 5,000 comments made in response to a request for more formal consultation on the draft plan.[134] Before planning could begin, the city undertook an extensive ground investigation to evaluate the nature and variability of the geotechnical conditions and the potential impact of future large earthquakes, assessments which will help inform decisions around land-use planning.[135] The draft city reconstruction plan envisions a wide-ranging transformation, modernization and greening of the city and has a planning horizon of 20 years, up to 2032.

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131 Stuff, "Crown to buy 5100 quake-hit Christchurch homes," 26 June 2011, http://www.stuff.co.nz/national/christchurch-earthquake/5179959/Crown-to-buy-5100-quake-hit-Christchurch-homes

132 New Zealand Herald, "Christchurch properties added to red zone," 17 November 2011, http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10766752

133 Christchurch City Council, *Draft Central City Recovery Plan, For Ministerial Approval*, December 2011, http://resources.ccc.govt.nz/files/CentralCityDecember2011/FinalDraftPlan/FinaldraftCentralCityPlan.pdf, p. 22.

134 *Ibid.*, p. 10.

135 *Ibid.*, p. 23.

Section 6

Learning from "The Year that Shook the Rich"

Based on this review of some of the major disasters affecting some rich countries in 2011, this section both reflects on some of the lessons learned and underscores some of the remaining open questions regarding disaster planning, response and reconstruction.

1. Low-probability high-impact disasters tend to surpass our imagination and preparations.

Low-probability high-impact events such as the 2004 Indian Ocean Tsunami and the 2011 Japanese Tohoku earthquake and tsunami in most cases catch states and societies by surprise. While Japan is probably the world leader when it comes to seismic disaster preparedness, scientists did not foresee an earthquake of that strength at that particular fault line.[136] While most buildings withstood the tremors, walls built to protect against tsunamis were simply not high enough to withstand the onslaught of waves much higher than predicted. As a report by Chatham House points out, known hazards such as floods, hurricanes and earthquakes can become "black swan" events, where the low likelihood of occurrence or the high costs of mitigation mean that societies remain unprepared or underprepared for them.[137]

In addition to the higher than expected tsunami waves, the nuclear accident caught both the government and humanitarian actors unprepared to mount relief operations in an environment where there was a possibility of radioactive contamination. Although this did not turn out to be a major factor affecting the disaster response in the case of Japan, it does raise the possibility that future relief operations may have to be carried out in an area contaminated by a nuclear, technological or even biological accident triggered by the disaster. Few humanitarian actors have seriously prepared for this eventuality; in fact it may be that specialized military forces are best equipped to operate when hazardous materials are involved.

From a cost-benefit perspective it is impossible for countries to prepare for every possible disaster. But given the potential impact of low-probability high-impact events, it would be prudent to prepare for them. These preparations should include stress-testing a country's response system to enable it to function well in case such an event occurs. 2011 has clearly shown that rich countries are not "immune" to major disasters and that disaster preparedness and emergency response systems can always be further improved.

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[136] The Star, "Size of Japan's quake surprises seismologists," 11 March 2011, http://www.thestar.com/news/world/article/952418-size-of-japan-s-quake-surprises-seismologists

[137] Bernice Lee et al., "Preparing for High-impact, Low-probability Events Lessons from Eyjafjallajökull," *A Chatham House Report*, January 2012, http://www.chathamhouse.org/publications/papers/view/181179

2. Disaster plans and defenses need to be adjusted to a new and shifting "normal."
While the total number of disasters in 2011 declined, many of the disasters that occurred were considered as "once-in-a-century" disasters. Predictions from climate scientists show that recurrence intervals of heavy precipitation and extreme temperatures will likely become more frequent.[138] In other words, what was formerly a "once-in-a-century" disaster might become a "once-in-a-generation" disaster. Furthermore, new "once-in-a-century" disasters may simply overwhelm the preparations undertaken thus far. With a disaster landscape where the past might no longer be indicative of the future, policy makers and mitigation specialists will need both foresight and guidance from ever more sophisticated climate models to take the necessary decisions to prevent and prepare for future disasters. This might require major investments in disaster mitigation measures and upgrading infrastructure as part of a climate change adaptation agenda for rich countries. Clearly, such investments should not distract from rich countries' obligations and commitments to assist less wealthy countries to deal with the negative effects of climate change.

3. Nuclear technology is not completely safe. We need a societal, global and intergenerational debate about the risks and benefits of nuclear technology.
The illusion that nuclear technology in the rich world is completely safe was spectacularly shattered by the collapsed reactor pressure vessels of the Fukushima Daiichi Nuclear Plant. Initial investigations into the accident have shown that disaster mitigation measures for the plant were insufficient; that the location itself was highly questionable; that possible tsunami risks were underestimated; and that neither TEPCO, the company running the plant, nor the government was prepared to deal with an accident of that scope.[139] As Mark Ramseyer argues in his thought-provoking paper "Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan," companies will never end up footing the entire bill for a nuclear disaster, as the costs would outstrip their entire assets. Therefore, energy companies have few disincentives to build plants in areas that might not be safe.[140] Close ties in many countries (as in Japan) between regulators and the nuclear industry might in addition lead regulators to overlook potential risk factors. In his paper, Ramseyer also makes the point that even government ownership of nuclear plants might lead to some of the same moral hazards because in democracies plants would more likely be built on "politically optimal" rather than "seismologically optimal" sites. While proponents of nuclear energy came out strongly after the disaster saying that new reactor models were much safer than the 1970s Fukushima model (just as Western reactors were much safer than Soviet ones after the 1986 Chernobyl meltdown),

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138 Clare M. Goodess, *SR1: How is the frequency, location and severity of extreme events likely to change up to 2060?,* UK Office for Science, Foresight, Migration and Global Environmental Change, October 2011.

139 BBC News, "Fukushima accident: disaster response failed – report," 26 December 2011, http://www.bbc.co.uk/news/world-asia-16334434

140 Mark Ramsayer, "Why Power Companies Build Nuclear Reactors on Fault Lines: The Case of Japan," *The Harvard John M. Olin Discussion Paper Series*, Discussion Paper No. 698, June 2011, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1874869&download=yes

there is a need for a broad debate at a societal level about what the acceptable risks of nuclear technology are and who will foot the costs when an accident happens.[141] As nuclear fallout isn't restrained by national borders, the debate needs to be held on a global scale and given that nuclear isotopes such as caesium 137 with its half-life of 30 years and plutonium 239 with a half-life of more than 24,000 years are produced in nuclear accidents such as the one in Fukushima, this debate also needs to have a strong intergenerational component.

4. Disaster risk reduction and preparedness work (up to a certain threshold).

This review of disasters that shook the rich world in 2011 leads to the conclusion that in many instances loss of life would have been much greater without disaster risk reduction and preparedness measures. This is a conclusion confirmed by the differences in casualty figures between disasters in the developed world and in developing countries (see Table 2). As noted before, casualties from the 9.0 earthquake in Japan were relatively low. While debates continue as to whether the tsunami defenses were sufficient given historical precedents, there is little doubt that tsunami warning systems, clear evacuation routes and disaster preparedness exercises saved many lives. It is very difficult and often not economically viable to provide safety from high-impact low-probability events, but a national culture of disaster

[141] Physorg, "Today's plants far safer than Fukushima: US expert," 15 September 2011.

Xingtai City, Hebei Province, China, March 28, 2011. Students participating in regular disaster preparedness exercises. Photo: © Jianbinglee | Dreamstime.com

preparedness can be extremely helpful when such disasters strike and save many lives. The striking difference between insurance coverage in the Japanese and New Zealand disasters also draws attention to the role of insurance and particularly mandatory government insurance schemes in protecting those at risk of disasters. The focus on disaster risk reduction in the reconstruction plans in many of the affected rich countries shows that states are taking to heart the need to be better prepared for when the next "big one" strikes.

5. Local disasters are getting rarer.

With economic globalization knitting an ever-tighter web of economic and social interconnections around the globe, disasters are becoming less and less local affairs. Disasters that once would have been local have become global issues. In addition to the Japanese tsunami, which disrupted global supply chains of products ranging from cars to smart phones, other disasters in 2011 caused major ripples in the global economic network. The floods in Thailand for example disrupted global production chains for computer hard drives and major carmakers had to slow down production in factories in several countries because they were missing car parts usually made in Thailand.[142] Disruption of coal production in Queensland, Australia, led to spiking coal prices in early 2011.[143] While the impacts of disasters on other countries' economies can be significant, they are rarely included in determining either the number of those affected by a disaster or in calculating economic damages caused by a disaster. Given the realities of globalization, we should consider broadening the net to include all of those affected in our tallies.

6. There seem to be few disincentives for people not to settle in disaster-prone areas such as coastal areas in the United States.

In many countries, a large proportion of the population lives in areas which are vulnerable to natural hazards. For example, many coastal areas face high disaster risks – risks which will be compounded by climate change through rising sea levels, stronger storms and changes in temperature and precipitation. Nonetheless, globally two-thirds of the world's cities with populations over five million are at least partially located in coastal zones.[144] In Australia, close to 90 percent of the population lives within 50 kilometers of the coast.[145] In the US, half the population lives within 50 miles of the coast, with population density much higher in coastal areas than in the rest of the country and density growing steadily in the recent decades.[146] The AIR Worldwide Corporation estimates that insured property

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142 The Hindu, "Thailand flooding affects global industries," 7 November 2011, http://www.thehindu.com/opinion/op-ed/article2607072.ece

143 The Australian, "Flood disruptions to push up world coal price, says Rio," 28 January 2011.

144 The Government Office for Science (London), *Foresight: Migration and Global Environmental Change, Final Project Report*, 2011.

145 Australian Bureau of Statistics, "How many people live in coastal areas?" 1301.0 - Year Book Australia, 2004, http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article32004?opendocument&tabname=Summary&prodno=1301.0&issue=2004&num=&view=

146 NOAA, "Over half of the American population lives within 50 miles of the coast," revised 17 November 2011, http://oceanservice.noaa.gov/facts/population.html

value in the coastal US was $8,891 billion in 2007.[147] While major disasters like Hurricane Katrina have led to a decline in population in certain areas, such as New Orleans, overall population in coastal areas in the US has grown steadily; for example, the population along the Gulf of Mexico soared by 150 percent between 1960 and 2008, more than double the rate of increase of the overall population of the country.[148] A World Bank report notes that mispriced insurance (insurance premiums too low because of popular pressures on a regulated industry) is partly to blame for overbuilding along the hurricane-prone US coastline.[149] After a disaster strikes, there may be some talk about declaring certain areas unsafe for habitation or reconstruction, or constructing buffer zones, or more radically, even abandoning whole areas or cities. But such discussions rarely lead to any changes in either individual behavior or in incentives to support other settlement patterns.

7. Communication, communication, communication!

Japanese authorities have presented us with a Janus-faced approach to communication following disasters. On the one hand, earthquake and tsunami warning systems generally worked well and there was a sense that authorities' communication with earthquake and tsunami-affected populations functioned smoothly. On the other hand, the government's crisis communication and handling of the Fukushima nuclear accident has been heavily criticized. Both TEPCO and the government were criticized for informing people too slowly about the details and the scale of the disaster. There were too many different spokespersons issuing multiple statements. The statements themselves were often confusing, too general in tone and too short on substance.[150] No one questions the fact that in crisis situations communication is always difficult and that governments often have to take difficult decisions on the basis of imperfect information. And yet providing important information to the public in a crisis is a core function of government and if authorities fail on that front, they stand to lose credibility with the public. In the US meanwhile, some of the lessons from Hurricane Katrina have been heeded by government officials. Learning from the Bush Administration's abysmal crisis communication and disaster management, when Hurricane Irene looked ominous, President Obama cut his holidays short, governors and majors were seen at the forefront of the disaster response, warnings flooded the media and evacuations proceeded relatively smoothly.

Social media such as Twitter and Facebook or mapping tools such as Google maps and Ushahidi play an increasingly important role in crisis communication between govern-

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147 Jeffrey Pompe and Jennifer Haluska, *Estimating the Vulnerability of U.S. Coastal Areas to Hurricane Damage*, Francis Marion University, April 2011.

148 US Census Bureau, "Census Data & Emergency Preparedness," last revised 9 November 2011, http://www.census.gov/newsroom/emergencies/

149 Apurva Sanghi et al., *Natural Hazards UnNatural Disasters: The Economics of Effective Prevention*, World Bank, 2010, p. 3f.

150 The Asia Foundation, "In Face of Disaster, Japanese Citizens and Government Pull from Lessons Learned," 16 March 2011, http://asiafoundation.org/in-asia/2011/03/16/in-face-of-disaster-japanese-citizens-and-government-pull-from-lessons-learned/

ments, media and the affected population, a development that is particularly pronounced in developed countries as they have a large user community.

Decision-making about post-disaster reconstruction is rarely uncontroversial. However, it seems that the attempts by the recovery authorities in both Queensland and Christchurch to foster strategic communication with the affected communities are good examples of ways that governments can involve affected communities in the decisions that affect their lives. In particular, the participatory reconstruction approach used for the inner city in Christchurch demonstrates how information technology can be used in developing inclusive approaches to post-disaster reconstruction.

8. How much international solidarity do rich countries need and want?

Most rich countries have the resources and the capacity to manage emergency relief and recovery operations as well as post-disaster reconstruction and thus don't need to rely on major assistance from the international humanitarian system. Still, in the event of a major disaster, like the Tohoku earthquake and tsunami in Japan or Hurricane Katrina in the US, the compelling media coverage leads to expressions of solidarity by governments, organizations and citizens from countries throughout the world. It is not so clear, however, how that solidarity can best be used.

The deployment of highly-trained search and rescue teams is often the first and most visible offer of international assistance. Ironically, the Japanese search and rescue team was deployed in Christchurch, New Zealand when the earthquake and tsunami occurred in Japan. But in any event, there were few people to be rescued in the aftermath of the Japanese tsunami, as the waves had been so high. Rather the grim matter of retrieving and identifying the dead bodies was an urgent task. Over the years, international protocols for the use of search and rescue teams have provided useful guidance on their deployment.[151] This is not the case for the far larger number of NGOs and international agencies seeking to offer assistance in the aftermath of a disaster. As discussed in the next chapter, governments – including governments of developed countries – would be well-advised to develop procedures for accepting and facilitating international assistance before disasters occur.

The US, for example, was strongly criticized for declining many international offers of assistance after Hurricane Katrina struck. In fact, the US turned down 54 of 77 recorded aid offers from three of its staunchest allies: Canada, Britain, and Israel. By April 2007 the US had only claimed $40 million out of $854 million in cash and in oil that was to be sold for cash, offered by US allies to aid with post-Katrina relief and reconstruction.[152] Similarly, the Japanese authorities struggled with how to respond to the large outpouring of international solidarity, eventually accepting only those offers that corresponded to the list of needs iden-

[151] For more about INSARAG - International Search and Rescue Advisory Group see: OCHA, "INSARAG – International Search and Rescue Advisory Group," http://www.unocha.org/what-we-do/coordination-tools/insarag/overview

[152] Washington Post, "Most Katrina Aid From Overseas Went Unclaimed," 29 April 2007.

tified by the Japanese government. It is easier to decide on how such offers of assistance will be handled before a disaster occurs and governments should include this in their planning for disaster response.

Another question surrounding solidarity in disasters centers on financial contributions. As our overview in Chapter 2 of humanitarian disaster relief funding in 2011 shows, Japan received more than $700 million in aid – a large percentage of all the international humanitarian disaster funding in 2011. Given the massive scale of the disaster, this represents only one third of one percent of the total disaster damage and will obviously only make a small dent in the amount of money the Japanese government and its citizens will need to invest in reconstruction. Given that the Japanese economy is one of the three largest in the world, this raises the question of whether those funds could have been more effectively used in some of the underfunded emergencies in the developing world in 2011. (Taken together, 33 other disasters received about the same amount of international assistance as did Japan.) Some of these broader questions about humanitarian financing are further explored in the next chapter.

9. Building back better in the rich world.

While disasters cause terrible human suffering and significant strain on human societies, post-disaster reconstruction, especially after such major disasters as the Christchurch earthquake or the Japanese tsunami, gives communities a chance to develop and implement a collective vision of a different future. Rich countries usually possess the resources and institutions that can make the slogan of “build back better” possible and while national governments and parliaments play a major role in creating the overall institutional and financial framework for reconstruction, it is often local and provincial authorities which are the key to successful reconstruction. Building back better also means ensuring that demographic, ecological and technological trends are incorporated into the reconstruction plans and process. Looking at the reconstruction plans in Japan and New Zealand, for example, there are positive signs that authorities are considering how to rebuild cities in ways that reflect the needs of aging societies, incorporate ecologically sound principles and make communities safer from future natural hazards. The long mandates and planning horizons for reconstruction authorities and master-plans – from 10 to 20 years for Japan and New Zealand respectively – indicate that reconstruction can be the task of up to a generation, and should give pause to the impatience that Western media and donors often show towards reconstruction in developing countries which have much fewer resources at their disposal. Of course, the final verdict on the success of reconstruction efforts will only be evident years or decades down the road. But these efforts should be closely monitored by the public, media and researchers. Good practices and lessons learned should be drawn out and applied in post-disaster reconstruction efforts in countries other than those in the rich world.

In addition to a spate of disasters hitting developed countries, a range of major natural disasters occurred all over the world in 2011, including floods and landslides in Brazil, drought in the Horn of Africa, massive floods in Southeast Asia which left Bangkok under water for months, storms in the Philippines and a major earthquake in Eastern Turkey.

Bangkok, Thailand – Airport under water. Photo: Thinkstock.com

CHAPTER 2

2011: NATURAL DISASTERS REVIEWED

We will begin this chapter by exploring some of the overall disaster statistics in 2011 in comparison with recent years. We will then take a brief look at some of the disasters that occurred in 2011 outside the developed world and will examine the ongoing relief and reconstruction efforts following the two 2010 mega-disasters, the floods in Pakistan and the earthquake in Haiti. The third section of this chapter looks at the imperfect science of measuring economic damage caused by disasters, followed by a fourth section, which will analyze trends in international disaster response, looking at developments related to international disaster response law and some of the debates and developments surrounding the humanitarian cluster system. Last but not least, we will review international humanitarian disaster funding for 2011 to see how well (or how poorly) disaster responses were funded in the past year.

Chocò department, Pacific Coast of Colombia. The inhabitants of the community of Chambacú carry food parcels delivered by the International Committee of the Red Cross (ICRC) and the Colombian Red Cross.
Photo: © ICRC/Jacques Gay Crosier

Section 1

Disaster Statistics and Trends in 2011

With 302 disasters recorded in EM-DAT, 2011 saw the lowest number of disasters since the beginning of the millennium.[153] The number of disasters was almost 20 percent below the average annual figure of 384 natural disasters from 2001-2010. Beyond simply counting the number of disasters in a given year, there are of course various ways to measure the impact of disasters, including the number of deaths, the number of people affected, and economic losses.

According to most statistical indicators, 2011 was a below average year in terms of the impact of natural disasters. While there were almost 30,000 disaster fatalities (not including the Horn of Africa drought and famine), this figure is well below the average annual figure in the past decade. There were 206 million disaster-affected persons in 2011, which is about ten percent below the ten-year average. The main statistical outlier in 2011 is disaster damage; because of a spate of major disasters in the rich world, all historic records were shattered with estimates of total losses ranging between $366 billion (EM-DAT) and $380 billion (Munich Re) for disaster damage in 2011 (see Tables 9 and 19).

Table 9 Natural Disasters World-Wide, 2000-2011

	2000-2009 avg.[154]	2009[155]	2010[156]	2011[157]
Number of recorded disasters	392	335	385[158]	302
Fatalities	78,087	10,655	297,000	29,782
Persons affected (millions)	227	119	217	206
Damage ($ billions)	89.3	41.3	123.9	366

153 EM-DAT: The OFDA/CRED International Disaster Database, “2011 disasters in numbers,” Université catholique de Louvain - Brussels – Belgium, 18 January 2011, www.emdat.be

154 EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be

155 Centre for Research on the Epidemiology of Disasters, *Annual Disaster Statistical Review 2009: The Numbers and Trends,* 2010, http://cred.be/sites/default/files/ADSR_2009.pdf

156 Debarati Guha-Sapir et al., *Annual Disaster Statistical Review 2010: The Numbers and Trends,* Centre for Research on the Epidemiology of Disasters, May 2011.

157 Debarati Guha-Sapir, “Disasters in Numbers 2011,” CRED-UNISDR Press Conference, Geneva, 18 January 2012, CRED Université catholique de Louvain - Brussels – Belgium, www.emdat.be

158 In our *Review of Natural Disasters in 2010* we reported 373 natural disasters and 208 million affected persons, based on data extrapolated from EM-DAT in January 2011. EM-DAT in May 2011 put the final tally of disasters for 2010 to 385 disasters and 217 million affected persons, which, as we try to use the latest data available, we have used in this review.

It should be noted that EM-DAT statistics do not include the casualty figures from the drought and famine in Somalia, which according to a study by Save the Children and Oxfam were estimated at 50,000 to 100,000 deaths in 2011.[159] If those figures are excluded, the casualty numbers for 2011 are almost ten times lower than in 2010, where the Haitian earthquake alone killed more than 200,000 persons. If we include the Somalia estimates in the equation, we see that 2011 might actually lie above the 2001-2009 average of 78,087 casualties, making 2011 one of the more deadly years in terms of natural disasters.

Table 10 Top 10 Natural Disasters in 2011 by Fatalities[160]

Country	Disaster	Month	Fatalities
Japan	Earthquake/tsunami	March	19,846
Philippines	Tropical storm	December	1,430
Brazil	Flood	January	900
Thailand	Flood	Aug.-Dec.	813
Turkey	Earthquake	October	604
Pakistan	Flood	Aug.-Nov.	509
United States	Storm	April	350
Cambodia	Flood	Aug.-Nov.	247
China, P. Rep	Flood	June	239
India	Flood	Aug.-Oct.	204
Total Number of Global Fatalities Caused by Natural Disasters			**29,782**

If we look at the disasters with the most casualties (see Table 10), the list is topped by the Japan Tohoku earthquake and tsunami, followed by tropical storm Washi in the Philippines, and by floods and mudslides in Brazil. Overall, eight of the ten most deadly disasters of 2011 took place in Asia, with four out of five countries with the highest numbers of disasters in 2011 also located in Asia. The Philippines had 33 recorded disasters in 2011, China had 21, the United States had 19, India had eleven, Indonesia had eleven and Mexico had ten.[161]

While the international disaster database has not yet provided a final breakdown of the 206 million disaster-affected persons in 2011, some of the disasters that affected the most people in 2011 were the drought and famine on the Horn of Africa, major floods in China in June and September, the floods in Southeast Asia, as well as renewed flooding in Pakistan. Each of these disasters affected more than five million persons.[162]

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159 Save the Children and Oxfam, "A Dangerous Delay, The cost of late response to early warnings, in the 2011 drought in the Horn of Africa," *Joint Agency Briefing Paper*, 18 January 2012, https://www.oxfam.org/en/policy/dangerous-delay

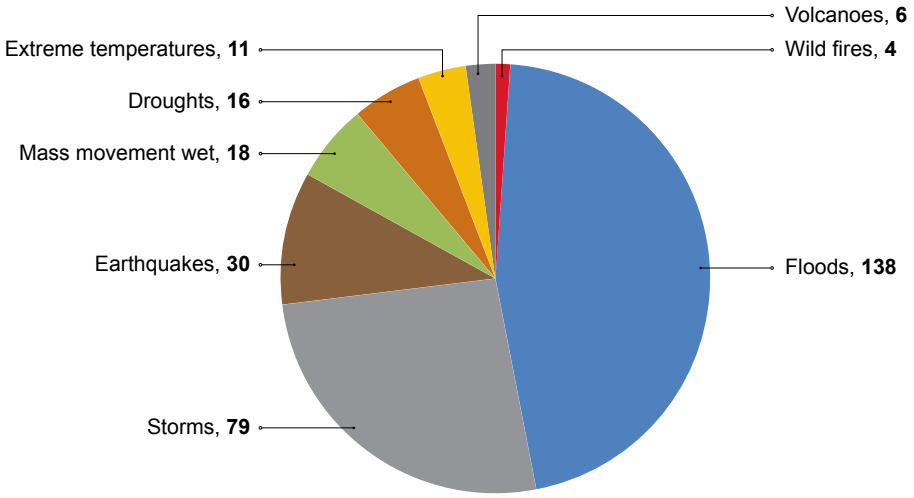
160 Guha-Sapir, "Disasters in Numbers 2011," *op. cit.*

161 EM-DAT: The OFDA/CRED International Disaster Database, "2011 disasters in numbers," Université catholique de Louvain - Brussels – Belgium, 18 January 2011, www.emdat.be

162 *Ibid.*

In 2011, EM-DAT registered 138 floods, 79 storms, 30 earthquakes (this category includes tsunamis), 18 wet mass movements,[163] 16 droughts, eleven extreme temperature events, four wild fires, and six volcanic eruptions.[164] Compared to the ten-year average, only earthquakes were more frequent, with 30 occurring in 2011 compared to the average for the decade of 28. Volcanic eruptions and drought disasters were in line with the average, while all other disaster categories were below average. Wildfires were down by two-thirds (4/12), extreme temperatures[165] were down by 50 percent (11/22), storms were down to 76 percent of the average (79/104), and floods were down to approximately 79 percent of the ten year average (138/175).

Graph 2: Frequency of Natural Disasters in 2011



Climatological and hydro-meteorological disasters

According to EM-DAT statistics, 266 out of the 302 recorded disasters (88 percent) in 2011 were climatological or hydro-meteorological disasters. The 138 floods reported in 2011 affected more than 106 million people and killed more than 5,200. This is almost exactly the same as the average number of people affected every year by floods during the 2001-2010 period and slightly below the annual average mortality rate from floods.[166] As mentioned above, floods were the most frequent disaster in 2011 (as they were in 2010), accounting for over 45 percent of total disasters recorded by EM-DAT.

[163] EM-DAT distinguishes between two kinds of hydrological disasters, “Flood” and “Mass Movement (wet)”. Mass Movement (wet) includes avalanches, landslides, rockfalls and subsidence, EM-DAT, “Classification,” http://www.emdat.be/classification

[164] EM-DAT: “2011 disasters in numbers,” *op. cit.*

[165] According to EM-DAT, extreme temperatures can either be heat waves, cold waves or extreme winter conditions. See. EM-DAT, “Classification,” http://www.emdat.be/classification

[166] EM-DAT: The OFDA/CRED International Disaster Database, “2011 disasters in numbers,” Université catholique de Louvain - Brussels – Belgium, 18 January 2011, www.emdat.be

2011 was a relatively benign year for storms, with 79 storms recorded as disasters. In comparison, an average of 104 storms was reported during the 2001–2010 period. And although 33 million people were affected by storms in 2011, they caused 3,076 casualties, far fewer than the average of 17,236 per year over the last decade.

Table 11 Comparing Hydrological Disasters 2001-2010 to 2011[167]

	Mass Movements (wet)[168]	Floods	Storms
Recorded disasters, 2011	18	138	79
Average number of recorded disasters, 2001-2010	20	175	104
2011 fatalities	314	5,202	3,076
Average number of fatalities, 2001-2010	1,002	5,614	17,236
Number affected, 2011 (millions)	0.01	106.4	33.9
Average number affected, 2001-2010 (millions)	0.38	106.3	39.0

Let us now take a brief look at some of the major areas facing tropical storm hazards: the Atlantic, West Pacific, East Pacific, Indian Ocean and South Pacific. The 2011 Atlantic hurricane season was slightly below average in terms of both hurricanes and major hurricanes. Seven hurricanes formed, of which three reached major hurricane strength, while the average since 1995 was eight hurricanes, of which four were considered to be of major strength. Meanwhile 2011 brought a total of 19 tropical storms, well above the 1995-2010 average of 15 storms. In fact, 2011 tied for the third highest number of tropical storms on record, only trailing 1993, which had 21 and 2005, with 28.[169] The most prominent Atlantic hurricane of 2011 was Irene, which we have already discussed in detail in Chapter 1.

The Eastern Pacific hurricane season saw a below average number of eleven storms, but all but one of those storms reached hurricane strength, the highest proportion of hurricanes in a single season. Six of the eleven storms became major hurricanes, double the average number. The deadliest weather system that hit the Eastern Pacific never in fact reached tropical storm strength, but made landfall in Central America as Tropical Depression 12-E on 10 October. Its heavy rains caused landslides and floods, affecting almost two million people and killing more than 100 in El Salvador, Guatemala, Honduras, Nicaragua, Panama, Costa Rica and parts of Mexico.[170]

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167 *Ibid.*

168 EM-DAT distinguishes between two kinds of hydrological disasters, “Flood” and “Mass Movement (wet)”. Mass Movement (wet) includes avalanches, landslides, rockfalls and subsidence, See at: EM-DAT, “Classification,” http://www.emdat.be/classification

169 Rick Knabb, ”2011 Atlantic Hurricane Season in Review,” *The Weather Channel*, 29 November 2011, http://www.weather.com/weather/hurricanecentral/article/recap-2011-hurricane-season_2011-11-29

170 Jeff Masters, “A strange 2011 Eastern Pacific hurricane season,” *Weather Underground,* 23 November 2011, http://www.wunderground.com/blog/JeffMasters/comment.html?entrynum=1992, see also: IFRC, “Over 1.9 million affected by severe flooding in Central America as the IFRC

The Western Pacific typhoon season was also below the long-term average with a total of 20 named storms – a figure 23 percent below the 25-year average. Of the 20 named storms, ten typhoons formed, which is 37 percent below the 25-year average of 16.[171] While the season was below average in numbers, the Philippines experienced a particularly devastating season with four storms making landfall (in addition to one near landfall). Typhoon Nesat in September and tropical storm Washi in December cost many lives and caused wide-spread destruction.

Cyclone activity was also below average in the Indian Ocean and Southern Pacific with a total of 26 named storms (from which 12 cyclones formed), 20 percent below the 25-year average of 32. The strongest storm of the region was Cyclone Yasi which hit Australia and became the second costliest tropical storm ever to hit the country. Other major cyclones in the region were Cyclone Wilma affecting both Tonga and New Zealand in late January, and Cyclone Bingiza which made landfall in Madagascar in February 2011. In South Asia, the biggest storm was Cyclone Thane, which made landfall in southern India in late December.[172]

La Niña, climate change and extreme weather events

Global weather patterns in early 2011 were heavily influenced by the 2010/11 La Niña episode, which was near record levels from September 2010 through the end of April 2011 and which lasted until summer 2011. La Niña is characterized by unusually cool ocean surface temperatures in the central and eastern tropical Pacific. La Niña is the opposite of El Niño, which is characterized by unusually warm ocean surface temperatures. Both La Niña and El Niño disrupt the large-scale ocean-atmospheric circulation patterns in the tropics and have important consequences for weather and climate around the globe. The 2010/2011 La Niña led to disastrously wet conditions in parts of northern and eastern Australia, Indonesia, Southeast Asia, and portions of northern South America such as Colombia in late 2010 and/or early 2011.[173] La Niña was also seen as largely responsible for the drought in the Horn of Africa.[174] After a brief period of neutral conditions in summer 2011 a new but weaker La Niña episode began, which is predicted to reach peak intensity in late 2011 or early 2012.[175] The following graphics show some of the typical effects of La Niña episodes.

launches emergency appeals," 28 October 2011, http://www.reliefweb.int/node/455836

171 Impact Forecasting, "Annual Global Climate and Catastrophe Report," Chicago: Aon Benfield, 2011, p. 22.

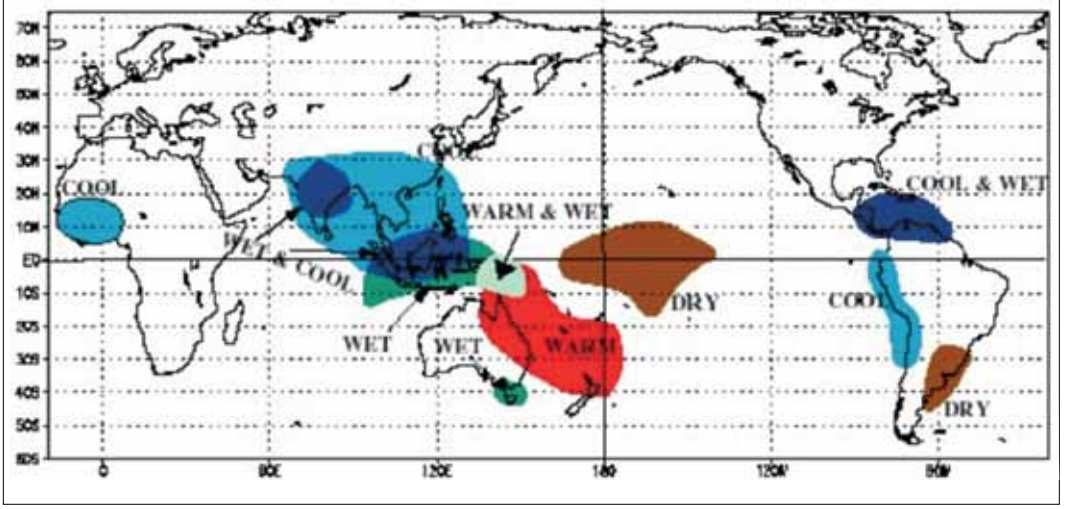
172 *Ibid.*, p. 23.

173 World Meteorological Organization, "El Niño/La Niña Update," 23 May 2011.

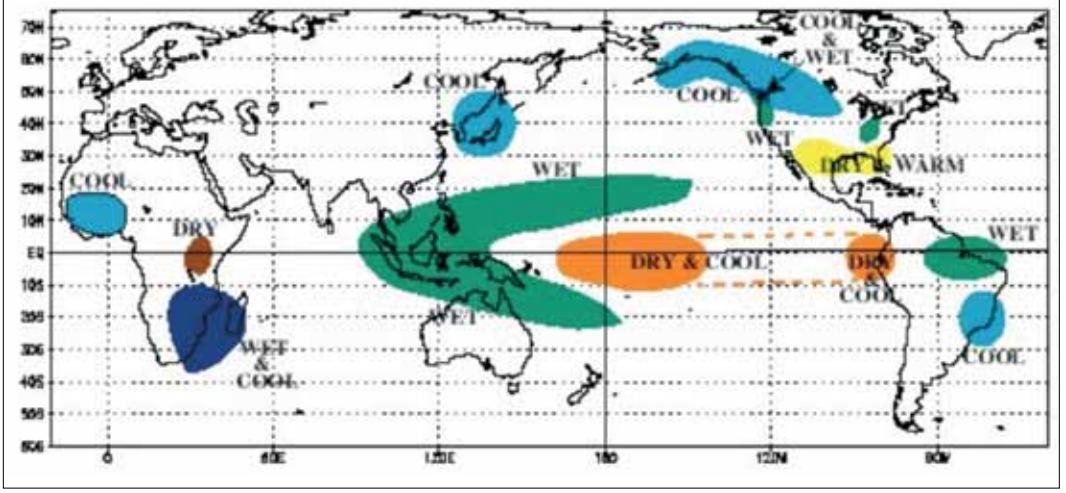
174 IRIN, "East Africa,"La Niña-induced drought 'to affect millions'," 18 February 2011, http://www.irinnews.org/report.aspx?ReportId=91966

175 World Meteorological Organization, *"El Niño/La Niña Update,"* 17 November 2011.

Graph 3: Typical Influence of La Niña, June-August[176]
Cold Episode relationships, June-August



Graph 4: Typical Influence of La Niña, December-February[177]
Cold Episode relationships, December-February



[176] The International Research Institute for Climate and Society, "Schematic Effects of ENSO, Typical Influence of La Nina," 16 August 2007, http://iri.columbia.edu/climate/ENSO/globalimpact/temp_precip/region_lanina.html

[177] *Ibid*.

In the run-up to the COP 17 Durban climate change summit in December 2011, the Intergovernmental Panel on Climate Change (IPCC) published a special report on *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)*, highlighting some of the latest scientific evidence on the nexus between climate change and extreme events.[178]

The report is cautious in warning that there is little data available about extreme events, given the fact that they only occur rarely and it is thus difficult to identify long-term changes in their frequency and severity. It finds that it is very likely that there has been an overall decrease in the number of cold days and nights and an overall increase in the number of warm days and night for most land areas since 1950. It qualifies a statistically significant increase of extreme precipitation events in some regions as well as a likely poleward shift in the main extra-tropical storm tracks. It also states with medium confidence that some regions, particularly Southern Europe and Western Africa, have experienced more intense and longer droughts while in some regions droughts have become less frequent, less intense or shorter.

The report further states that there is evidence that some extremes have changed as a result of anthropogenic influences, including increases in atmospheric concentrations of greenhouse gases. It is likely that anthropogenic influences have led to warming of extreme daily minimum and maximum temperatures on the global scale. There is medium confidence that anthropogenic influences have contributed to intensification of extreme precipitation on the global scale. It is likely that there has been an anthropogenic influence on increasing extreme coastal high water due to increase in mean sea level."[179] However, the report underlines that the attribution of single extreme events to anthropogenic climate change is challenging.

Looking forward, the report predicts a high probability for a rise in the length, frequency and/or intensity of warm spells, or heat waves over most land areas. It also predicts an increase in heavy precipitation and a rise in the percentage of heavy rainfalls among total rainfall as likely within the 21st century. In terms of tropical cyclones it suggests a rise in average storm speeds is likely (although it might not occur in all ocean basins), while storm frequencies will likely decrease or remain stable. Changes in rainfall and temperature imply possible changes in floods but projections are at this point only of low confidence both because the evidence is limited and the causes of regional alterations are often complex. Rising sea levels on the other hand make it very likely that extreme coastal high waters will occur in the future. The report also points out that there is high confidence that changes

[178] Intergovernmental Panel on Climate Change (IPCC), "Summary for Policymakers," in *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation,* eds. Field et al., A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change, 2012.

[179] IPCC, *op. cit.,* p. 7.

in heat waves, glacial retreat and/or permafrost degradation will affect high mountain phenomena such as slope instabilities, wet mass movements and glacial lake outburst floods. There is also high confidence that changes in heavy precipitation will affect landslides in some regions.[180]

According to the World Meteorological Organization, the warmest 13 years of average global temperatures have all occurred in the 15 years since 1997, contributing to more frequent extreme weather events. 2011 was predicted to be the tenth hottest year on record and the hottest year ever during a La Niña episode, during which global temperatures are on average cooler than in non-La Niña years.[181] There is no conclusive scientific evidence about the interrelationship between El Niño/La Niña episodes and climate change, but there are hypotheses that more frequent occurrence of those phenomena could be connected to globally warming temperatures.[182]

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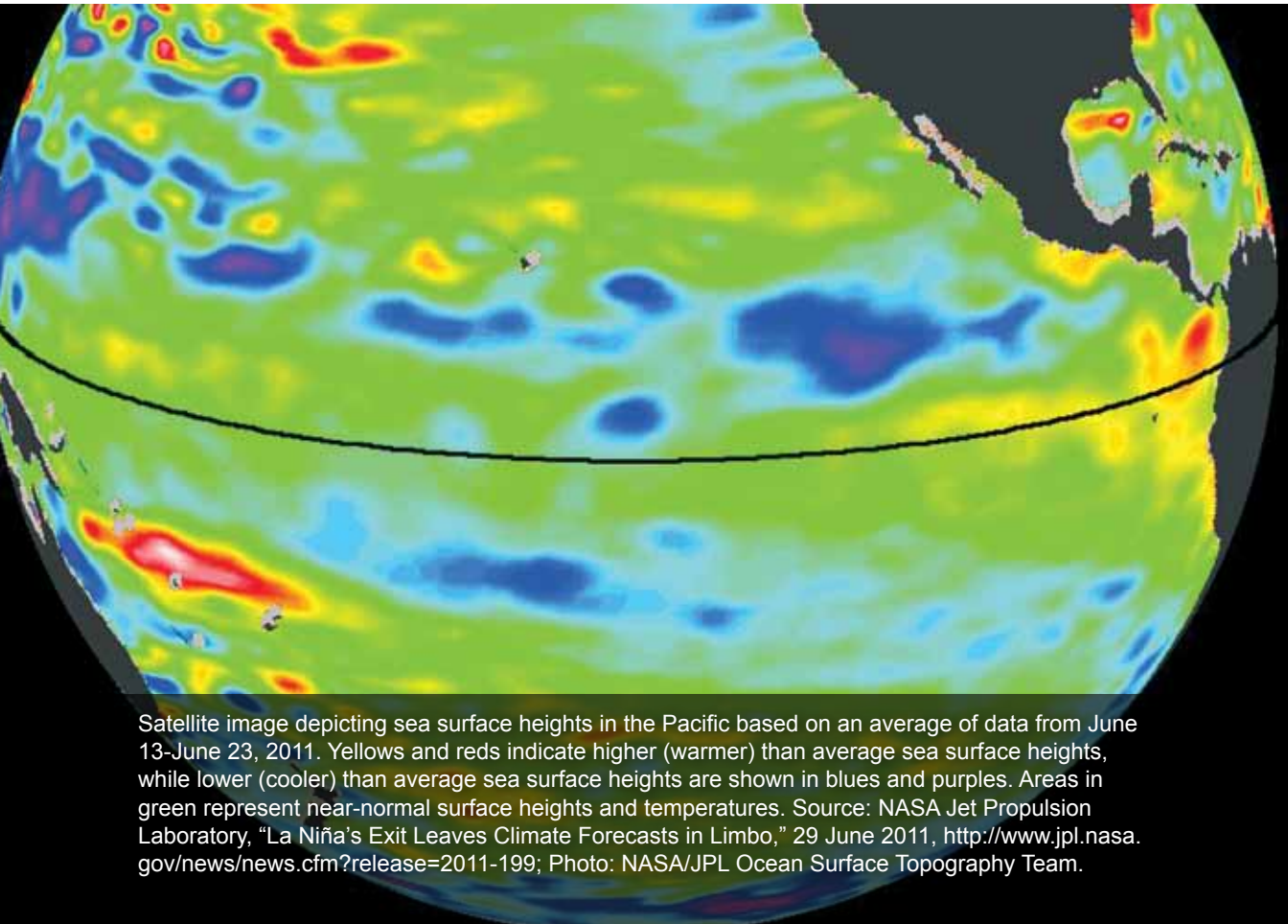
[180] IPCC, *op. cit.,* p. 11-12.

[181] Christian Science Monitor, "Climate change: 2011 temperatures the hottest ever during La Nina," 29 November 2011, http://www.csmonitor.com/Science/2011/1129/Climate-change-2011-temperatures-the-hottest-ever-during-La-Nina

[182] National Oceanic and Atmospheric Administration, "Global Warming: Frequently Asked Questions," http://www.ncdc.noaa.gov/oa/climate/globalwarming.html



Satellite image depicting sea surface heights in the Pacific based on an average of data from June 13-June 23, 2011. Yellows and reds indicate higher (warmer) than average sea surface heights, while lower (cooler) than average sea surface heights are shown in blues and purples. Areas in green represent near-normal surface heights and temperatures. Source: NASA Jet Propulsion Laboratory, "La Niña's Exit Leaves Climate Forecasts in Limbo," 29 June 2011, http://www.jpl.nasa.gov/news/news.cfm?release=2011-199; Photo: NASA/JPL Ocean Surface Topography Team.

Section 2

A Brief Look at Some Major Disasters in 2011[183]

That many rich developed countries were hit hard by natural disasters in 2011 does not mean that there were no disasters in less wealthy and developing countries. In this section we therefore look at some of the major disasters in 2011 that occurred in countries other than those described in the first chapter of this *Review*.

Brazil: floods and landslides

Table 12 Brazil, Floods and Landslides, January 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
202.4 million/5	84	8/54

Disaster statistics	
Fatalities	900[184]
Displaced	14,000[185]
Est. damage ($ billions)	13[186]

Brazil suffered one of its worst ever natural disasters in early 2011, when mudslides and floods in the south of the country, near Rio de Janeiro, killed 900 persons. With media and experts blaming state and municipal authorities for failing to invest in disaster prevention and urban planning, Brazil's President Dilma Rousseff promised federal government support for the affected areas, but also strongly emphasized the need for disaster prevention and affordable housing for poor people.[187] After the landslides, authorities urged residents in at-risk zones to abandon their homes, even as 14,000 people were housed in shelters

[183] Disaster data in this section are taken from UN, government and/or news sources as well as from EM-DAT. Sources are indicated in the footnotes. For population data we use the CIA World Factbook: https://www.cia.gov/library/publications/the-world-factbook/rankorder/2119rank.html, for the Human Development Index UNDP data: http://hdr.undp.org/en/statistics/ and for the GDP ranking IMF data we use IMF's World Economic Outlook Database, available at www.imf.org

[184] Guha-Sapir, "Disasters in Numbers 2011," *op. cit.*

[185] Agence France Presse (AFP), "Residents moved from Brazil disaster zone," 19 January 2011, http://reliefweb.int/node/381519

[186] Several articles use $13 billion as the estimated damage number without indicating where the projections come from. See for example: Jeff Masters, "At least 611 dead in Brazilian floods: Brazil's deadliest natural disaster in history," *Weather Underground,* 14 January 2011, http://www.wunderground.com/blog/JeffMasters/comment.html?entrynum=1727

[187] See: AlertNet, "Brazilian authorities under fire over flooding deaths," 17 January 2011, see also: Government of Brazil, "Brazil: Dilma promises federal aid to disaster area hit by rainfall and mudslides," 14 January 2011, http://reliefweb.int/node/380865

or were staying with relatives after the disaster.[188] At the end of January the government announced that it would build 6,000 houses to give for free to poor people made homeless by the floods and landslides, with another 2,000 houses donated by a consortium of construction companies. The government also provided $480 million in emergency funds for the affected areas.[189]

Sri Lanka: floods and landslides

Table 13 Sri Lanka, Floods and Landslides, January and February 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
21.2 million/57	97	67/121

Disaster statistics[190]	**January 2011**	**February 2011**
Fatalities	44	18
Affected	1,100,000	1,200,000
Displaced	362,646	320,408
Est. damage ($ billions)		0.5 (Jan. and Feb.)

Heavy rains through mid-January 2011 caused heavy flooding and landslides in eastern, northern and north-central Sri Lanka, affecting approximately 1.1 million persons and displacing more than 300,000. Among those displaced by the flooding were many families in the Northern Province that had only recently returned after being displaced during the conflict between the government and the Tamil Tigers. The government mobilized more than 30,000 navy, police and air force personnel to provide aid to the affected provinces and on 10 January requested UN relief assistance.[191] Another bout of heavy rain at the end of January led to even more widespread flooding, affecting 1.2 million persons. On 15 February, the government established a Presidential Task Force on Flood Relief to monitor and coordinate the flood response.[192] The timing of the flood affected the critical harvest season from January to February and threatened the April planting season; this has had serious negative implications for livelihoods of affected populations.

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188 AFP, "Residents moved from Brazil disaster zone," 19 January 2011, http://reliefweb.int/node/381519

189 BBC, "Brazil floods: More than 500 dead," 14 January 2011, http://www.bbc.co.uk/news/world-latin-america-12187985

190 OCHA, "Sri Lanka: Monsoon Flood Update Situation Report No. 15," 25 February 2011, http://reliefweb.int/node/389819. Damage figures from: Radio France Internationale (RFI), "Sri Lanka estimates flood damage at 400 million Euros," 13 February 2011, http://www.english.rfi.fr/node/75269

191 BBC, "Battle to reach thousands of Sri Lanka flood victims," 13 January 2011, http://www.bbc.co.uk/news/world-south-asia-12179296

192 OCHA, "Sri Lanka Flash Appeal Revision March 2011," 25 March 2011, http://reliefweb.int/node/393459

With rains abating in early March, most displaced persons were able to return and humanitarian agencies began focusing on early recovery activities. According to the rapid flood assessment, 58 percent of the 246,888 households surveyed reported they had suffered both temporary loss of income during the peak of the floods, and longer-term livelihood loss.[193] Total flood damage was estimated at 400 million Euros ($527 million), with Sri Lanka's government spending 221 million Euros on urgent repair to 50,000 homes damaged by the flood.[194] The $50 million UN appeal was only 57 percent funded by the end of the year.

China: floods

Table 14 China, Floods, June and September 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
1,336.7 million/1	101	2/90

Disaster statistics	**June[195]**	**September[196]**
Fatalities	175 (239)[197]	57
Affected	36,570,000	12,300,000
Est. damage ($ billions)	5.41	2.7

After months of drought in the center and north of the country, many regions of China were hit by heavy rains and flooding in the summer, with authorities claiming that almost 50 million persons were affected by floods in June and September. In June, torrential rains battered the Yangtze River's downstream provinces and several southwestern and southern provinces, affecting 36 million people and leaving 1.64 million displaced in 510 counties.[198] One major concern after the floods was rising food prices as agricultural production was heavily affected in many provinces.[199] In September, a week of heavy rain caused floods affecting Sichuan, Henan and Shaanxi provinces in the south-west, center and north of China, with the flooding in Sichuan expected to be the worst since records began. The September floods affected 12.3 million persons, forced over a million persons from their homes, killed at least 57 per-

193 UN OCHA, "Sri Lanka: Monsoon Flood Update Situation Report No. 16," 17 March 2011, http://reliefweb.int/node/393050

194 RFI, "Sri Lanka estimates flood damage at 400 million euros," 13 February 2011, http://www.english.rfi.fr/node/75269

195 Xinhua News, "Death toll reaches 175 in south China flooding since early June," 20 June 2011, http://news.xinhuanet.com/english2010/china/2011-06/20/c_13940085.htm

196 BBC, "China floods: Dozens killed after days of rain," 20 September 2011, http://www.bbc.co.uk/news/world-asia-pacific-14981928

197 EM-DAT estimates the number of fatalities at 239 while Xinhua News reports 175 casualties and 86 missing as of 20 June 2011.

198 Xinhua News, "Death toll reaches 175 in south China flooding since early June," *op. cit.*

199 The Guardian, "China floods bring steep food price rises," 19 June 2011.

sons, and damaged more than 120,000 houses.[200] Chinese authorities directed the relief operations in the disaster areas and did not request international assistance.

Thailand: floods

Table 15 Thailand, Floods, August 2011 – January 2012

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
66.7 million/20	103	24/89

Disaster statistics	
Fatalities	813[201]
Affected	13,000,000[202]
Est. damage ($ billions)	40

In the wake of tropical storm Nock Ten in late July, and with heavy monsoon rains soaking the country, wide scale flooding began in Thailand's northern and north-eastern provinces. The water slowly began making its way through the Central Plains towards the capital of Bangkok in the following months. Ongoing heavy monsoon rains led the country to declare a third of its provinces as disaster areas by mid-October, affecting millions and bringing large parts of the Thai economy to a halt. By mid-October flood waters reached the city of Bangkok and the government acknowledged that it would not be able to protect all districts of the capital city because of the huge amounts of water. To save the inner city and densely populated areas of the capital, authorities diverted water to surrounding areas.[203] High seasonal tides blocked the water from flowing into the sea and worsened the flood situation in late October. At the height of the disaster, 65 of the country's 77 provinces were affected by the floods.[204]

The floods imposed enormous costs on Thailand's economy, entirely inundating some of the country's main industrial zones. Internationally, supply chains for several major car manufacturers as well as computer production were heavily impacted as Thailand has become an important producer of car parts and produces 25 percent of global computer hard drives. More than 40 percent of the Thai electronic capacity was damaged by the floods. There was also a severe decline in tourists visiting the country, hurting one of the country's major service industries. The floods also severely impacted rice production in several provinces.[205]

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200 BBC, "China floods: Dozens killed after days of rain," 20 September 2011, http://www.bbc.co.uk/news/world-asia-pacific-14981928

201 Debarati Guha-Sapir, "Disasters in Numbers 2011," *op. cit.*

202 Xinhua News, "Thai floods slash tourism income by 1.1 bln U.S. dollars," 17 November 2011, http://news.xinhuanet.com/english2010/world/2011-11/17/c_131253563.htm

203 AFP, "Thai PM says floods in parts of Bangkok inevitable," 20 October 2011, http://reliefweb.int/node/454117

204 AFP, "Thai floods death toll tops 800," 31 December 2011, http://reliefweb.int/node/467850

205 Bangkok Post, "Floods: Losses to Thailand's economy?" 4 November 2011, http://www.

By late 2011 most of the water had receded although in early 2012 several provinces in southern Thailand were still experiencing flooding. With the floods receding, the government promised major investment ($11 billion) in flood prevention and water infrastructure. Plans under consideration include huge artificial waterways north of Bangkok to divert water to the east and west of the city, the establishment of a new water management body for the city to better coordinate the response, planting of trees along waterways and the building of new reservoirs and dams.[206]

Thailand was not the only country in the region hit by floods in 2011. Next to Thailand, the heaviest hit was Cambodia, which also saw large parts of the country inundated, 247 persons killed and millions affected by floods from August to November.[207]

Turkey: earthquake

Table 16 Turkey, Earthquake, 23 October 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
78.8 million/17	92	17/62

Disaster statistics		
Fatalities[208]	604	
Injured	4,152	
Collapsed buildings	2,309	
Damaged buildings[209]	Severely damaged: 11,847	Moderately damaged: 17,923

A 7.2 magnitude earthquake struck eastern Turkey on 23 October in the predominantly Kurdish area in and near the town of Van. The quake killed 604 persons, injured more than 4,000 and destroyed or damaged several thousand buildings. Initially, the Turkish government declined offers of international assistance, opting instead to rely on its own emergency management systems to respond to the effects of the earthquake. However, as the need for shelter increased, and criticism of the initially slow relief distribution mounted, the government formally requested assistance on 25 October.[210] An aid campaign launched by the Turkish government raised $67 million (including a $50 million donation from Saudi

bangkokpost.com/learning/learning-from-news/264786/floods-losses-to-thailand-economy

206 Jonah Fisher, "Flood-proofing Bangkok could force canal dwellers out," BBC News, 25 January 2012, http://www.bbc.co.uk/news/world-asia-pacific-16713875

207 Debarati Guha-Sapir, "Disasters in Numbers 2011," *op. cit.*

208 USAID, "USAID/DCHA Turkey Earthquake Fact Sheet #1 - FY 2012," 3 November 2011, http://reliefweb.int/node/457087

209 IFRC, "Emergency appeal and operation update, Turkey: Van Earthquake," 1 November 2011.

210 USAID, "USAID/DCHA Turkey Earthquake Fact Sheet #1 - FY 2012," 3 November 2011, see also: Reuters, "Quake rescuers save baby, Turkey requests aid," 25 October 2011, http://www.reuters.com/article/2011/10/25/us-turkey-quake-idUSTRE79M10Z20111025

Arabia) by early November.[211] A 5.7 magnitude aftershock on 9 November led to the collapse of several hotels, killing 12.[212]

Given that winter was quickly approaching, winterized tents, clothes and blankets for people who had lost their houses as well as the early provision of temporary shelter were the main humanitarian needs following the earthquake. By mid-January, the government had provided 18,000 containers to be used by affected persons who lost their housing during the earthquake, with over 50,000 more containers in the pipeline. The government planned to temporarily relocate 180,000 disaster victims to container cities, with the first permanent houses for disaster victims to be ready by August 2012.[213]

Colombia: floods, landslides

Table 17 Colombia, Floods, Landslides, April 2010-June 2011, September-December 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
44.7 million/30	87	28/77

Disaster statistics	April 2010 – June 2011	September – December 2011
Fatalities	486	181
Affected	4,000,858	914,280
Est. damage ($ billions)	5.3	n/a

In 2010 and early 2011, Colombia was battered by severe rainfall connected to one of the strongest La Niña episodes in the last century. The rains led to massive floods, causing almost 500 fatalities and affecting more than four million people from April 2010 until June 2011.[214] Economic losses were estimated to be over $5 billion.[215] The Colombian people and government mobilized substantial funds for disaster relief and recovery, with the government creating the "Colombia Humanitaria" framework for flood relief. Although there were positive aspects of the new mechanism – such as national ownership and the leveraging of private resources – the system was widely criticized. By largely replacing the existing disaster response system with a new one during an emergency, the response was slow and thousands of flood victims were left to survive on their own. Some areas affected by the floods were also areas where people had been displaced by conflict. In Colombia, those displaced by conflict

[211] Government of Turkey, "Van earthquake press release," 3 November 2011, http://reliefweb.int/node/457169

[212] AlertNet, "Turkish police fire tear gas in quake city," 10 November 2011, http://www.trust.org/alertnet/news/turkish-police-fire-tear-gas-in-quake-city/

[213] Government of Turkey, "Deployment of disaster victims to containers has being promptly continued," 19 January 2012, http://reliefweb.int/node/471405

[214] UN OCHA, "Colombia Inundaciones 2010, Informe de situación No. 40," 8 September 2011.

[215] Alice Thomas, *Surving Alone: Improving Assistance to Colombia's Flood Victims*, Refugees International, May 2011.

and by natural disasters fall under completely separate legal and institutional frameworks, meaning that while "protection of people internally displaced by conflict has gradually been informed by international human rights standards, those affected by natural disasters continue to be viewed as objects of care rather than rights-holders." [216]

While the rains were weaker in 2011 than the year before (when they were seven times heavier than average), they still caused floods and mudslides in both the spring and the autumn. UN OCHA reports that from September to shortly before the end of December, 914,280 persons were affected by the rains and 181 died as a result of the disaster.[217] *The Economist* notes with respect to the government program instigated after the 2010 floods to mitigate the effects of the next rainy season that only 400 of 4,250 public-works projects had been finished (with another 680 near completion) by the end of 2011.[218]

Philippines: storms

Table 18 Philippines, Typhoon Nesat and Tropical Storm Washi, September and December 2011

Country data		
Population/rank	**Human Development Index rank**	**GDP total/per person rank**
101.8 million/12	112	32/123

Disaster statistics	**Nesat, September**[219]	**Washi, December**[220]
Fatalities	85	1,268 (1,430)[221]
Affected	3,105,355	1,168,726
Evacuated	387,641	525,945[222]
Damaged houses	7,491	52,435
Est. property damage ($ billions)	0.36	0.04

[216] *Ibid.* pp. 11-13.

[217] UN OCHA, "Colombia Inundaciones 2011 Informe de situación No. 05," 30 December 2011, http://reliefweb.int/node/467806

[218] The Economist, "That damned Niña, Endless rain exacts a heavy toll," 10 December 2011, http://www.economist.com/node/21541419

[219] Republic of the Philippines, National Disaster Risk Reduction and Management Council (NDRRMC), "2011 top 10 Philippine Destructive Tropical Cyclones," last updated 6 January 2012, http://www.ndrrmc.gov.ph/index.php?option=com_content&view=article&id=413

[220] Republic of the Philippines, NDRRMC, "NDRRMC Update, SitRep No 47 re Effects of Tropical Storm "Sendong" (Washi) and Status of Emergency Operations," 26 January 2012.

[221] EM-DAT estimates the number of fatalities at 1,430 while the Government of the Philippines reports 1,268 casualties and 181 missing by 26 January 2012.

[222] Republic of the Philippines, NDRRMC, "2011 top 10 Philippine Destructive Tropical Cyclones," last updated 6 January 2012, http://www.ndrrmc.gov.ph/index.php?option=com_content&view=article&id=413

As noted earlier in this chapter, the Philippines was the country with the highest number of disasters in 2011. Two of the most devastating disasters were Typhoon Nesat and Tropical Storm Washi.

Typhoon Nesat, known locally as Pedring, made landfall in Aurora and Isabela provinces in northeastern Philippines on 27 September, causing the evacuation of tens of thousands of persons as well as the suspension of all school classes in Manila and other affected areas. The storm caused widespread flooding, killing 85 persons, damaging more than 7,000 houses and affecting more than three million persons.[223] Authorities were also concerned about widespread damage to corn crops in the affected area. Nesat was followed shortly afterwards by Typhoon Nalgae (Quiel), which traced its path along the track of Nesat, compounding the devastating impact on northern and central Luzon.[224]

Tropical Storm Washi, known locally as Sendong, swept through the southern province of Mindanao between 15 and 18 December 2011, triggering flash floods and landslides in many municipalities in the regions, including the two major cities of Cagayan de Oro and Iligan. The storm killed more than 1,200 persons, damaged more than 13,000 houses and devastated many communities. As many as 400,000 persons were reported to have fled their homes in the aftermath of the disasters, with 23,000 remaining in evacuation centers by the end of January.[225] Experts noted that the storms' heavy toll was caused by people being asleep when the storm hit and also by the fact that in that part of the country people were not used to storms. Deforestation of watersheds was also seen as a factor which intensified the effects of the heavy rains.[226] With support from aid organizations, the government launched a large-scale relief operation, providing assistance to almost half a million persons. While emergency relief operations for the many displaced persons were still ongoing in late January, the government was determining areas in the affected towns that were unsafe for return due to the high risk of future disasters and was contemplating resettlement options for the inhabitants of those areas.

How are reconstruction efforts progressing in last year's disaster areas?

In our 2010 *Review*, we focused on the earthquake in Haiti and the floods in Pakistan. In this section we examine the recovery efforts in these two disasters a year later. The story is not an encouraging one.

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223 *Ibid.*

224 OCHA, "Typhoon Nelgae and Nesat, Situation Report No. 3," 4 October 2011, http://reliefweb.int/node/450632

225 OCHA, "Tropical Storm Washi, Situation Report No. 15," 27 January 2012.

226 People & Planet, "Philippine floods: a disaster waiting to happen," 30 December 2011, http://www.peopleandplanet.net/?lid=30189&section=33&topic=27

Haiti Camp Residents Relocated to Prepare for Tropical Storm.
Photo: UN Photo/Logan AbassiDormino

Haiti: Still in the Emergency Phase?

It is normal after a major disaster for reconstruction to take several years, but the pace of recovery in Haiti has been slower than in other major post-disaster areas. It is probably fair to say that with more than 519,000 Haitians still living in tents and under tarpaulins in more than 750 camps, the emergency phase of the disaster has not yet ended.[227] Over ten thousand people have been evicted from camps, many with no place to go, and up to 120,000 of the remaining IDPs are threatened by eviction.[228] With the Haitian government only slowly gaining a foothold after the contested and drawn out election process in late 2010 and early 2011, a reconstruction master plan is still missing. While housing repair and reconstruction projects have begun in several areas, most international actors have focused on the construction of temporary housing, in part because land and property issues were easier to overcome for temporary dwellings than for permanent housing.[229]

Data from the UN shelter cluster show that more than 128,000 families or approximately half a million people had found at least temporary housing by January 2012, with 100,604

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227 Haiti E-Shelter/CCCM Cluster, IOM, "Displacement Tracking Matrix, v2.0 update," 30 November 2011.

228 Oxfam International, "Haiti - The Slow Road to Reconstruction, Two years after the earthquake," 10 January 2012, http://www.oxfam.org/en/policy/haiti-slow-road-reconstruction

229 IFRC, "Thousands of families face short- and long-term challenges after Typhoon Washi," 22 December 2011.

T-shelters constructed (61,241 in 2011), 13,578 houses repaired, 6,725 rental subsidies given, 4,769 houses reconstructed and 2,386 emergency shelters provided.[230] As temporary shelter construction is based on a neighborhood approach, the large number of constructed T-shelters has not brought many solutions for the displaced persons, with only 22 percent of the T-shelters going to IDPs. One of the main problems of finding durable housing solutions for the hundreds of thousands of displaced in Haiti's tent cities is that 77 percent of IDPs still living in camps by late 2011 in Haiti were tenants – rather than owners – before the earthquake.[231] With a severe lack of available rental properties as a result of the earthquake, even the distribution of rental subsidies cannot provide sufficient solutions for most of them. Funding has become more scarce in the second year after the earthquake and many humanitarian actors have transitioned towards reconstruction, resulting in growing gaps in service provision to IDPs in 2011.[232]

Next to the displacement crisis, the cholera crisis also set back the recovery efforts. By November 2011, almost half a million cholera cases had been reported and more than 6,000 persons had died from cholera.[233] Efforts to prevent the further spread of cholera used important resources, which might have otherwise been used for reconstruction. With investigations showing that the outbreak of the cholera epidemic was most likely connected to the MINUSTAH peacekeeping mission, the epidemic soured relations between the Haitian population and the peacekeeping mission.[234]

Haiti's new government under President Martelly and Prime Minister Conille has made ambitious promises, including free primary education, economic development and IDP resettlement, but political infighting with parliament delayed the confirmation of the prime minister and his cabinet until autumn. This took time that could have been used for making important reconstruction decisions. On the upside, the year has witnessed the beginning of several major projects such as a training hospital, a multimillion dollar industrial park on Haiti's northwest coast and a program to stimulate agricultural production. On the downside, the end of the mandate of the Interim Haiti Recovery Commission in October (by which time it had approved over 100 projects worth $3.2 billion) and the failure to either prolong the mandate or to create the originally planned successor to the IHRC, the Authority for the Development of Haiti, seemed to be a bad omen for prospects of coordinated reconstruction in 2012.[235] Given these difficulties, donors' inertia is understandable, but it

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230 Giovanni Cassani, Haiti E-Shelter and CCCM Cluster, Presentation at E-Shelter & Camp Coordination and Camp Management Cluster Interaction meeting, draft version, 12 January 2011.

231 *Ibid.*

232 Oxfam International, "Haiti – The Slow Road to Reconstruction," *op. cit.*

233 WHO, "Health Cluster Bulletin, Cholera and Post-Earthquake Response in Haiti," 7 November 2011.

234 Reuters, "U.N. peacekeepers likely caused Haiti cholera," 30 June 2011, http://www.reuters.com/article/2011/06/30/us-haiti-cholera-idUSTRE75T4O220110630

235 Oxfam International, "Haiti – The Slow Road to Reconstruction," *op. cit.*, p. 8.

certainly has also contributed to the slow speed of reconstruction in Haiti, with donors only disbursing 52.88 percent of the $4.5 billion pledged for 2010-11.[236]

The prospects for 2012 are mixed. On the one hand the Martelly/Conille government has begun initiatives to resettle IDPs from several camps, recently announcing the start of a resettlement project for approximately 20,000 IDPs housed in the vicinity of the destroyed presidential palace.[237] But this is only a fraction of remaining IDPs. Without a master plan for reconstruction which deals with some of the contentious land and property rights issues, and without additional funding, by November 2012 there could still be more than 350,000 persons living in camps in the earthquake-affected areas.[238] Almost three years after the earthquake, this number seems shockingly high. And while some government agencies have performed well in the emergency phase, many Haitian state institutions lack capacity and/or are underfunded. Thousands of NGOs are working on projects which are mostly well-intentioned, but are often not well-coordinated. And some presidential initiatives, such as the plan to reconstitute the Haitian army, seem to only distract attention from the huge remaining reconstruction challenges.

Still, with some gentle signs of progress, the cholera epidemic slowing down, half of the rubble cleared and good intentions abounding, there should be fewer excuses if reconstruction is not well on the way by this time next year.

Pakistan flooding: A double hit

As might be expected given the scale of Pakistan's flooding in 2010, recovery was slow in 2011. The 2010 floods, as reported in last year's *Annual Review,* affected over 20 million people and covered a fifth of the country's territory.[239] In terms of the government's response to the 2010 floods there was both popular and expert concern with the slow pace of rebuilding and particularly with the fact that embankments, dams and other water control infrastructure were not being repaired sufficiently quickly to protect against future floods.[240] Nor did reconstruction of housing keep pace with the needs of the population. Refugees International reports that some nine million people who lost their homes in the 2010 floods lacked secure shelter even as the 2011 monsoon season approached.[241]

It turned out that these fears were well-founded as the 2011 summer monsoon rains were again heavier-than-usual and caused renewed widespread flooding in Pakistan. Even

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236 Office of the Special Envoy for Haiti, "Assistance Tracker," accessed 19 January 2012, http://www.haitispecialenvoy.org/assistance-tracker/

237 Reuters, "Haiti Marks Two Years After Catastrophic Quake," 12 January 2012, http://www.reuters.com/article/2012/01/12/us-haiti-quake-anniversary-idUSTRE80B0BS20120112

238 Cassani, *op. cit.*

239 Ferris and Petz, *op. cit.,* p. 23.

240 Alice Thomas, "Pakistan: Flood Survivors Still Struggling to Recover," *Refugees International*, 31 August 2011, http://www.refugeesinternational.org/node/4944

241 *Ibid.*

though they were more limited in scope than the previous year, primarily affecting the provinces of Sindh and Balochistan, the 2011 floods affected over five million people and demonstrate the particular impact of recurrent disasters.

But first a word about recovery from the 2010 floods. The transition from relief to early recovery did not work very smoothly. Although the Pakistani government decided several months in advance that the disaster relief phase would end on 31 January 2011, humanitarian agencies were surprised when this decision was implemented in all but five districts. The camps for IDPs were closed and food assistance was discontinued. This came as a surprise because the humanitarian agencies were conscious that many people affected by the floods still lacked housing, food, medical services, and access to clean water and sanitation. But it also came as a surprise because the assistance structures intended to facilitate the transition from relief to long-term development were not yet in place. The Early Recovery Cluster, as it is called, had not yet completed its plans for the transition and, in fact, the final Strategic Early Recovery Action Plan was not released until 15 April 2011. Even then, the early recovery plan did not receive sufficient support from donors. It is true that the transition from relief to development rarely runs smoothly, but in Pakistan, the situation was particularly acute because of the exposure of the population to the effects of further hazards.

A year after the 2010 floods, Refugees International found that 5.6 million people in flood-affected areas were food insecure and "alarmingly high numbers" were malnourished. Of even more concern was the fact that some nine million people were still in need of permanent shelter. Hundreds of thousands of people still lived in tents or in various types of temporary shelters rather than the more permanent – and safer – one-room shelters that had been agreed on. There were many criticisms of shelter reconstruction in the aftermath of the Pakistani floods (such criticisms are unfortunately not unusual in post-disaster settings.) It took time to agree on a standard housing model; once agreed, agencies were slow to commit to building the structures, and even among those who had committed to construct housing, progress was slow. There were also difficulties in distribution of new housing. As in other post-disaster situations, permanent housing tended to be given to those who either owned their property or had secure property rights, rather than to the most vulnerable members of the society.

This was the backdrop against which the 2011 floods occurred. Rajiv Sinha of the Indian Institute of Technology in Kanpur links the recurrent flooding to climate change, arguing that all of the climate change models predict that the distribution of monsoon rains will become more uneven in the future. "Total rainfall stays the same, but it comes in shorter more intense bursts." [242] In August 2010, more than half of the normal monsoon rain fell in only one week. Typically it is spread over three months and rivers such as those in the vast

[242] Ishann Tharoor, "Pakistan's Floods: Déjà vu, All Over Again," *Time Magazine*, 14 September 2011, http://globalspin.blogs.time.com/2011/09/14/pakistans-floods-deja-vu-all-over-again/#ixzz1l3Nu1UgF

Indus River system just could not cope with that quantity of water in a short period.[243] Once again in late summer 2011, the heavier-than-usual monsoon rains flooded the Indus Valley.

As of October 2011, a joint UN-Pakistani government assessment mission found that the 2011 floods affected more than five million people in Sindh and Balochistan. Nearly 800,000 houses were damaged; 41 percent of them were completely destroyed.[244] Millions of hectares of agricultural land lay under water and hundreds of villages were completely submerged. Over 500 people died.[245] 4.3 million people – 84 percent of the affected population – were found to be food-insecure in Sindh and Balochistan (although it should be noted that even without the flooding, Sindh had the highest food insecurity rate in Pakistan at 72 percent). Acute respiratory infections were on the rise and the survey indicated that flood-affected people are at risk of vector-borne diseases such as malaria and dengue. As usual, a critical issue was access to safe drinking water and sanitation facilities. According to the WHO, up to 87 percent of water sources tested were unfit for drinking. The loss of livelihoods and the flooding of agricultural land meant that there was an urgent need for agricultural inputs so that flood-affected communities could begin farming once again. By the end of the year, humanitarian actors were distributing winterization items for people in the flood-affected areas. While some 450,000 households had received assistance, 43 percent of affected households had not received any assistance at all.[246]

In sum, as a result of a second year of extreme flooding, many flood-affected people in Sindh and Balochistan have become more vulnerable due to damage to infrastructure and lack of livelihood opportunities.[247] The floods also may have political consequences; when a government is seen to be responding inadequately to a national emergency, its legitimacy may be called into question. The Pakistani government faces numerous pressures, including insurgent activity, troubled civilian-military relationships and strained ties with the United States. In the 2010 flooding, there were popular protests against the government for failing to deliver relief quickly and many observers contrasted the generally efficient response by the Pakistani military with the slower response of civilian authorities.[248] In 2011, there were again political critiques of the government's response, particularly its seeming inability to prepare for the crisis and difficulties in mobilizing international assistance.[249]

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243 *Ibid.*

244 OCHA, "Pakistan Monsoon 2011, Situation Report No. 15," 9 December 2011.

245 Guha-Sapir et al., "Annual Disaster Statistical Review 2010," *op. cit.*

246 OCHA, "Situation Report No. 15," *op. cit.*

247 OCHA, "Situation Report No. 15," *op. cit.*

248 The Telegraph, "Pakistan floods: flood stirs anger at government as death toll hits 1,200," 2 August 2010, http://www.telegraph.co.uk/news/worldnews/asia/pakistan/7922152/Pakistan-floods-flood-stirs-anger-at-government-as-death-toll-hits-1200.html. Also see: Resilience Science, "How resilient is the Pakistan government to floods?" 17 August 2010, http://rs.resalliance.org/2010/08/17/how-resilient-is-the-pakistan-government-to-floods/

249 Zulfiqar Ali, "Flood survivors suffer in KP as govt fails to mobilise donors," *Dawn*, 26 July 2011, http://www.dawn.com/2011/07/25/flood-survivors-suffer-in-kp-as-govt-fails-to-mobilise-donors.html

Saint Louis, Missouri - Destroyed homes after tornadoes, Saint Louis area on Friday April 22, 2011.
Photo: © R. Gino Santa Maria | Dreamstime.com

Section 3

Estimating Economic Costs of Natural Disasters: An Imperfect Science

This was a year of extraordinary economic losses due to natural disasters. Munich Re, one of the largest reinsurers in the world, estimates the economic losses of natural disasters in 2011 at $380 billion – the largest sum ever, breaking the previous record from 2005 of $262 billion (in constant 2011 dollars).[250] As noted elsewhere in this study, this was due to several large-scale disasters in developed countries as well as to the flooding in Thailand.[251] But measuring the economic impact of disasters is complicated. This section looks at the way economic costs are calculated, considers why the costs of disasters are increasing, examines the different economic impacts of disasters in rich and poor countries, and makes some observations on the cost of prevention versus response.

Table 19 Top 5 Natural Disasters by Cost of Disaster Damage, 2011[252]

Country/ Region	Disaster	Date	Overall losses ($ billions)	Insured losses ($ billions)
Japan	Earthquake, tsunami	3 March	210	35-40
Thailand	Floods, Landslides	1 Sep – 15 Nov	40	10
New Zealand	Earthquake	22 Feb	16	13
USA	Severe storms/ Tornadoes	22 – 28 April	15	7.3
USA, Caribbean	Hurricane Irene	22 August – 2 Sep	15	7
Total			**380**	**105**

The economic impact of disasters is increasing for several reasons: there are, first of all, simply more people on earth and they are increasingly living in cities where built structures tend to be more expensive. As the *Economist* points out, "economic activity is being concentrated in disaster-prone places: on tropical coasts and river deltas, near forests and along earthquake fault lines."[253] A 2010 World Bank study led by Apurva Sanghi estimated

250 If an insurance company does not wish to bear the full risk of their potential liabilities they can get insurance themselves from a reinsurer.

251 Munich Re, "The five largest natural catastrophes of 2011," Geo Risks Research, NatCatSERVICE, January 2012, http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.aspx

252 *Ibid.*

253 The Economist, "Counting the cost of calamities," 14 January 2012, http://www.economist.com/node/21542755

that between 2000 and 2050 urban populations exposed to tropical cyclones or earthquakes will more than double, rising from 680 million in 2000 to 1.5 billion in 2050.[254]

Different kinds of disasters produce different kinds of economic impact. Sudden-onset disasters primarily damage productive capital, including infrastructure, and may destroy means of production. Slow-onset disasters are typically more extensive in their impact and may be more destructive in the longer term as they erode rates of savings, investment and domestic demand as well as undermining productive capacity.[255]

Measuring the economic impacts of disasters

The disaster damage figures in this review are based on both EM-DAT and Munich Re NatCatService data because Munich Re's dataset is more detailed in terms of damage figures than the EM-DAT dataset. For example, in 2010, EM-DAT only provides damage estimates for fewer than 20 percent of the natural disasters in its database.[256] Meanwhile, EM-DATs database allows broader access to data which makes long-year comparability easier. EM-DAT describes "estimated damage" as: "The economic impact of a disaster usually consists of direct (e.g. damage to infrastructure, crops, housing) and indirect (e.g. loss of revenues, unemployment, market destabilization) consequences on the local economy."[257]

Insurance companies obviously have a strong interest in calculating the economic losses which they cover and have developed methodologies to estimate total economic losses, including those not insured. For example, Munich Re, a reinsurance company, explains its methodology in determining disaster damage as follows:

> In the case of roughly one-third of all loss events, reliable data on economic losses are provided by governments, statistical offices, the World Bank and development banks. These are entered in the database by Munich Re after close scrutiny and verification of their plausibility. If suitably verified data concerning the economic losses are not available, we take as our basis the figures concerning the insured losses, extrapolate these via the insurance density of the affected region and determine the amount of loss with the aid of specially developed algorithms. These loss estimates take account of the type of event, as well as the risk exposure of the region affected. Among other things, this includes information on the structure of affluence in the country affected, as well as details concerning damaged industrial plants, infrastructure and supply systems. Even if an insured loss has not been

254 Apurva Sanghi et al., *Natural Hazards UnNatural Disasters, op. cit.*

255 Mark Pelling, Alpaslan Ozerdem and Sultan Barkat, "The macro-economic impact of disasters," *Progress in Development Studies*, vol. 2, no. 4 (2001), p. 285.

256 Elizabeth Ferris and Daniel Petz, *A Year of Living Dangerously, A Review of Natural Disasters in 2010*, Brookings-LSE Project on Internal Displacement, 2011.

257 EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, "Glossary", www.emdat.be.

> incurred, Munich Re can still determine the overall losses. To this end, a realistic picture of the loss is drawn up by experts on the basis of the type of event, the nature of the region affected, its population density and information on damage to buildings and infrastructure, as well as injuries, and then use this to arrive at the overall losses.[258]

In comparison with reinsurance companies such as Munich Re, it is often difficult to uncover the methodologies used by governments, insurance companies, development agencies, researchers, and others collecting data on the impact of disasters. A first major problem with economic loss figures is the lack of consistency in methodology and of lack of transparency in explaining the methods used.[259] A second problem is that disaster loss figures are generally based on government reports and thus will reflect different methodologies and capacities of governmental data collection instruments. For example, one would expect more reliable loss estimates from the government of Australia than from the government of Togo. While calculating the loss of physical infrastructure – buildings, roads, factories – is relatively straightforward, a third problem is that there seem to be different ways of calculating the knock-on effects of disasters. Some refer to direct losses (e.g. loss of physical infrastructure), indirect losses (e.g. manufacturing affected by loss of power, labor and communications) and secondary impacts (as when, for example, disasters increase demand for building materials and skilled labor).[260]

Disasters can cause demand for building materials, food, energy and water to increase at the same time that damage to infrastructure causes domestic production to fall; damages to infrastructure such as transportation, marketing and communications reduces the ability of goods to circulate; demands for skilled workers, particularly in construction, can lead wages and prices to increase.[261] After the 1995 Kobe earthquake in Japan, for example, production failures led to a loss of 4,500 jobs – the knock-on effects included lost household earnings.[262] In 2012, Japan reported its first trade deficit since 1980, due largely to the economic effects of the earthquake/tsunami.[263]

The long-term impact of disasters may be difficult to measure. For example, there may be difficulties in estimating such consequences as the decline in property values that sometimes occurs in an area affected by a disaster. The economic consequences of a disaster may be felt far from the area where the disaster occurs, as when European tour operators are affected by the loss of a popular vacation destination due to a disaster.

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258 Munich-Re, “NatCatSERVICE Natural catastrophe know-how for risk management and research,” 2011.

259 Pelling et al., *op. cit.,* p. 284.

260 *Ibid.,* p. 288-290.

261 *Ibid.,* p. 290.

262 *Ibid.,* p. 291.

263 The Guardian, “Japan reports first trade deficit in 32 years after tsunami,” 25 January 2012, http://www.guardian.co.uk/world/2012/jan/25/japan-first-trade-deficit-12-years-tsunami?newsfeed=true

There are also long-term costs in terms of education and health. The World Bank found that the temporary withdrawal of children from school after disasters affect their communities sometimes becomes permanent, noting that children withdrawn from schools during droughts in Central Mexico between 1998 and 2000 were about 30 percent less likely to resume their studies afterwards than children in other areas.[264] These are long-term costs as is malnutrition, which often affects populations after a disaster and leaves people less able to work and more susceptible to disease. Other health costs may include decreased earning potential of people who sustain permanent injuries or disabilities from the disaster and for their family members who care for them.

Looking beyond the immediate material losses generated by disasters can yield some surprising results. For example Sutter and Simmons calculate that the monetary value of injuries sustained by tornadoes is much less than the cost of time lost to tornado warnings. In fact, this loss of time accounts for 65 percent of the economic cost of tornadoes over an extended period in the US. But even this does not include the cost of social impacts, such as when, for example, a tornado destroys the only grocery store in town and people have to drive an hour further to shop.[265]

In looking at the issue of economic loss, there is not a consistent use of terminology throughout the sector. Terms such as economic damage, loss, and impact are used interchangeably in various documents, including official ones. EM-DAT uses the term "estimated damage" while NatCat's data is labeled as "overall losses." Okuyama and Sahnin, two World Bank economists, suggest the following terms: "damages" to refer to damages to stocks, which include physical and human capitals; "losses" as business interruptions, such as production and/or consumption, caused by damages and which can be considered as first-order losses; "higher-order effects", which take into account the system-wide impact based on first-order losses through inter-industry relationships; and "total impacts" as the total of flow impacts, adding losses and higher-order effects.[266] Kevin Kliesen also includes differences between the market effect (e.g. loss of income due to disaster-caused destruction) and non-market effects (e.g. loss of leisure time due to a longer commute as a result of the disaster).[267] Even when the various types of costs are separated, there may be problems with both double-counting and underestimation of damage and losses. For example, if a hospital is destroyed in an earthquake, adding the lost social benefit (due to reduced access to care) with the cost of reconstruction (as a crude proxy for the lost value of the asset) would double count the output losses.[268]

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[264] Sanghi et al., *op. cit.*, p. 44.

[265] Daniel Sutter and Kevin M. Simmons, "The Socioeconomic Impact of Tornadoes," in William Kern (edi.), *The Economics of Natural and Unnatural Disasters,* W.E. Upjohn Institute for Employment Research, 2010, pp. 104-106.

[266] Yasuhide Okuyama and Sebnem Sahin, *Impact Estimation of Disasters: A Global Aggregate for 1960 to 2007*, World Bank Policy Research Working Paper Series, no. 4963, June 2009, p. 11.

[267] Kevin L. Kliesen, "The Economics of Natural Disasters," Regional Economist, April 1994, p. 15.

[268] Sanghi et al., *op. cit.*, p. 58.

A recent World Bank study explains that damage assessments are tricky because they are often conducted as a basis for compensation and questions whether it is valuable to try to comprehensively value damage to private property at all.[269] The study goes on to note the difficulties in measuring damage with the following example:

> Consider estimating the value of physical damage when Cyclone Sidr knocks down a thatched hut in Bangladesh (for which there is neither a rental nor a property market). Is the damage what the farmer had spent in materials with or without the (foregone) value of his time in building it? This 'acquisition cost' (what it cost the farmer) could differ substantially from 'replacement cost' (what it would now cost to rebuild the hut) or from the conceptual asset value of the structure (what the lost structure could have fetched in exchange).[270]

An additional difficulty in estimating economic loss is that there is a reported tendency to overestimate the economic losses in the immediate aftermath of a disaster. Buildings that may appear totally destroyed may turn out later to be repairable. Sometimes this tendency to overestimate damages is the result of media pressure to make a disaster appear more catastrophic in order to generate news interest. And sometimes there are pressures on local officials to "overestimate their losses in order to maximize their political leverage over federal assistance dollars."[271]

Yet another factor complicating economic cost assessments is that while disasters usually result in economic loss, there also may be positive economic effects, as when more productive technologies replace outdated ones.[272] Other economic gains may result from the reconstruction process itself. Thus in the US on average, aggregate local employment falls by 3.4 percent following a flood event, but in a study of Florida, income increased by 4.35 percent in directly affected areas as a result of decreasing labor supply and a simultaneous increase in post-hurricane labor demand, particularly in construction.[273] In other words, the economic costs of a disaster need to be offset by contributions which post-disaster reconstruction brings to the country, including in many cases foreign disaster assistance.

The question of calculating the economic impact of disasters is an extraordinarily complex one – particularly for non-economists.[274] The work of the World Bank is shedding some

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269 *Ibid.,* p. 43.

270 *Ibid.,* p. 59.

271 Kliesen, *op. cit.*

272 Derek Kellenberg and A. Mushfiq Mobarak, "The Economics of Natural Disasters," *Annual Review of Resource Economics*, vol. 3, no. 1., 297-312., October 2011, p. 302, resource.annualreviews.org

273 *Ibid.,* p. 303.

274 Humanitarian and development actors often attempt to assess damages by looking at specific sectors, such as agriculture and tourism as economic sectors; housing education and health as social sectors; and energy, water supply and transportation as infrastructure sectors. See for example: Australian Agency for International Development (AUSAID), "Economic Impact of Natural Disasters on Development in the Pacific, vol. 2, Economic Assessment Tools," May 2005,

light on these complexities, and efforts by reinsurance companies to share their data with the broader community are to be commended. But it would be even more helpful if those involved could either agree on a common methodology or share the details of the methodology they use so that researchers could determine the extent to which the resulting data are comparable. For now, the question of assessing the economic costs of natural disasters remains a highly imperfect science. What we do know is that economic costs include more than the loss of physical assets, that the economic costs of disasters can be felt for a very long time, and that the economic costs of disasters are expected to increase in the future.

Who's most affected by economic losses from disasters?

Perhaps surprisingly, the economies most vulnerable to disasters are not the most undeveloped.[275] Undeveloped economies are overwhelmingly agricultural and semi-subsistence in structure; for example, while they may be severely affected by drought, once the rains return, they generally recover quickly. Intermediate economies with some diversification appear more secure but tend to have greater direct, indirect and secondary impacts. Okuyama and Sahin find that there is an inverted U-shaped curve in terms of the economic impact of disasters with poor countries and rich countries less affected by disasters than middle income countries. In a nutshell, poor countries have less to lose and rich ones are better able to cope.[276]

The economic impact of disasters depends on a number of factors, starting with the resources of a country or community. As Kellenberg and Mobarak point out, "low-income countries that suffer from frequent disasters are at risk of becoming stuck in a poverty trap. They continually replace damaged capital with capital similar to what existed before the disaster in order to resume prior levels of productivity as quickly as possible. This, however, limits the possibility of future increases in productivity."[277]

Developed countries have many advantages in prevention, mitigation, response and recovery: they can design and enforce building codes, develop early warning systems, provide effective disaster relief when a disaster occurs. Moreover, people living in developed countries have more access to insurance. But the relationship is not completely straightforward; people with higher incomes not only have more expensive homes (and thus more to lose) but they may also be living in areas more vulnerable to disasters – for example on coastlines or near forests which are susceptible to wildfires.

The type of economy influences the impact of a disaster. For example, small and poorly diversified economies whose productive assets are spatially concentrated are highly vulnerable to economic loss from disasters. For example, Antigua is small and dependent on

http://www.ausaid.gov.au/publications/pdf/impact_pacific_tools.pdf

275 Pelling et al., *op. cit.,* p. 293.

276 Okuyama and Sahin, *op. cit.*, p. 7.

277 Kellenberg and Mobarak, *op. cit.,* p. 303.

agriculture and tourism – two economic sectors that are particularly vulnerable to disasters. In 1995 Hurricane Luis caused $330 million in direct damage to Antigua – equivalent to 66 percent of the country's GDP – precisely because of its impact on agriculture and tourism.[278]

Disasters impact development. For example, "Hurricane Mitch is said to have set back development in Nicaragua by 20 years."[279] And, as mentioned above, the long-term impact of children missing out on education and suffering long-term health effects can impede a country's development efforts. But development itself can lead to destruction of natural barriers, such as mangrove forests, which provide some protection from the effects of natural hazards. For example, many have commented that the damage to New Orleans from Hurricane Katrina was at least partly due to the clearing of the marshes south of the city which had provided a buffer from the Gulf of Mexico.[280] Moreover, the growth of cities increases the demand for water; taking water from the ground can increase vulnerability to flooding. The *Economist* cites the case of Jakarta – a city whose population has more than doubled since 1980 to 24 million, and is projected to increase to 35 million by 2020. "Land that once absorbed overflow from the city's 13 rivers has been developed, and is now subsiding; 40 percent of the city is now below sea level."[281]

Within countries affected by disasters, not everyone is affected equally. There are always at least a few winners as well as many losers. For example, farmers whose crops have not been affected by a disaster can get higher prices for their food after a disaster.[282] Reconstruction efforts can inject considerable resources into the community, generating new employment opportunities, albeit often only for the short term. At the same time, relief and recovery spending can displace maintenance of infrastructure, increasing risk of future deaths and loss in future disasters.[283]

And then there's the cost of prevention

A major disaster, particularly when it's well-covered in the media, generally leads to an outpouring of response, both domestically and internationally. This desire to respond to people suffering from the effects of a natural hazard is perhaps universal. But there is less human interest in supporting measures to reduce the risk of catastrophic loss from disasters and usually less political will than to contribute to emergency response. To cite one of many examples, in 2002, Mozambique, anticipating major floods, "asked donors for $2.7 million to prepare and got only half the amount, but $100 million were received in emer-

278 Pelling et al., *op. cit.,* pp 285-286.
279 M. Day, "Nicaragua needs a break," in *World Disasters Report*, IFRC, 2000.
280 The Brookings Institution Metropolitan Policy Program, *New Orleans After the Storm: Lessons from the Past, a Plan for the Future*, October 2005, p. 26.
281 The Economist, "Counting the cost of calamities," 14 January 2012.
282 Okuyama and Sahin, *op. cit.*, p. 12.
283 *Ibid.,* p. 122.

gency assistance following the floods, with another $450 million pledged for rehabilitation and reconstruction."[284]

While around 20 percent of humanitarian aid is now spent on responding to disasters, only 0.7 percent is spent on preventive measures to mitigate their possible consequences.[285] Although disaster risk reduction should be an integral part of development funding, less than half of one percent of development funding is directed toward disaster risk reduction.[286] And yet there is increasing awareness of the need for preventive measures. While the international decade on disaster risk reduction is generally considered to have been a failure, the International Strategy on Disaster Risk Reduction, launched in the aftermath of the Kobe earthquake, has generated some very positive momentum. For example, the United Kingdom's Department for International Development (DFID) has pledged that whenever it provides over £500,000 of humanitarian aid, 10 percent of the funding will be used for preparedness and future mitigation.[287]

Governments are of course the ones primarily responsible for keeping their people safe by adopting risk reduction measures and as noted above, developed countries generally are able to adopt and implement risk reduction policies. Perhaps the stellar example of a country which has taken this cause to heart is the Netherlands. Much of the country lies below sea level, increasing its vulnerability to flooding and storms, but over the centuries the Dutch have developed physical barriers and water management systems to protect the country from the effects of natural hazards.[288]

It seems obvious that governments of countries where there is a low risk of disasters will invest less in disaster risk reduction measures than countries where the risk is higher. But what this means is that often countries with a low probability of being affected by a disaster can actually suffer greater damages than countries with a high risk of being affected.[289]

Finally, it's important to mention the role of insurance in reducing the risk of the consequences of natural disasters. In developed countries, people may be required to have insurance against natural hazards, such as flooding. Sometimes governments subsidize this insurance, as the US does in the case of flood insurance – allowing and perhaps even encouraging people to build and re-build homes in areas prone to disasters. But if not required, many people choose not to purchase insurance policies if the premiums are too high, choosing instead to take the risk. Sometimes too, they may bet that in accord with

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284 Sanghi et al., *op. cit.*, p. 19.

285 *Ibid.,* p. 9.

286 UNISDR, "Equal priority is needed to strengthen policies on disaster response and prevention says European Commissioner," 14 June 2011, http://www.unisdr.org/archive/20473

287 Adele Harmer, Glyn Taylor, Katherine Haver, Abby Stoddard and Paul Harvey, *Thematic CAP for National Disaster Preparedness. Feasibility study*, Humanitarian Outcomes, December 2009, p. 8.

288 See: The Economist, "Counting the cost of calamities," 14 January 2012, for a fuller description of the Dutch policies.

289 Kellenberg and Mobarak, *op. cit.,* p. 305.

past experiences, governmental assistance after a disaster will cover much of the cost of rebuilding.

There are various international and regional mechanisms designed to pool disaster risks, such as the World Bank's Catastrophe Risk Deferred Drawdown Option and the Caribbean Catastrophe Risk Insurance Facility.[290] Finally, there are some promising initiatives in countries where disasters are common to introduce social insurance schemes for the very poor.[291]

Given global trends of urbanization and increasing wealth, the economic impacts of future natural disasters will certainly be higher than they are today. And yet the models used to estimate damages – at least the models publicly available – seem incomplete and inconsistent. Closer collaboration between the insurance and re-insurance industries and development/humanitarian actors is one area where productive synergies could result from simply sharing information about the ways economic assessments are currently conducted and could lead to concrete recommendations to ensure that such assessments yield results which are comparable.

[290] Okuyama and Sahin, *op. cit.*, p. 16.

[291] See for example: Clemence, Raghuram, Alok, Anupama, Mangesh, Priya, Rupalee, Javed (CIRM), *Financing Disaster Management in India: Possible Innovations,* http://microinsurancemap.com/mri/docs/reports/innovative_disaster_financing_mechanism_for_india_leveraging_market_capital.pdf. See also: Margaret Arnold, "The Role of Risk Transfer and Insurance in Disaster Risk Reduction and Climate Change Adaptation," *Policy Brief for Commission on Climate Change and Development,* 2008, http://www.ccdcommission.org/Filer/pdf/pb_risk_transfer.pdf. Also see reports of new microinsurance plans where premiums are as low as 10 cents per day: Allianz Group, "Pioneering Disaster Insurance for Some of India's Poorest," 11 March 2008, https://www.allianz.com/en/press/news/commitment_news/community/news_2008-03-11-2.html

November 3, 2011 – Bangkok, Thailand: Flood victims receiving aid.
Photo: © Charnsitr | Dreamstime.com

Section 4

Trends in the Field of International Disaster Response

Legal developments

While there is a well-established body of international law for people affected by conflict (international humanitarian law, refugee law), the normative framework for disaster response is much more primitive. Of course, it is well recognized that it is the responsibility of national governments to protect and assist those affected by natural disasters within their territory. The right to receive humanitarian assistance has been affirmed in documents such as the Guiding Principles on Internal Displacement and is implicit in the recognized rights of people to food, shelter, and medical care.[292] But, perhaps in part because of growing awareness of natural disasters, in recent years there have been several – largely parallel – initiatives to develop international law on this issue.

The International Law Commission (ILC) is presently engaged in drafting legal text which may serve as a basis for the development of binding international law on natural disaster response. At its 58th session, in 2006, the Commission identified the topic "Protection of persons in the event of disasters" for inclusion in its long-term programme of work, and in 2007 the Commission appointed Eduardo Valencia-Ospina as Special Rapporteur for the topic. In 2008, the Special Rapporteur put forward a preliminary report on the issue which traced the evolution of the protection of persons in the event of disasters and the Secretariat presented an overview of existing legal instruments and texts applicable to various aspects of disaster prevention and relief assistance. Since then, the Commission has drafted 12 articles (Articles 1 to 5 adopted in 2010, and articles 6 to 11 adopted in 2011) for an eventual legal instrument on disasters.[293]

In 2011, the ILC addressed the issue of the responsibility of the affected state to seek assistance where its national response capacity is exceeded; the duty of the affected state not to arbitrarily withhold its consent to external assistance; and the right to offer assistance from the international community. The Commission drafted an Article (12) on these issues to be part of an eventual normative framework on protection of persons in the event of disaster. This article affirms the principle of national sovereignty and the view that offering assistance is a practical manifestation of solidarity. But the Commission was unable to agree on the article and it was referred to the Commission's drafting committee, which due to lack

[292] David Fisher, *Law and Legal Issues in International Disaster Response: A Desk Study – Summary Version*, IFRC 2007, p. 10.

[293] International Law Commission, "Chapter IX, Protection of persons in the event of disasters," Sixty-third session, last updated 16 December 2010, http://untreaty.un.org/ilc/sessions/63/63sess.htm and http://untreaty.un.org/ilc/reports/2011/english/chp9.pdf

of time was unable to complete work on this. In particular, there were concerns that more clarity was needed on the issue of the circumstances in which an affected state could reject offers of assistance. Concerns were expressed that the "right" to offer assistance shouldn't apply to non-governmental organizations and that more clarity was needed on differences between offers of assistance by non-affected states and by intergovernmental organizations. There was also discussion about whether the Responsibility to Protect (R2P) concept should apply in cases of natural disasters – an issue which was also discussed by the Commission in its 2009 session. Again, the Commission agreed that R2P should not be applied to natural disasters.

While the International Law Commission will continue its work in the coming years to draft international law on protection in natural disasters, another important ongoing initiative in 2011 was the work of the International Federation of Red Cross and Red Crescent Societies (IFRC) to develop and promote more effective regulatory frameworks to facilitate the actions of international responders, and to operationalize the responsibility of affected state governments to oversee and coordinate the work of these responders.[294]

In 2001, the IFRC began a program of research and consultations about the regulatory problems in international disaster response operations and the strengths and weaknesses of relevant legal frameworks at the global, regional and national levels. This work culminated six years later in the development of the *Guidelines for the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance* (also known as the IDRL Guidelines), which were unanimously adopted by the state parties to the Geneva Conventions in November 2007.[295] These non-binding guidelines seek to assist governments to prepare their own rules to avoid common problem areas.

In 2011, the 31st International Conference of the Red Cross and Red Cross assessed progress in the use of the IDRL Guidelines, noting that nine countries had adopted new rules or laws consistent with their recommendations and approximately a dozen more were currently considering draft legislation. The Conference also welcomed the efforts of the IFRC, UN OCHA and the Inter-Parliamentary Union to develop a pilot "model act" to help states implement the IDRL Guidelines. Consultations on the model act will continue in 2012, with a view to finalization at the end of the year.

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294 See for example: IFRC's Disaster Law Programme, http://www.ifrc.org/en/what-we-do/idrl/

295 IFRC, *Guidelines for the Domestic Facilitation and Regulation of International Disaster Relief and Initial Recovery Assistance,* 2007 (30IC/07/R4 annex), available at: www.ifrc.org. Since their adoption at the 30th International Conference of the Red Cross and Red Crescent in 2007, eight UN General Assembly resolutions have also encouraged states to make use of the IDRL Guidelines. The abbreviation IDRL was derived from the name of the IFRC's "International Disaster Response Laws, Rules and Principles Program," which has since been renamed the "Disaster Law Program."

In addition to IDRL, the Conference also focused on:

- Enhancing disaster risk reduction at the community level through legislation;
- Addressing regulatory barriers to the rapid and equitable provision of emergency and transitional shelter after disasters.

A third initiative on the legal front sought to address the relationship between natural disasters and climate change. Growing interest in this relationship was manifest on many fronts, but particularly at the Nansen Conference on Climate Change and Displacement in June 2011 – a Norwegian initiative.[296] There has been growing awareness of the possible gaps in the international system of those displaced – or likely to be displaced – as a result of climate change, including those uprooted by sudden-onset natural disasters. While most of those displaced by natural disasters remain within the borders of their own countries and are thus IDPs, there are cases where people flee to other countries to escape the effects of a natural disaster. As Volker Turk, Director of UNHCR's Division of International Protection, affirmed at the Nansen Conference in June 2011, "UNHCR stands ready to support States in developing a guiding framework or instrument in this area. It might take the form of a temporary or interim protection regime. There are indeed many examples of State practice of granting permission to remain or at the very least a stay of deportation to persons whose country of origin is hit by a natural disaster or other extreme event. These precedents support the view that such persons are in need of international protection, even if only temporarily."[297] There have also been efforts to develop binding treaties to protect those displaced by the effects of climate change.[298] However, most humanitarian experts note the difficulties in defining the groups of concern and the political challenges of getting any binding treaty accepted by national governments.[299]

Thus, on the legal front, there are initiatives to develop binding international law through the International Law Commission, efforts to develop concrete operational guidance for governments to respond to disasters through the IFRC, and increasing discussion about the need for new legal instruments to deal with the potential movement of people resulting from climate change. What all of these initiatives have in common is a recognition that the international normative framework needs to be strengthened. Governments need to get their laws and policies in order in case a disaster puts them in the position of being on the

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296 The conference was co-organized by the Norwegian Ministry of the Environment, Norwegian Ministry of Foreign Affairs, Norwegian Refugee Council and the Center for International Climate and Environmental Research – Oslo.

297 Volker Turk, "Climate Change and Displacement in the 21st Century," *Remarks at the Nansen Conference*, Oslo, 7 June 2011, pp. 5-6.

298 See for example: www.ccdpconvention.com; a summary of one treaty proposal can be found at: http://www.ccdpconvention.com/summary.html

299 See for example: Jane McAdam, "How to Address the Protection Gaps – Ways Forward," *The Nansen Conference: Climate Change and Displacement in the 21st Century*, Oslo, 5–7 June 2011.

receiving end of offers of aid. This is a challenge to both developed and developing countries and, in fact, some developing countries have much better systems in place to facilitate and regulate international disaster assistance than developed countries. Efforts to develop binding international laws are inevitably long-term efforts. The work of the International Law Commission, which in the past has developed important international conventions such as the 1958 Convention on the High Seas, may in time result in a treaty on protection of persons affected by natural disasters. It is striking though how this initiative is being carried out on a separate track from humanitarian actors. Thus, the ILC has formulated a different definition of disasters than that incorporated in the *Operational Guidelines on the Protection of Persons in Situations of Natural Disasters* and it is unclear what the ultimate intent is of the drafters of the ILC.[300] Will they be suggesting, for example, obligations on the part of states to receive and/or provide assistance? Will they suggest certain principles for protecting people in the event of disasters, and if so, will such principles be in line with those in the *Operational Guidelines?*

When the issue of climate change is introduced into the mix, the debate becomes even more complicated. At the present time, many people are talking about the need for a normative framework to apply to people displaced by the effects of climate change, but there is no consensus about the scale and timing of such displacement, how to determine the extent to which displacement can be attributed to climate change, or whether a new normative framework should be binding (as in the case of proposed conventions) or softer international law (perhaps modeled on the *Guiding Principles on Internal Displacement*), or simply left to individual states to negotiate.[301] Given these uncertainties, it should be easier to reach a consensus on laws about natural disasters – at least sudden-onset disasters – than the effects of climate change on displacement.

Operational developments

In addition to the growing discussion of the need for global normative frameworks and new laws and policies on the national level on natural disasters, there have been similar discussions on the operational level of disaster responders. There have been new and encouraging developments on the role of the affected state and increasing clarity on the role of the military. At the same time, efforts to delineate responsibilities of international actors in protecting people affected by natural disasters proved to be frustrating and inconclusive in 2011.

300 Brookings-Bern Project on Internal Displacement, *IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters*, January 2011, http://www.brookings.edu/reports/2011/0106_operational_guidelines_nd.aspx

301 OCHA, *Guiding Principles on Internal Displacement,* 1998, E/CN/4/1998/53/Add2, http://www.brookings.edu/projects/idp/gp_page.aspx

The affected state

Haiti certainly wasn't the only disaster-affected country to witness an influx of non-governmental organizations and civil society groups which complicated coordination mechanisms, but Haiti's experiences raised anew the question of the responsibility of the affected state to regulate the activities of disaster responders. As mentioned above, international disaster response law (IDRL) seeks to help states both facilitate international assistance and regulate the provision of such assistance. During the course of 2011, there was renewed focus on the role of the affected state – an issue which has received relatively little attention from either policy analysts at humanitarian organizations or academics.

Building on IFRC's work with IDRL, four organizations – IFRC, the Office for the Coordination of Humanitarian Affairs (OCHA), the International Council of Voluntary Agencies (ICVA) and the Swiss Development Corporation – convened an International Dialogue on Strengthening Partnership in Disaster Response: Bridging National and International Support. This meeting, held in October in Geneva, brought together more than 130 representatives from governments, regional organizations, the UN system, the International Red Cross and Red Crescent Movement, and non-governmental organizations to consider ways of improving their working relationships. Perhaps as important as the final outcome statement was the enhanced recognition given to the role of the affected state in managing disaster response.[302]

Reflecting the visibility of militaries in responding to the mega-disasters of 2010 – such as US military operations in Haiti and the leading role of the Pakistani military in flood response – there was a spate of activity around the role of military forces in natural disasters in 2011.[303] There seemed to be a clearer recognition that the military's role in disasters is different and less controversial than its role in conflict situations. As noted in the previous chapter, the role of the Japanese military in responding to the earthquake/tsunami as well as the mobilization of military and police in other developed countries, such as Australia, New Zealand and the US underscored that for developing and developed countries alike, military assets are often invaluable when disasters strike.

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[302] SDC, IFRC, ICVA and OCHA, *Statement of the Co-Convenors Identifying Elements for a Plan of Action,* International Dialogue on Strengthening Partnership in Disaster Response: Bridging National and International Support, Geneva, 25-26 October 2011, http://www.ifrc.org/PageFiles/90118/IDDR%20co-convenors%20statement%20EN.pdf. See for example the background papers commissioned for the dialogue: http://www.ifrc.org/en/what-we-do/idrl/international-dialogue-on-strengthening-partnership-in-disaster-response/; Also see: ALNAP, *The role of national governments in international humanitarian response to disasters*, Meeting Background Paper, 26th ALNAP Meeting in Kuala Lumpur, 16-17 November 2010, www.alnap.org/pool/files/26-meeting-background-paper.pdf

[303] See for example reports of meetings in the UK, Qatar, and Australia: British Red Cross, Foreign & Commonwealth Office, "Summary Note," *NGO-Military Contact Group Conference 2011, Civil-Military Relations in natural disasters*, 12 October 2011, http://reliefweb.int/sites/reliefweb.int/files/resources/Full_Report_3072.pdf; OCHA, "Humanitarian Issues: Effective civil-military partnerships are crucial in disaster response," 29 November 2011, http://www.unocha.org/top-stories/all-stories/humanitarian-issues-effective-civil-military-partnerships-are-crucial-disast

Clusters, clusters

In 2005, the Inter-Agency Standing Committee (IASC) agreed to implement a cluster system as a way of increasing accountability and effective responses to humanitarian emergencies by naming designated lead agencies to coordinate activities in a given area. Of the eleven clusters, only one lacks a designated lead agency (or co-lead) charged with coordinating response – the cluster on protection in natural disasters.

While UNHCR is the acknowledged lead of the global protection cluster (as well as the shelter and camp management clusters) in cases of conflict situations, UNHCR was initially reluctant to take on responsibility for leading the protection cluster's response in natural disasters. Indeed within the Global Protection Cluster Working Group, a task force was established on natural disasters under the leadership of the RSG on the Human Rights of Internally Displaced Persons and later the International Disaster Law Organization. Interestingly neither the RSG nor the International Disaster Law Organization is operational in the sense of having programs running in the field. The Task Force developed training materials for coordination of protection work in natural disasters. Having completed this work, the task force was disbanded in late 2011 and discussions about continuing the Global Protection Cluster's engagement with natural disasters were continuing.

While progress on this issue was elusive on the international level, on the country level, a clear process had to be established to determine, on a case-by-case basis, who would serve as lead agency for protection in the event of a natural disaster. This was essential because there is no agency automatically assigned to take the lead on protection through the cluster system but rather responsibility was to be determined through a consultative process. As originally formulated, when a natural disaster occurred, the Resident Coordinator was supposed to consult with the three agencies with protection mandates – UNICEF, UNHCR and OHCHR – to determine which body would take the lead responsibility for protection. As Roberta Cohen points out, in most cases UNICEF has assumed the lead but its protection role is limited.[304] It has received high marks in child protection, tracing families, helping separated children and preventing their exploitation in disasters. But other vulnerable groups, such as the elderly, the disabled, ethnic or religious minorities, or those with HIV/AIDS, have not received as strong a focus.[305] In Haiti, OHCHR served as cluster lead for protection (with UNICEF for child protection and UNFPA for gender-based violence) but came under criticism from other agencies for its lack of operational involvement.[306]

The ad hoc nature of this arrangement meant protection responses in natural disasters were not very predictable. Therefore, pressure mounted for UNICEF to take on this respon-

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[304] Roberta Cohen, "An institutional gap for disaster IDPs," *Forced Migration Review # 32*, April 2009, http://www.brookings.edu/articles/2009/0406_natural_disasters_cohen.aspx, p. 58.

[305] *Ibid.*, p. 59.

[306] Refugees International, "Haiti: From the Ground Up, Field Report," March 2010, available at: www.refugeesinternational.org

sibility, and when UNICEF declined, attention focused on UNHCR. UNHCR has often been involved in on-the-ground responses to natural disasters, but only in countries where it was in a position to offer assistance, as occurred after the 2004 tsunami, the 2005 earthquake in Pakistan, and the 2010 Haitian earthquake.[307] Recently, UNHCR has indicated a willingness to take a more active role in response to natural disasters, and has been actively engaged in the discussions around climate change-induced displacement. UN High Commissioner for Refugees, António Guterres, stated: "With our deep experience of protecting people, extensive worldwide presence and improved integration of emergency preparedness, UNHCR can bring to the protection cluster for persons displaced by natural disaster the predictable leadership and proven results required. As with our leadership of the protection cluster for those displaced forcibly by conflict, I view such leadership in natural disasters as a logical extension of our responsibilities."[308]

In March 2011 the UN Emergency Relief Coordinator, Valerie Amos, asked UNHCR to assume the lead agency role in protection in natural disasters for a pilot period of one year. Although intended to be limited in scope and application, this possibility led to considerable discussion within the humanitarian community and particularly governments who form part of UNHCR's governing body. At the 51st meeting of the UNHCR Standing Committee on 22 June, a number of governments expressed reservations about UNHCR taking on this role. Some feared that it would detract from UNHCR's core mandate of refugee protection. Others feared that it would give UNHCR an opportunity to become more involved in issues that were the legitimate territory of governments while some seemed to fear that this was mission creep which would require more funding for the agency. In any event UNHCR was left without a clear mandate to assume this leadership role and by the end of the year there were still questions about which UN agency would assume responsibility for coordination of protection work in the event of a natural disaster.

Leadership of the other clusters – in situations of natural disasters has proven less problematic than protection with IFRC responsible for shelter and IOM for camp management and coordination. But the difficulty in finding an agency willing to take on responsibility for protection in natural disasters and with the necessary support from its governing body is a serious shortcoming in international response. It is ironic that even as more attention is being devoted to natural disasters, more focus is placed on the affected state and more actors are involved in humanitarian response, the international community is unable to come up with a clear leadership structure. Perhaps it will take another mega-disaster with an uncoordinated international response for momentum and political will to develop to agree on a new lead agency.

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307 Bryan Deschamp et al., "Earth, wind and fire: A review of UNHCR's role in recent natural disasters," *UNHCR Policy Development and Evaluation Service*, PDES/2010/06, June 2010.

308 UNHCR, "High Commissioner's Opening Statement to 60th Session of Excom," Palais des Nations, Geneva, 28 September 2009, p. 5.

Humanitarian aid supplies loaded by Hawaii Air National Guard into a C-17 Globemaster III.
Photo: © Thinkstock.com

Section 5

Humanitarian Funding in 2011

International humanitarian disaster funding in 2011 was down to one fourth of its 2010 total

As mentioned in Chapter 1 of this review, Munich Re estimates natural disaster-related damages in 2011 at $380 billion, which is approximately the GDP of Austria (the 26th largest economy in the world in 2010).[309] This is almost double Munich Re's 2010 damage projections of $152 billion and significantly above the 10-year average of disaster-related damages from 2001-2010 of $113 billion.[310]

Humanitarian funding for natural disasters shot up significantly in 2010, primarily due to responses to the earthquake in Haiti and the floods in Pakistan, reaching $6.43 billion. With reported damages so far above average in 2011, common sense might lead us to expect a corresponding increase in international funding for disaster relief and recovery operations in 2011, but this did not happen. Actually, international humanitarian disaster funding saw a more than four-fold decrease in 2011 compared to 2010.[311]

The primary explanation for this counterintuitive development is the fact that most of the major disasters in 2011 happened in developed countries that did not request nor require large amounts of international disaster assistance, as they are able to generate or borrow sufficient funds for humanitarian relief operations and post-disaster reconstruction. They also require much less assistance from UN agencies and international non-government organizations who are usually the main actors through which humanitarian funding is channeled.

Still, 50 percent of international humanitarian natural disaster funding in 2011 went to Japan. Given the scale of destruction, those amounts represent gestures of solidarity, as they cover less than 0.35 percent of Japan's total disaster damage.[312] In comparison, interna-

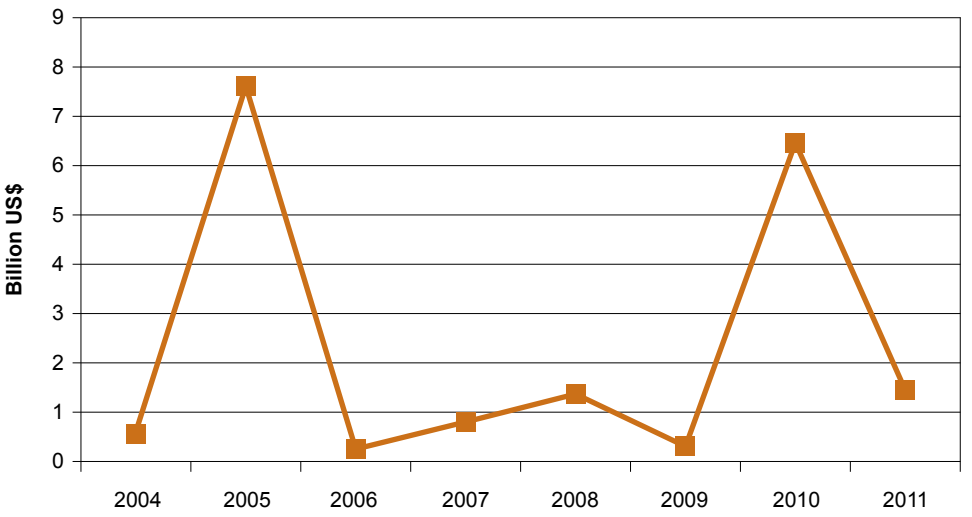
[309] Munich Re, "Review of natural catastrophes in 2011: Earthquakes result in record loss year," 4 January 2012, http://www.munichre.com/en/media_relations/press_releases/2012/2012_01_04_press_release.asp; EM-DAT recorded $366 billion in disaster damage in 2011, Debarati Guha-Sapir, "Disasters in Numbers 2011," *op. cit.*; GDP data: The World Bank, "GDP Ranking," http://data.worldbank.org/data-catalog/GDP-ranking-table

[310] The $366 billion of estimated disaster damage by EM-DAT are more than double of EM-DATs 2010 damage projections of $123.9 billion and also significantly above the 10-year average of disaster-related damages from 2001-2010 of $89.3 billion (See Table 1 in this chapter).

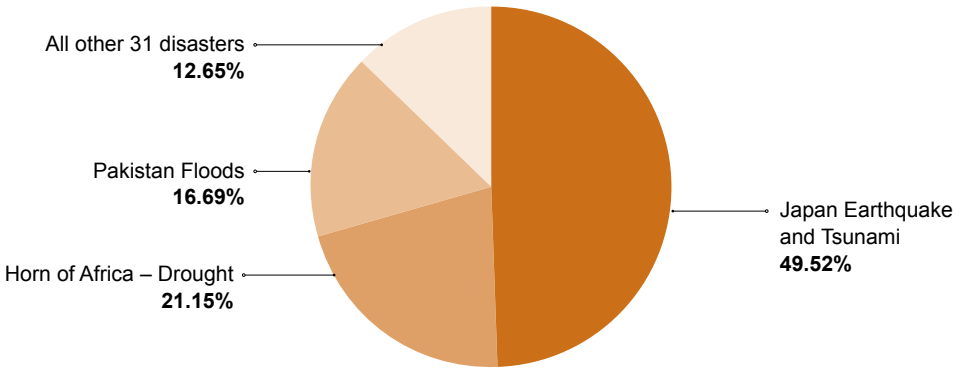
[311] OCHA, "Financial Tracking Service," http://fts.unocha.org

[312] Damage figures from 2012: Münchener Rückversicherungs-Gesellschaft, "The five largest natural catastrophes of 2011," Geo Risks Research, NatCatSERVICE; funding figures from: OCHA, Financial Tracking Service, "Natural Disasters in 2011," accessed 5 January 2012, http://fts.unocha.org

Graph 5: Funding for Humanitarian Responses to Natural Disasters, 2004-2011



Graph 6: International Funding for Natural Disaster Response 2011



tional funding for recovery from the Haiti earthquake in 2010 covered the cost of 40 percent of the estimated damage.[313]

The drought response in the Horn of Africa was the second-highest funded disaster response in 2011, receiving around $307 million or 21.15 percent of the funding recorded by UN OCHA's Financial Tracking Service (FTS), followed by the relief and recovery efforts for the renewed floods in Pakistan which received $242 million or 16.69 percent of all funding. The 31 other internationally-funded disaster response operations shared 12.65 percent of humanitarian disaster funding for 2011, or $184 million.[314]

[313] Ferris and Petz, *op. cit.,* p. 23.

[314] OCHA, Financial Tracking Service, "Natural Disasters in 2011," accessed: 5 January 2012, http://fts.unocha.org

As in previous years, international funding for disaster relief in 2011 was highly disproportionate from one crisis to the next. Two or three disasters received more than 85 percent of humanitarian disaster funding in both 2010 and 2011. If we calculate the funding by number of persons affected the disparities are even starker. In 2010 Haiti received an average of $950 per affected person while Chile received around $25 per affected person and a victim of the Chinese floods received on average less than one cent.[315] These differences may reflect differences in need. Poverty in Haiti, for example is widely recognized. But they also reflect media coverage of mega-disasters as evidenced by the fact that almost half of 2011 disaster funding went to Japan – a country with the third largest economy in the world.

If we look at the ratio of humanitarian disaster funding to affected persons in 2011, we see that while international humanitarian disaster funding averaged $1,800 for every person affected by the Japanese earthquake and tsunami, a person affected by the drought and famine at the Horn of Africa only received $24.4 on average (see Table 20).[316] Ratios for flood victims in Sri Lanka and Pakistan were a little higher with $41.9 and $36 respectively per disaster victim, with those affected by Central American floods in October 2011 receiving less than $20 per person.

These figures need to be treated with caution, as they do not include all funding sources per disaster. If we use damage to funding ratios, the Japanese ratio drops substantially given the massive damage figures. The low amount of funding per person for Central American victims might also be at least partially explained by the fact that the floods only occurred in October so humanitarian appeals are still ongoing with much of the funding falling into 2012.

Table 20 Humanitarian Natural Disaster Funding per Affected Person in 2011

Country/Region	Disaster	Funding[317] ($ millions)	Affected persons[318] (millions)	Funding/affected person ($)
Japan	Earthquake/ Tsunami	720	0.4	1,800.00
Horn of Africa	Drought	308	12.6	24.40
Pakistan	Floods	243	5.8	41.90
Sri Lanka	Floods	36	1	36.00
Central America	Floods	28	1.9	14.70

315 Ferris and Petz, *op. cit.,* p. 23.

316 The number of affected that EM-DAT provides for the Japan earthquake and tsunami seems rather to be a low estimate, but even doubling the number of affected, the difference would still be stark.

317 OCHA, Financial Tracking Service, "Natural Disasters in 2011," accessed 5 January 2012, http://fts.unocha.org

318 Numbers for Japan, Horn of Africa (accumulated Ethiopia, Kenya, Somalia), Pakistan, Sri Lanka: EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be; numbers for Central America: IFRC, "Over 1.9 million affected by severe flooding in Central America as the IFRC launches emergency appeals," 28 October 2011.

With most of disaster damage occurring in developed countries in 2011, which required little to no international assistance, the ratio between disaster damage to humanitarian disaster funding at 0.4 percent is the lowest since 2004, and almost four times below the average since 2004 (see Table 21).

Table 21 Humanitarian Natural Disaster Funding Compared to Estimated Cost of Natural Disaster Damage, 2004-2011

	Humanitarian disaster funding/year ($ billions)[319]	Estimated damage from natural disasters/year ($ billions)[320]	Funding/damage %
2004	0.59	136.20	0.43
2005	7.62	214.20	3.56
2006	0.26	34.10	0.76
2007	0.82	74.40	1.10
2008	1.40	190.50	0.73
2009	0.31	41.30	0.75
2010	6.43	123.90	5.19
2011	1.45	366.00	0.40
Average	2.36	147.58	1.62

There are several other qualifications to bear in mind when looking at total financial contributions. First, the humanitarian disaster funding numbers collected by the financial tracking service do not include all contributions to specific emergencies.

For example, let us take a look at selected 2011 consolidated and flash appeals (see Table 22). The Consolidated Appeal Process (CAP) aims to create a common strategic approach in emergencies by fostering cooperation between donors, NGOs, UN agencies, governments and the International Red Cross and Red Crescent Movement. Donors rely on the CAP for a one-stop overview of humanitarian action, a catalogue of projects to be funded, and a system that ensures their funds are spent strategically, efficiently and with greater accountability. When a new disaster is foreseen or occurs, humanitarian and other partners develop a flash appeal within a few days to address people's most urgent needs in the short term. This can be followed by a consolidated appeal if the crisis persists.[321] The process of developing an appeal is a complex one, involving negotiations between various humanitarian actors with differing capacities in the concerned country. In addition to reflecting the overall humanitarian need in the country, appeals are also based on such factors as

[319] OCHA, Financial Tracking Service, "Natural Disasters in 2011," accessed 5 January 2012, http://fts.unocha.org

[320] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, www.emdat.be.

[321] OCHA, "Consolidated Appeal Process," accessed 4 February 2012, http://www.unocha.org/cap/about-the-cap/about-process

the capacity of implementing agencies to spend funds effectively and on an assessment of reasonable expectations of the amount likely to be contributed.

Table 22 Funding Provided for Selected UN 2011 Consolidated and Flash Appeals[322]

	Original requirements ($)	Revised requirements ($)	Funding provided ($)	% covered
Kenya Emergency Humanitarian Response Plan (2011+)	525,827,794	741,818,150	529,420,770	71%
Afghanistan (2011)	678,632,984	582,318,627	342,854,959	59%
Democratic Republic of the Congo (2011)	719,289,671	721,589,589	448,438,492	62%
Djibouti Drought Appeal (2011)	39,199,338	33,264,338	19,370,114	58%
El Salvador Flash Appeal (October 2011)	15,764,212	14,781,209	5,702,807	39%
Haiti (2011)	910,489,407	382,390,619	210,414,074	55%
Nicaragua Flash Appeal (October 2011 – April 2012)	14,289,736	14,840,854	4,457,651	30%
Pakistan Floods Rapid Response Plan (2011, September – March 2012)	356,759,669	356,759,669	174,639,321	49%
Somalia (2011)	529,520,029	1,003,322,063	840,821,865	84%
Sri Lanka Floods Flash Appeal (Revised) (January – June 2011)	50,623,333	46,358,480	26,507,660	57%
Total (21 appeals)	**7,925,557,006**	**8,903,199,466**	**5,449,507,217**	**61%**

As we can see from Table 22, the appeals connected to the Horn of Africa drought managed to raise substantially more money than is included under the Financial Tracking Service's humanitarian disaster funding category.[323]

[322] OCHA Financial Tracking Service, "Consolidated & Flash Appeals 2011," Summary of Requirements and Pledges/Contributions by affected country/region, report as of 24 January 2012.

[323] The natural disaster funding category includes projects that are part of the Consolidated Appeal Process and also includes additional contributions outside of the CAP (bilateral, Red Cross, etc.). For the Horn of Africa drought in 2011, it is difficult to match the funds reported in the FTS's natural disaster category with the funds in the CAP as there were separate appeals for Somalia, Kenya and Djibouti in 2011. As these are complex emergencies not all funding captured in the appeals seems to be classified as natural disaster funding by the FTS. The FTS's humanitarian natural disaster funding numbers for 2011 in turn also don't include the $210 million appeal funding for the victims of the 2010 Haiti earthquake and the following cholera epidemic as it only includes emergencies that happened in that specific year.

Total humanitarian funding in 2011, as recorded by OCHA's Financial Tracking Service, was $12.5 billion, which is lower than the $16 billion in 2010, but higher than the $12.1 billion in 2009. With respect to overall humanitarian funding, 2011 was the year with the third highest total funding in the new millennium after 2005 and 2010.[324]

Second, this analysis of international funding patterns and trends relies on statistics reported by the UN's Financial Tracking System, but this captures only funds reported to the UN by governments, the Red Cross/Red Crescent Movement, and large international NGOs. Smaller NGOs and civil society organizations often channel significant amounts of funding directly to communities affected by disasters, which consequentially are not reported in the UN's summary. The UN's Financial Tracking System also does not capture the many significant financial contributions made by local NGOs and civil society organizations. Moreover, remittances – which dwarf overseas development assistance generally – are an important source of support for communities affected by disasters. The Center for Global Prosperity, for example, reports that remittance flows generally increase during and after natural disasters and other crises and constitute an important financial resource for individuals, families and communities affected by disasters.[325] These contributions are never counted in the statistics and tables compiled by the UN and other financial tracking systems. Thus while much attention is devoted to international funding of disasters, it must be recognized that international contributions are only a part of the total response.

The UN Central Emergency Response Fund in 2010

The Central Emergency Response Fund (CERF) is a humanitarian fund established by the United Nations in 2005 to enable more timely and reliable humanitarian assistance to those affected by natural disasters and armed conflicts. The CERF was approved by consensus by the United Nations General Assembly on 15 December 2005 to promote early action and response to reduce the loss of life, to enhance response to time-critical requirements, and to strengthen core elements of humanitarian response in underfunded crises.[326] The CERF's rapid release of funds to provide humanitarian relief avoids the often slow process of receiving pledges and/or translating pledged money from donor governments into tangible contributions.[327]

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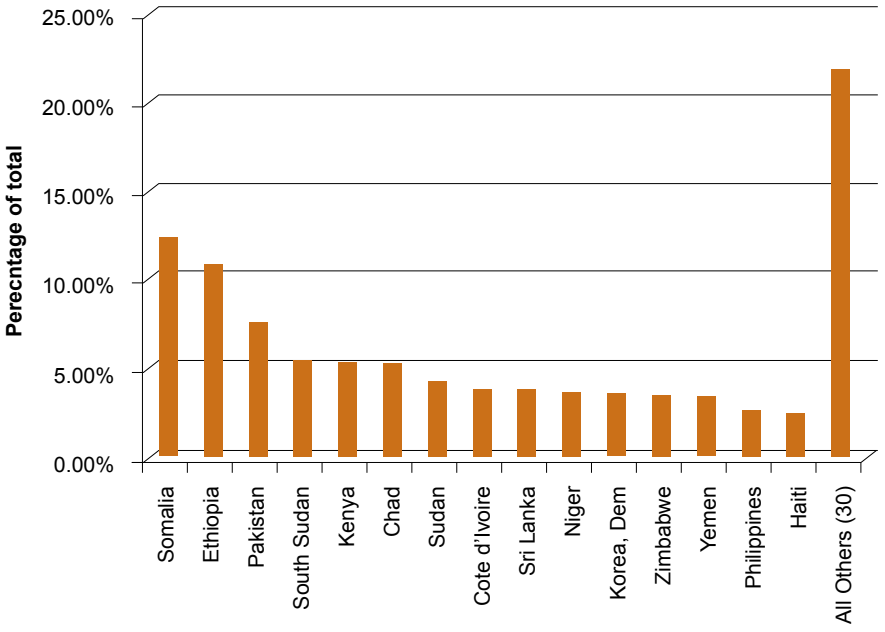
[324] OCHA, Financial Tracking Service, "Trend Analysis, By Sector," accessed 24 January 2012, http://fts.unocha.org/pageloader.aspx?page=Trend-TrendAnalysis

[325] John Telford and John Cosgrave, *Joint Evaluation of the International Response to the Indian Ocean Tsunami: Synthesis Report,* Tsunami Evaluation Coalition, July 2006, p. 21.; See also: John Cosgrove, "Humanitarian Funding and Needs Assessment," in *The Human Response Index 2008: Donor Accountability in Humanitarian Action,* Development Assistance Research Associates, Palgrave Macmillan, September 2008, p. 83, 63.

[326] OCHA, Central Emergency Response Fund, "What is CERF?" 2007, http://ochaonline.un.org/cerf/WhatistheCERF/tabid/3534/language/en-US/Default.aspx

[327] OCHA, Central Emergency Response Fund (CERF), "2011 Funding by Country," http://ochaonline.un.org/cerf

Graph 7 UN Central Emergency Response Fund (CERF) 2011 Funding by Country



In 2011, the CERF dispersed $426 million in 45 countries for both natural disaster and conflict situations, compared to $415.2 million in 2010, and $397.4 million in 2009. As Table 23 demonstrates, in 2010 the majority of funding went to countries affected by the Horn of Africa drought and the ongoing conflict in Somalia, followed by Pakistan and the world's newest country, South Sudan. Somalia, Ethiopia and Pakistan attracted almost 30 percent of all CERF funding in 2011. The World Food Programme (WFP) and UNICEF were the main agencies receiving CERF funds in 2011 with WFP receiving $126.2 million or 29.6 percent of all CERF funds and UNICEF $109.8 million or 25.76 percent respectively.[328]

CERF also provides funding numbers by emergency type. In the first eleven months of 2011, the CERF disbursed 38.2 percent of its funds for refugees and IDPs, 21.4 percent were spent for drought, 11.7 percent for floods and 9 percent for protracted conflict-related emergencies.[329] Funds for various emergency types can be dispersed in a single crisis area, so for example funds disbursed for projects in Somalia might have supported projects pertaining to drought or displaced persons as well as projects related to the conflict.

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328 CERF, "CERF Funding by Agency (2011) – Summary (01/01/2011 to 31/12/2011)," accessed 5 February 2012, http://ochaonline.un.org/cerf

329 CERF, "Quarterly Update, 4th Quarter 2011," January 2012, http://reliefweb.int/node/464868

330 OCHA, CERF, "CERF Funding by Country (2011) – Summary," 5 January 2011, http://ochaonline.un.org/cerf

Table 23 Top 5 Countries Receiving CERF Funds, 2011[330]

#	Country	Funds allocated ($)	Percentage of total 2011 CERF funds
1	**Somalia**	52,953,336	12.40%
2	**Ethiopia**	46,475,653	10.89%
3	**Pakistan**	32,370,901	7.58%
4	**South Sudan**	22,766,954	5.33%
5	**Kenya**	22,683,472	5.31%
	Subtotal	**177,250,316**	**41.51%**
	Total	**426,157,020**	**100 %**

The CERF has become an extremely important tool for rapid response and also for funding emergencies that receive little international publicity and donor interest. The gradual growth of CERF funds over the last several years is a positive development, as distribution by the CERF seems to be much less susceptible to media coverage of mega-disasters than the distribution of international humanitarian aid reflected in the UN's Financial Tracking Service.

This chapter concludes with an overview of humanitarian disaster funding in 2011.

Table 24 Funding for Humanitarian Responses to Natural Disasters, 2011[331]

Disaster	Funding ($)	Percentage
JAPAN – Earthquake and Tsunami – March 2011	720,264,717	49.5
HORN OF AFRICA – Drought – July 2011	307,626,972	21.1
PAKISTAN – Floods – August 2011	242,696,041	16.7
SRI LANKA – Floods – January 2011	35,601,287	2.4
TURKEY – Earthquake – October 2011	27,884,148	1.9
CENTRAL AMERICA – Floods – October 2011	27,665,163	1.9
THAILAND – Floods – August 2011	21,508,782	1.5
CAMBODIA – Floods – September 2011	19,631,752	1.3
NEW ZEALAND – Earthquake – February 2011	9,822,642	0.7
BANGLADESH – Floods and Landslides – July 2011	9,192,860	0.6
PHILIPPINES – Floods – June 2011	8,245,835	0.6
INDIA – Floods – July 2011	4,277,551	0.3
BOLIVIA – Floods and Landslides – January 2011	3,429,274	0.2
SOUTHERN AFRICA – Floods – January 2011	3,092,689	0.2
VIET NAM – Floods – September 2011	2,390,293	0.2
MADAGASCAR – Cyclone Bingiza – February 2011	2,090,727	0.1
PHILIPPINES – Tropical Cyclone – July 2011	1,870,526	0.1
DPR KOREA – Floods – July 2011	1,739,903	0.1
COLOMBIA: Floods and Landslides – April 2011	1,389,527	0.1
LAO PDR – Tropical Cyclone – August 2011	1,230,372	0.1
MYANMAR – Earthquake – March 2011	1,008,180	0.1
GUINEA – Floods – August 2011	394,005	0.0
DOMINICAN REPUBLIC – Floods – June 2011	288,204	0.0
MYANMAR – Flash Flood – October 2011	271,606	0.0
BRAZIL – Floods – January 2011	235,705	0.0
VANUATU – Tropical Cyclone Vania – January 2011	195,336	0.0
PHILIPPINES – Tropical Cyclone – October 2011	150,754	0.0
UGANDA – Floods and Mudslides – August 2011	87,426	0.0
TONGA – Tropical Cyclone – January 2011	75,000	0.0
MEXICO – Hurricane Jova – October 2011	70,721	0.0
INDIA – Himalayan Earthquake – Sep 2011	32,597	0.0
NIGER – Floods – August 2011	31,646	0.0
MALI – Floods – August 2011	30,706	0.0
BANGLADESH – Cold Wave – January 2011	30,030	0.0
Total:	**1,454,552,977**	**100.0**

[331] OCHA, Financial Tracking Service, "Natural Disasters in 2011," accessed 5 January 2012, http://fts.unocha.org

Somalia Suffers from Severe Drought. UN Photo/Stuart Price

CHAPTER 3

SOMALIA: DROUGHT + CONFLICT = FAMINE?

This chapter will look briefly at some of the particular characteristics of drought as a natural hazard. It will then turn to the complicated and sad story of how drought in Somalia, indeed the Horn of Africa generally, led to famine – a phenomenon the world has not seen for years, since the last famine in Somalia in the early 1990s.

Drought. Photo: Thinkstock.com

Section 1

Droughts: Slow, Long, Wide

Droughts are the classic slow-onset disaster. They develop slowly, they tend to last a long time, and they cover a wide geographic area. Unlike earthquakes or cyclones, where the date (and even the exact time) of the hazard can be identified, droughts do not become disasters until time has passed. Because they develop slowly, it is difficult to determine exactly when the drought begins and ends.[332]

A drought is defined as "a period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area."[333] But there is a lack of a standard quantitative definition of drought – how far from normal patterns does rainfall have to decline in order for a shortfall in precipitation to be a drought? Ten percent below normal over six months in time? 50 percent below normal over a year? In fact, given the prevalence of and destruction caused by drought, it is surprising that there isn't more clarity or statistical analyses of droughts. While other hazards have their own databases (e.g. the Dartmouth Flood Observatory collects data on floods; earthquakes are studied and monitored by the US Geological Survey), there is no specific database on droughts.[334]

Droughts kill more people than any other type of disaster. Below et al. reviewed drought disasters from 1900-2004, finding that more than half of the 22 million deaths associated with natural hazards were due to drought. And yet droughts accounted for only 35 percent of the 5.4 billion people affected by natural disasters. In comparison, floods affected far more people, accounting for 50 percent of those affected by natural disasters. In other words, droughts kill proportionally more people, while floods affect a higher number of people than droughts – at least according to prevailing methodologies used to measure those impacted by drought.[335] Surprisingly, they also found that only seven percent of the estimated $1.2 trillion in economic losses from disasters occurring between 1900 and 2004 were due to

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[332] As reported in our *Annual Review of Natural Disasters* in 2010, EM-DAT reports the occurrence of a drought in the first year it takes place; subsequent years do not acknowledge the drought even though its effects may actually be far worse later. See: Ferris and Petz, *op. cit*.

[333] Scientists often distinguish between four different types of drought: meteorological (lower than normal precipitation), agricultural (where the amount of moisture in the soil no longer meets the needs of a particular crop), hydrological (when surface and subsurface water supplies are below normal) and socioeconomic (when physical water shortages begin to affect people). NOAA, "What is Meant by the Term Drought?" accessed 5 January 2012, http://www.wrh.noaa/gov/fgz/science/drought.php?wfo=fgz

[334] Regina Below, Emily Grover-Kopec and Max Dilley, "Documenting Drought-Related Disasters: A Global Reassessment," *The Journal of Environment and Development*, vol. 16, no. 3, Sept 2007, p. 332.

[335] *Ibid.*, pp. 339-340.

droughts while floods, earthquakes and wind storms each accounted for approximately 30 percent. Why are there such low economic losses for drought? It may well be that indirect losses are simply not captured as well as direct physical damage incurred by other types of disasters. While droughts destroy crops and livelihoods, they rarely damage built structures or infrastructure. Moreover, the 2011 drought in the US southwest notwithstanding, droughts tend to affect poor nations more so than wealthy ones, where data collection is generally less comprehensive.[336]

In comparison with other disasters, droughts tend to affect spatially larger land areas. While droughts can and do occur in any region of the world, they are more likely to occur in arid areas, known as drylands. Given the fact that drylands cover about 41 percent of the global landmass, comprise 44 percent of the world's cultivated lands, and are home to a third of the world's population or two billion people, the potential for drought to have catastrophic consequences is significant.[337]

It is important to stress that aridity is a long term climatic phenomenon and a defining physical characteristic of drylands, while "drought is an episodic feature, which can affect any environment, but is also a frequent and defining characteristic of drylands."[338] There are a few trends that make it likely that drought will become more frequent: land degradation, population growth, and climate change.

According to the Millennium Ecosystem Assessment, 10-20 percent of the world's drylands are degraded. Land degradation is defined by the OECD as "the reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, pasture, forest or woodlands resulting from natural processes, land uses or other human activities and habitation patterns such as land contamination, soil erosion and the destruction of the vegetation cover."[339] It is estimated that between five and six million hectares globally are permanently lost to agriculture each year through human-induced soil degradation. Causes of land degradation include overgrazing, deforestation, agricultural mismanagement, fuel wood overconsumption, industry and urbanization. There is a high correlation between extreme poverty, land degradation and rural livelihoods.[340] Poverty can force people to overgraze, reduce fallow periods, expand cultivation, and follow land man-

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336 *Ibid.*, pp. 339-340.

337 Pierre Marc Johnson, Karel Mayrand and Marc Paquin, "The United Nations Convention to Combat Desertification in Global Sustainable Development Governance," in *Governing Global Desertification: Linking Environmental Degradation, Poverty and Participation,* ed. by Pierre Marc Johnson, Karel Mayrand and Marc Paquin, Burlington, VT: Ashgate Publishing Co., 2006, p. 14.

338 Pierre Marc Johnson, Karel Mayrand and Marc Paquin, "The Scientific Basis: Links between Land Degradation, Drought and Desertification," in *Governing Global Desertification: Linking Environmental Degradation, Poverty and Participation,* ed. by Pierre Marc Johnson, Karel Mayrand and Marc Paquin, Burlington, VT: Ashgate Publishing Co., 2006, p. 14.

339 Glossary of Environment Statistics, Studies in Methods, Series 4, No. 67, United Nations, New York, 1997, http://stats.oecd.org/glossary/detail.asp?ID=1494

340 Johnson et al., *op. cit.,* p.2.

agement and cultivation practices that deplete soils. But land degradation is not just the result of poverty. Rather, it is frequently linked to governmental policies, corporate exploitation of land, and cross-cutting social issues such as land tenure, lack of rural infrastructure and availability of water.[341]

When you add to this the grim predictions that rainfall will become more unpredictable and that droughts will increase in the future as a result of climate change, prospects for the future are frightening indeed.[342] Regionally, the impacts of global warming on drought will differ; in some cases like northwestern Australia, droughts have become less frequent, less intense, or shorter. In other cases, such as the Mediterranean and West Africa, regions have experienced more intense and longer droughts, conditions which are expected to intensify. The IPCC predicts with medium confidence that droughts will intensify in southern Europe and the Mediterranean region, central Europe, central North America, Central America and Mexico, northeast Brazil and southern Africa.[343] What seems clear is that rainfall patterns will become more variable. As Leighton says, "While drylands are routinely subject to moisture deficits, including droughts, and thus susceptible to desertification processes, the concern today is that the intensity, incidence, and severity of drought and desertification are accelerating."[344]

Droughts are particularly deadly in Africa. According to the World Bank, between 1970 and 2010 Africa had over 800,000 deaths directly attributable to drought.[345] In comparison with other types of disasters, the Bank found that droughts produce the largest declines in GDP and tend to exacerbate conflict. Moreover, it cites studies showing, for example, that children malnourished during the 1982–84 drought in Zimbabwe had a seven percent loss in (extrapolated) lifetime earnings, delayed school enrollment (3.7 months), and lowered grade completion (0.4 grades).[346] In other words, it seems that the severity of drought tends to cause long-lasting costs to a society's human capital. As noted in a report by Save the Children and Oxfam: "Between 1997 and 2007, Ethiopia lost on average $1.1 billion to drought every year; this almost eclipses the $1.3 billion per year that Ethiopia received in international assistance to tackle poverty and emergencies over the same period."[347]

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341 Hermann et al., *op. cit.,* pp. 29-34.

342 The Washington Post, "Climate change means more frequent droughts and floods, U.N. panel says in report," 18 November 2010, http://www.washingtonpost.com/national/health-science/report-climate-change-means-more-frequent-droughts-floods-to-come/2011/11/15/gIQAfwqHXN_story.html

343 IPCC, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation, op. cit.*

344 Michelle Leighton, "Migration and slow-onset disasters: desertification and drought," in IOM, *Migration, Environment and Climate Change: Assessing the Evidence*, 2009, p. 326.

345 Sanghi et al., *op. cit.,* p. 29.

346 *Ibid.,* pp. 46-60.

347 Save the Children and Oxfam, *A Dangerous Delay, op. cit.*, p. 9.

According to the Economic Commission for Africa, drought and desertification are core threats to sustainable development in the region.[348] Two-thirds of Africa is classified as deserts or drylands and the region is especially susceptible to land degradation. In fact, it is estimated that two-thirds of African land is already degraded to some degree and that land degradation affects at least 485 million people or sixty-five percent of the entire African population.[349] Desertification in Africa is both a major cause and consequence of poverty and resource depletion, which threatens economic growth, food security, and political stability.

As Chapter 1 of this *Review* reports, severe drought in parts of the United States had a serious impact on lives and livelihoods in 2011. But the situation in Somalia and East Africa generally underscores the lesson that while drought is the result of lower-than-normal rainfall – a natural phenomenon – disasters are indeed man-made.

348 Economic Commission for Africa, *Africa Review Report on Drought and Desertification in Africa,* 2007, http://www.un.org/esa/sustdev/csd/csd16/rim/eca_bg3.pdf

349 *Ibid.*

A Somali woman hands her severely malnourished child to a medical officer of the African Union Mission in Somalia (AMISOM). Photo: UN Photo/Stuart Price

Section 2

2011 Drought in East Africa, Famine in Somalia

The summer of 2011 produced one of the worst droughts in 60 years in the Horn of Africa, affecting Kenya, Somalia, Ethiopia, Eritrea and Djibouti. Following several seasons of very low rainfall, there was a total failure of the October-December 2010 *Deyr* (or short) rains and the April-June 2011 *Gu* (or long) rains were meager, resulting in the worst annual crop production in 17 years, excess animal mortality, and very high food prices.[350] According to the UK Meteorological Office, the low rainfall (at least in the short rains) may be attributed in part to conditions associated with La Niña.[351] While all of the countries of East Africa were affected by drought and associated declines in food production, it was in Somalia that the drought led to famine.

In late July 2011, the UN declared the situation in parts of southern Somalia to be a famine in which 3.7 million people – nearly half the country's population – faced a humanitarian crisis, but most of the issues facing the country were not new. The fact that famine emerged in Somalia in mid-2011 serves as an example of the deadly effects of the combination of severe and prolonged drought, ballooning food and water prices, poor governance, ongoing conflict, and an international response that was inadequate, for many reasons, to meet the needs of millions of people.

Somalia has long been wracked by instability and the famine of 2011 has an eerie resemblance to the last famine in the early 1990s. Like the situation in 2011, the famine from 1991 to 1992 was the product of the intersection of drought and conflict. In 1991, Somali president Major General Mohamed Siad Barre was overthrown, ushering in what was to become a decades-long civil war. Africa's worst drought hit the country in 1992, driving up food prices and causing extreme malnutrition. People began to leave their communities in search of food. At the same time, gangs of armed men terrorized Mogadishu. By early 1992, it was estimated that between one-quarter and one-third of all Somali children under the age of five had died.[352] By mid-1991 the International Committee of the Red Cross (ICRC) was devoting half of its entire worldwide emergency budget to relief operations in Somalia.[353] By late 1992, 1.5 million people faced imminent starvation and almost five million were totally dependent on food aid. The international community responded by in-

[350] Food Security and Nutrition Analysis Unit (FSNAU), "Famine Continues: Observed Improvements Contingent on Continued Response," 18 November 2011.

[351] Reported in: Oxfam, "Briefing on the Horn of Africa Drought: Climate Change and Future Impacts on Food Security," August 2011, http://www.oxfam.org/sites/www.oxfam.org/files/briefing-hornofafrica-drought-climatechange-foodsecurity-020811.pdf

[352] Jeffrey Clark, *Famine in Somalia and the International Response: Collective Failure,* U.S. Committee for Refugees Issue Paper, November 1992.

[353] *Ibid.*, p. 13.

creasing humanitarian aid and deploying several military missions to Somalia: Operation Provide Relief, UNOSOM I, UNOSOM II, and Operation Restore Hope. But in October 1993 the forces of one of Somalia's strongmen attacked the peacekeepers and they withdrew. An estimated 300,000 Somalis died in the drought/violence of 1992.[354]

The way the 1992 Somali crisis unfolded was a shock to the international system. Before that tragedy, there had been a sense that the post-Cold War world order would allow the international community to intervene and to respond to crises in ways that hadn't been possible during the Cold War.[355] But in spite of four separate efforts, intervention did not work.[356] For almost two decades, Somalia was wracked by civil conflict while humanitarian agencies continued to provide assistance, mostly from bases in Nairobi. Still, the international system seemed unable to respond to the deteriorating political situation in the country. In the period between 1995 and 2010, hundreds of thousands of Somalis left the country in search of security, most going to neighboring Kenya where they lived in Dadaab, the world's largest refugee camp. Others made their way to Ethiopia and other countries in the region. For Somalis remaining in the country, internal displacement was common and traditional coping skills and strategies were eroded by the many years of conflict. Over the years, the United Nations undertook a number of initiatives to try to address the causes of instability in Somalia, but as of late 2011, these had yet to restore security to the country.[357]

The 2011 Somali famine illustrates the deadly combination of drought, conflict and an uncertain international response. In many respects, Somalia is the classic example of a failed state, characterized by clan-based violence; a militant Islamist group, al-Shabaab, which has targeted foreigners; piracy on its southern coast; an outflow of refugees; and virtually non-existent political structures. The following sections examine the intersection of these factors, beginning with the humanitarian emergency that was declared in mid-July 2011.

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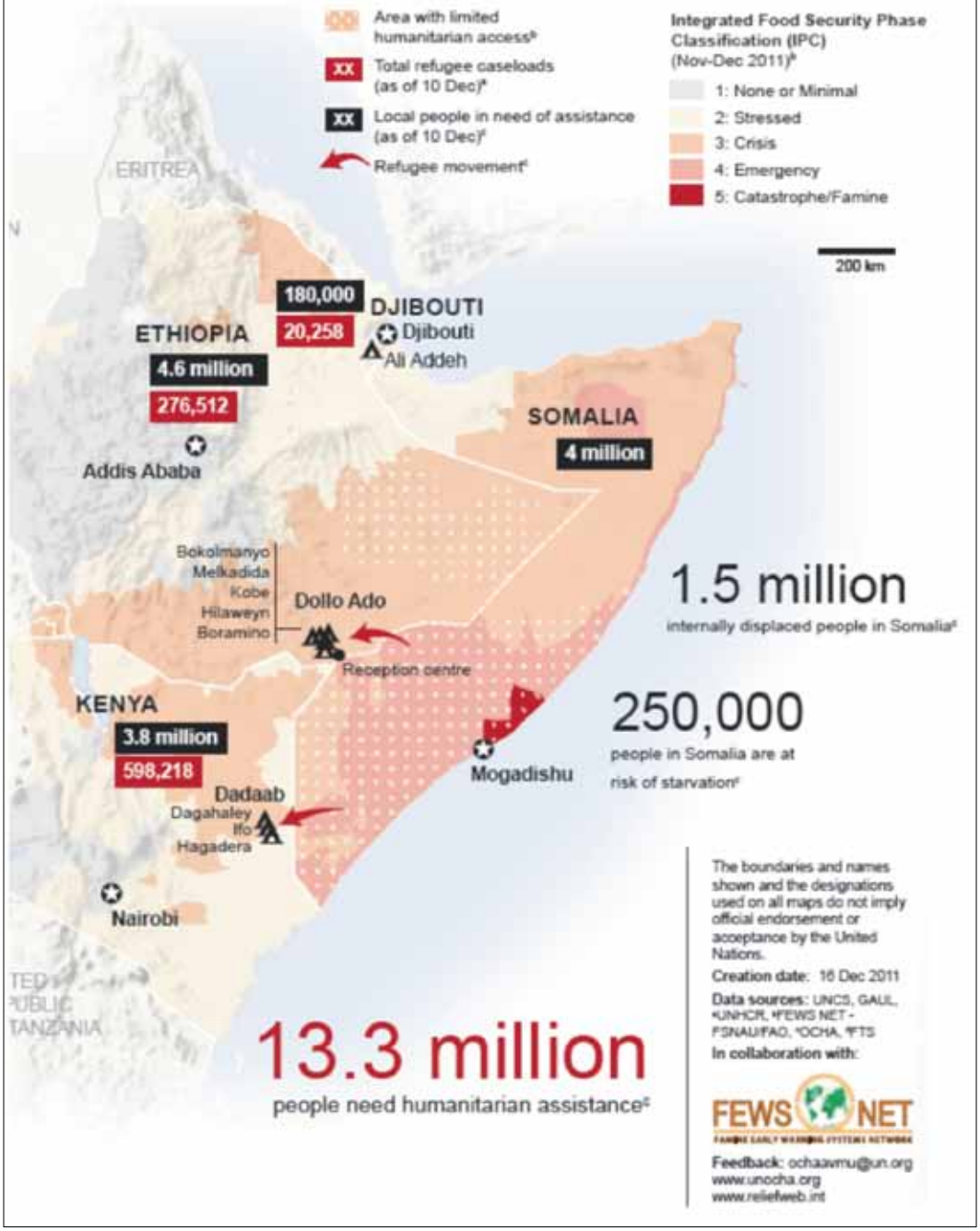
354 United Nations Department of Peacekeeping Operations, "Somalia – UNOSOM I," updated 21 March 1997, http://www.un.org/Depts/DPKO/Missions/unosomi.htm

355 For further analysis, see Elizabeth Ferris, *The Politics of Protection: The Limits of Humanitarian Action*, Brookings Institution Press, 2011, p. 128.

356 For an excellent analysis of the reasons for the failure of these initiatives, see Taylor B. Seybolt, *Humanitarian Military Intervention,* Oxford University Press, 2008.

357 For a review of these initiatives, see UN Secretary-General, *Special Report on Somalia*, S/2012/74, 31 January 2012, http://www.un.org/ga/search/view_doc.asp?symbol=S/2012/74&Lang=E

Graph 8: Horn of Africa Snapshot, December 2011[358]



[358] OCHA, "Horn of Africa: Humanitarian Snapshot (as of 16 Dec 2011)," 16 December 2011, http://reliefweb.int/node/465667

The famine

Famine was declared for two regions of southern Somalia – Southern Bakool and Lower Shabelle in July 2011. For the UN to declare a famine, three criteria are necessary: acute malnutrition rates among children exceeding 30 percent; extreme food shortages facing at least 20 percent of households with a limited ability to cope; and more than two people per 10,000 dying per day. In the famine-affected parts of southern Somalia, the death rate was three times this level. In fact, the UN reported that food security outcomes in Somalia were the worst in the world and the worst in Somalia since the 1991-92 famine with an estimated 3.7 million people facing a humanitarian crisis.

The drought hit at a time when the long-standing violence had weakened Somalis' traditional coping skills. Among other strategies, when times got tough in Somalia, people have traditionally migrated to other parts of the country where conditions were better. But many communities were already hosting large numbers of IDPs and there was little for poor Somalis to offer their relatives when they came in search of assistance. By the time famine was declared, some 1.5 million people – perhaps one-fifth of Somalia's population – were internally displaced. Many were crowded into the Afgoye corridor along a road running south of Mogadishu – an area which acquired the dubious distinction of hosting the largest concentration of IDPs in the world. Moreover, movement within the country was more difficult as a result of the violence. As a consequence, many left – or tried to leave – the country, as discussed in the sections below.

Conditions for those who remained in Somalia were grim. In mid-2011, the US government estimated that 29,000 children had died in the preceding three months.[359] Not only were there food shortages, but livelihoods had been destroyed, disease and ill health was increasing, and access to education was abysmal. In August 2011, the Global Protection Cluster identified the following critical protection risks: forced displacement, family separation, sexual violence and abuse, early marriage of girls, and lack of access to basic services.[360] The shortages disproportionately affected, as they always do, the weakest and most vulnerable people. There was an alarming rise in rape and sexual violence against displaced women who were rendered more vulnerable by the disintegration of traditional clan and other protection structures.[361]

It wasn't just the drought that was causing the famine, but the severe problems in accessing communities in need due to the activities of al-Shabaab. Al-Shabaab is an offshoot of the Islamic Courts Union, a group of Sharia Courts who united to form a rival administration

[359] CBS News, "U.S.: 29,000 Somali kids have died in last 90 days," 4 August 2011, http://www.cbsnews.com/stories/2011/08/04/501364/main20088015.shtml

[360] Global Protection Cluster, "Responding to Urgent Risks in the Horn of Africa," *Alert,* August 2011, p.1.

[361] Jeffrey Gettleman, "Somalia Faces Alarming Rise in Rapes of Women and Girls," *New York Times*, 28 December 2011.

to the Transitional Federal Government of Somalia and controlled large parts of Southern Somalia until it was defeated by the Ethiopian intervention in 2006. Known for its virulently anti-Western ideology and suspected of having links to al-Qaeda, the group has targeted western aid workers and terrorized the population in areas it controls.

Al-Shabaab and famine response

By early August, the international community was trying to scale up operations in response to the famine and had begun airlifts of emergency food. But most of the starvation was occurring in the south, in areas largely inaccessible to international agencies. In fact, the two parts of Southern Somalia where famine was initially declared were controlled by al-Shabaab. The militants had forced out Western aid organizations in 2010 and even when famine was declared, few of these agencies were able to return quickly. The aid agencies were understandably reluctant to resume operations, in part because scores of aid workers had been killed by the insurgents. But there was another deterrent. In 2008, the US government declared al-Shabaab to be a terrorist group, making it a crime for US-supported organizations to provide material assistance to them. Although the restrictions were relaxed in response to the famine, NGOs were still uncertain about their situation – could they really guarantee that their aid wouldn't end up in the hands of al-Shabaab?

Since famine was declared in July 2011, many aid agencies geared up and aid eventually poured into the country. Al-Shabaab left Mogadishu in July, allowing relief to be delivered to that city. But the uncertainties and the danger posed by al-Shabaab continued. In September, the UN reported that famine had spread, with an estimated 750,000 people now at risk of starvation.[362] In late November, al-Shabaab ordered six more aid agencies to leave the country.[363] By early January 2012, ICRC, one of the few aid agencies excluded from a ban by al-Shabaab, suspended its food and seed distributions to 1.1 million in the south after reporting that its efforts to distribute commodities were being blocked.[364]

Somalis on the move

In response to the escalating violence and increasing hunger, hundreds of thousands of Somalis fled to Kenya and Ethiopia in search of assistance. For a time, al-Shabab prevented people from fleeing the country and set up a cantonment camp where it imprisoned displaced people trying to escape al-Shabaab territory.[365] Even the relatively stable state of

[362] OCHA, "Somalia Situation Report no. 13," September 2011.
[363] Mohammed Ibrahim and Jeffrey Gettleman, "Somali Militants Shut Down More Aid Organizations," *New York Times*, 29 December 2011.
[364] ICRC, "Somalia: ICRC temporarily suspends distributions of food and seed," 12 January 2012, http://www.icrc.org/eng/resources/documents/news-release/2012/somalia-news-2011-01-12.htm
[365] Jeffrey Gettleman, "Somalis Waste Away as Insurgents Block Escape From Famine," *The New York Times,* 1 August 2011, http://www.nytimes.com/2011/08/02/world/africa/02somalia.html

Puntland issued restrictions on the movement of people, as President Abdirahman Farole of Puntland banned internally displaced persons (IDPs) from southern Somalia from entering Puntland.[366]

As of November 2011, the figures on Somali refugees in the region were as follows:

Table 25 Somali Refugees in Neighboring Countries[367]

Host country	Total new arrivals in 2011 (as of mid-November 2011)	Total number of Somali refugees
Kenya	163,599	520,230
Uganda	361	22,146
Ethiopia	98,210	181,271
Djibouti	4,867	18,748
Yemen	19,390	196,917
Eritrea	60	3,865
Total	**286,487**	**944,692**

For many years, Somalis had sought protection in neighboring Kenya. But in October (as discussed below), Kenya, concerned about its own security and its own ethnic Somali population in the north of the country, sent troops into Somalia and closed the border to Somali arrivals.[368] As of 9 December, humanitarian operations at the Dadaab refugee complex – where nearly 464,000 refugees resided – remained limited to the provision of essential services, as the majority of staff had been evacuated due to insecurity in and around Dadaab.[369]

Broader regional military and security dynamics

While international efforts to intervene to bring an end to the violence in Somalia largely dissipated after the failed efforts of 1992 to 1993, there has been no shortage of attempts by regional actors to try to stop the deteriorating security situation. In 2006, Ethiopian forces invaded the country in an effort to dislodge the Islamic government established by the Islamic Courts Union, and to consolidate a Transitional Federal Government (TFG). Three years later, the Ethiopians pulled out; although the ICU had indeed been dislodged,

366 OCHA, "Horn of Africa Crisis Situation Report No. 30," 16 January 2012, http://reliefweb.int/node/470632

367 IDMC, "Somalia: New displacement and worsening humanitarian and protection crisis for IDPs," 9 December 2011, p. 2, http://www.internal-displacement.org/8025708F004BE3B1/%28httpInfoFiles%29/76AE3E5570C42FE8C1257961004D7CD3/$file/somalia-overview-dec2011.pdf

368 UN Secretary-General, *Special Report on Somalia*, *op. cit.*

369 USAID, "Horn of Africa - Drought Fact Sheet #11, Fiscal Year (FY) 2012," 17 December 2011, http://reliefweb.int/node/465715

one of the byproducts of the Ethiopian intervention was the emergence of al-Shabaab as one of the groups splintering off from the dispersed ICU.

Meanwhile, the African Union deployed forces known as AMISOM to Somalia in 2007, and continues to have a presence there, though its ability to function effectively has been limited by lack of funding and personnel, with only 10,000 troops deployed and only to Mogadishu, at least until recently. The mandate of AMISOM is to protect the small TFG, to promote reconciliation and to support the delivery of humanitarian aid. However, most observers do not think that AMISOM has been effective or that it can be, due to the limited legitimacy of the TFG, its inadequate resources and its opponent. Al-Shabaab continues to control most of the country.

In 2011 and early 2012 both Kenya and Ethiopia sent military forces into Somalia in support of African Union efforts. While the Kenyan intervention has managed to create a buffer zone in Southern Somalia, the lack of a clear exit strategy and fears of terrorist attacks in Kenya lead to popular nervousness with the intervention.[370] Meanwhile insecurity is on the rise in northeastern Kenya, with increasing incidents of terrorist attacks creating insecurity in the area around Dadaab. Food prices have increased, services are more difficult to deliver, and schools have been closed.

The international response

Against this backdrop of dire humanitarian need and a precarious security environment, the international humanitarian community sought to respond to the famine. But the response was slow.

As Save the Children and Oxfam report, the emergency in the Horn of Africa in 2011 was no sudden-onset crisis.[371] Thanks to sophisticated early warning systems (EWS), there were clear indications of the impending drought and its consequences, beginning with forecasts of the impending crisis in August 2010, as changing weather conditions linked to La Niña were confirmed. These predictions became more strident in early November 2010, when it was forecast that the October to December short rains would be poor. This prediction proved accurate, prompting the Food Security and Nutrition Working Group for East Africa (FSNWG) to set up a La Niña task force. In December 2010, the newly-constituted FSNWG for East Africa stated that "pre-emptive action is needed to protect livelihoods and avoid later costly lifesaving emergency interventions" and called on the humanitarian community (donors, UN, NGOs) "to be prepared NOW at country level."[372] A multi-agency scenario planning meeting took place in February 2011. A Famine Early Warning Systems

[370] AllAfrica, "Intervening in Somalia - Risky Business With No End in Sight," 17 January 2012, http://allafrica.com/stories/201201170950.html

[371] Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.,* pp. 4-11.

[372] FSNWG, "La Niña Alert," November 2010, http://reliefweb.int/node/374713

Network (FEWSNET) food security alert dated 15 March made it clear that the situation was already alarming and would deteriorate further if the March to May rains were as poor as expected. It stated that even average rains would lead to a critical food security situation until May or June and predicted "localized famine conditions [in southern Somalia], including significantly increased child mortality… if the worst case scenario assumptions are realized."[373] The FSNWG also warned that "failure of the March to May rains is likely to result in a major crisis."[374] At this stage, humanitarian actors were advised to begin large-scale contingency/response planning immediately, and to implement expanded multi-sectoral programming. Yet this call was not adequately heeded.

Why was the response so slow? For 20 years, the international community had intervened in many situations of drought to avert famine. The Save the Children and Oxfam report notes that mobilizing a rapid response depends on getting accurate data and media coverage – but this wasn't possible in Somalia.[375] They also claim that humanitarian workers on the ground were often aware that conditions were deteriorating and moving toward famine yet couldn't persuade their headquarters of the urgency of the situation. Additionally, they note that some NGOs were wary that international interventions could undermine community-based initiatives.[376] But there were other factors at play, including the perception that Somalia is a lost cause and the ever-present difficulty of access by humanitarian actors to communities in need inside the country.

The original 2011 Consolidated Appeal for Somalia was set at $530 million in late 2010. This appeal was revised to more than $1 billion by August 2011.[377] On 13 December, the UN launched its 2012 Somalia Consolidated Appeal Process (CAP), asking for $1.5 billion – a 50 percent increase from the 2011 CAP request – to address the emergency needs of four million people. While slow, the aid did eventually pour in; the UN received $800 million by late November 2011.[378]

As in other disasters, funding patterns followed the typical distribution of best coverage for food assistance – with 94 percent of requested funds received. Other sectors such as protection were only funded at 17 percent of the amount requested and agriculture and livelihoods only received a little more than half of the requested funding.

On 19 November the UN revised its estimates of people at risk of starvation in Somalia from 750,000 to 250,000 with some three million people still in need of humanitarian assistance. Three of the six regions where famine was declared – Bay, Bakool and Lower Shabelle – were lifted out of famine by November. The fact that aid had gotten in and that

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373 FEWSNET, "EAST AFRICA Food Security Alert," 15 March 2011.

374 *Ibid.*

375 Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.,* p. 4.

376 *Ibid.*

377 *Ibid.,* p. 11.

378 USA Today, "Many Somali famine victims afraid to return home," 22 November 2011, http://www.usatoday.com/news/world/story/2011-11-22/somalia-famine/51353706/1

at least some rains fell made the difference. Since September/October, there has been a massive scale-up of emergency response which has had a significant impact on malnutrition and mortality, with declines in crude death rates. However, FSNAU notes that "even with these improvements, current levels of malnutrition and crude mortality remain two to four times higher than typical levels in Somalia for this time of year. Under 5 death rates remain up to six times the typical background level for sub-Saharan Africa."[379] Global acute malnutrition remains near or above famine levels (greater than 30 percent), and diseases such as measles, cholera and malaria have led to many deaths. Casualty rates are uncertain, but the UN reports that tens of thousands have died in the famine – perhaps 50,000 to 100,000 in total.[380]

By the end of the year, an estimated 13 million people were still in need of assistance in the Horn of Africa.[381] The violence continued unabated in Somalia, and access by humanitarian agencies remained extremely limited. In late November, the operations of sixteen humanitarian organizations, including UN agencies such as UNHCR, UNICEF and the World Health Organization, as well as international NGOs were suspended following the new ban announced by Al-Shabaab and, as mentioned above, in January 2012 the ICRC suspended its operations in the country.

Despite these setbacks, on 3 February 2012 the UN officially declared that the famine in Somalia had ended. Good *Deyr* rains between October and December, coupled with humanitarian aid, meant that the risk of starvation had declined. While the Director General of the Food and Agricultural Organziation, José Graziano da Silva, reported the positive news, he also cautioned that there is still a crisis that exposes 2.34 million people – almost a third of the population – to high risks of malnutrition and insecurity.[382]

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379 FSNAU*, op. cit.*

380 BBC News, "Somali famine 'will kill tens of thousands'," 15 January 2012, http://www.bbc.co.uk/news/world-africa-16568842; see also: Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.,* p. 1.

381 Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.,* p. 1.

382 The Guardian, "Famine in Somalia is over, says UN," 3 February 2012, http://www.guardian.co.uk/world/2012/feb/03/famine-somalia-over-says-un?newsfeed=true; also see: FSNAU, "Famine ends, yet 31% of the population remain in crisis," 3 February 2012, http://www.fsnau.org/in-focus/famine-ends-yet-31-population-remain-crisis

Other countries

Three countries – Kenya, Ethiopia, and Somalia – were almost equally affected by failure of the October-December 2010 and the March-May 2011 rains. All experienced crop failure, deaths of animals, and human displacement. But as discussed above, famine only occurred in Somalia – particularly in southern and central Somalia, where conflict further impeded traditional drought coping mechanisms and reduced access for humanitarian agencies.

In comparison, the reaction in both Ethiopia and Kenya was better – the result of superior early warning and early response mechanisms. But there were also problems with both countries' responses. In Ethiopia there was a concern that the government was underestimating the number of drought-affected people. In Kenya, the response was quite late, with an emergency declared only in May 2011. This was perhaps because the country's attention was focused elsewhere, on issues such as corruption and Kenya's new constitution. Although the response in these two countries was inadequate, the drought did not result in famine.[383] The evaluation carried out by the UK's Disasters Emergencies Committee noted, however, that while mortality did not reach catastrophic levels in Ethiopia and Kenya – except among refugees – the result of the failure was far greater malnutrition, suffering and damaged livelihoods than would have been the case with more concerted preventive action and early relief.[384] Perhaps paradoxically, when the rains did return, flooding occurring in Kenya displaced 80,000 people.[385]

Concluding thoughts

This chapter began by looking at the physical characteristics of drought and ended by discussing problems of humanitarian access and violence in one of the poorest countries in the world.

Although drought occurs elsewhere with devastating effects, it is particularly prevalent in Africa. Given the region's physical characteristics – with two-thirds of its landmass as drylands or desert – it is particularly susceptible to the negative effects of lower-than-normal rainfall. But drought, unlike floods or cyclones, generally has a long lead time. There are good warning systems in place and in the last few years, the warning systems in East Africa functioned as they were intended to. But in spite of the warnings and the long lead time, famine occurred in Somalia over a six month period, resulting in the deaths of tens of thousands of people.

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383 Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.*

384 Cited by: Save the Children and Oxfam, *A Dangerous Delay*, *op. cit.,* p. 10.

385 OCHA, "Horn of Africa Crisis, Situation Report No. 29," 30 December 2011.

The 2011 famine in Somalia was not a natural phenomenon, but rather the product of human-made factors, including lack of governance, political instability and conflict, which undermined traditional coping strategies that have evolved over generations in response to the natural hazard of drought. [386] As Amartya Sen pointed out decades ago, famines do not occur in democracies.[387] The best way of preventing famines is not simply a technical issue of coming up with better warning systems or aid delivery mechanisms, but engaging in the far more difficult task of creating political systems capable of protecting and assisting their people when natural hazards occur.

[386] See for example: Jane Corbett, "Famine and Household Coping Strategies," *World Development*, vol. 16, no. 9, 1988.

[387] Amartya Sen, *Development as Freedom,* 1999.

Victims of famine seek treatment at Mogadishu Hospital.
Photo: UN Photo/Stuart Price

Photo: © Thinkstock.com

CHAPTER 4

THE OLD ARE THE FUTURE

Impacts of an aging world population on the future of disaster response

"No man loves life like him that's growing old."
—Sophocles, Acrisius

"Fully 64 percent of deceased victims whose remains were received at the Saint Gabriel morgue established by FEMA's Disaster Mortuary Operational Response Team (DMORT) were over 65 years old in a population in which that age group represented only about 15 percent of the existing population. Mortality rates for those over 75 were even higher. The elderly mostly lived alone and in isolation, perhaps little aware of the dangers they faced and with no ability to seek safety even if they did. Many elderly people died in their homes or in nursing homes, unwilling or unable to leave if they lived alone or fearing the consequences of leaving. Death among elderly whites exceeded those of elderly African Americans because there were a greater number of elderly whites; their life expectancies considerably exceeding those of blacks."

—John C. Mutter, Kye Mesa Barnard on mortality after Hurricane Katrina, USA[388]

When natural disasters strike, older persons are often disproportionately affected, which is why they are considered to be a vulnerable group by humanitarian actors in need of special attention. But even though this is common knowledge, too often the specific needs of older people are not taken into account when preparing for disasters, responding to them when they do occur or when dealing with the medium and longer-term effects of disasters.

This is especially worrisome given that aging is one of the mega-trends which will affect human societies across the globe in the next half-century. The 2009 UN report on population aging qualifies the current trend of aging as "unprecedented, a process without parallel in the history of humanity."[389] Predictions show that while aging has certainly occurred earlier and at a faster rate in developed societies (and the topic is therefore in line with the cover story of this *Review*), there are strong indications that many developing countries will also see the rapid aging of their populations in the coming decades.

In this chapter, we will begin with a review of demographic trends about aging, and then examine some of the reasons why elderly persons may be particularly vulnerable in situations of natural disasters. We will then look at some of the factors that make it difficult for disaster responders to deal with these vulnerabilities.

While it is important to recognize the vulnerabilities of the elderly, there is often a tendency to discount the many positive contributions that older people make in our societies today, and which they may make in the future. As the title of this article indicates, the old are the future. If utilized, the experiences and faculties of elderly persons are and will be assets in preventing, preparing for and responding to sudden-onset natural disasters and longer-term challenges such as climate change.

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[388] John C. Mutter and Kyle Mesa Bernard, "Climate Change, Evolution of Disasters and Inequality," in Human Rights and Climate Change, ed. Stephen Humphreys, International Council of Human Rights, 2010, p. 281.

[389] United Nations Department of Economic and Social Affairs, Population Division, *World Population Aging 2009*, ESA/P/WP/212, December 2009, p. viii.

Section 1

An Aging World[390]

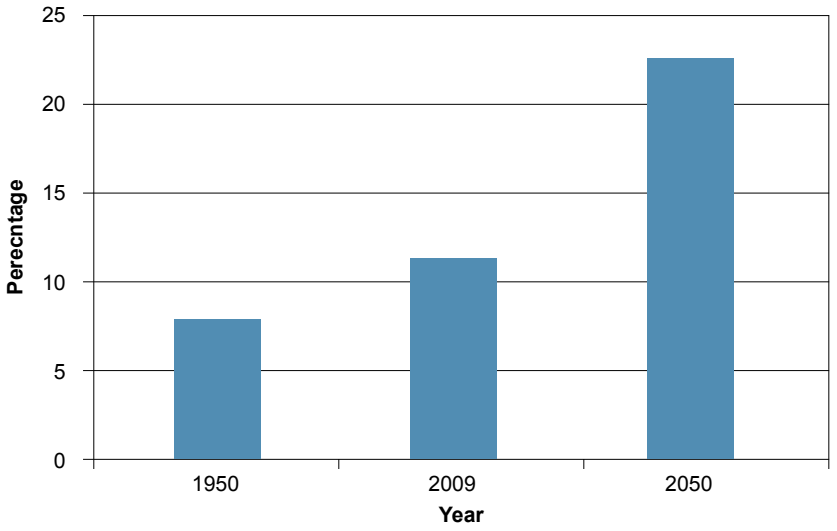
"Population aging is unprecedented, a process without parallel in the history of humanity."

—UN, World Population Aging 2009

This section sets the stage for considering the relationship between aging and disasters by looking at some of the data on the unprecedented aging of the global population. Throughout this chapter, we will follow the UN's categorization of older people being 60 years or above, while persons 80 years and above will be classified as the "oldest-old."

Since 1950, the proportion of older persons has steadily risen from eight percent of the human population in 1950 to eleven percent in 2009. This number is expected to reach 22 percent in 2050 (see Graph 9).[391]

Graph 9: Proportion of Population 60 Years and Over, World



In 2009, the world median age was 28 years (half the world's population were below and the other half above that age). In the same year, the country with the lowest median age was Niger (15 years) and the country with the highest median age was Japan (44 years).

[390] If not otherwise indicated, data in this section is taken from: United Nations, Department of Economic and Social Affairs, Population Division, *World Population Aging 2009*, 2009.

[391] UN, *World Population Aging 2009, op. cit.,* p. 11.

Prognoses are that the global median age will rise to about 38 years by 2050.[392]

The main causes for the aging of the world population are major reductions in fertility and longer lifespans due to a reduction in mortality rates. Fertility has declined significantly in the last half century. Globally, fertility has been reduced by almost half since the 1950s, from 4.9 children per woman in 1950-1955 to 2.6 children per woman in 2005-2010. Fertility decline has been more pronounced in the developed world, where in many countries, for example Japan, Italy and Germany, fertility has declined below replacement levels (2.1 children per woman) and therefore without sufficient in-migration, those countries are or will be shrinking in population size.

The second main reason for the aging of the world's population is a general trend of higher life expectancy. Since the 1950s, life expectancy has increased by 21 years to 67.6 years in 2005-2010. On average, less developed regions realized higher gains in life expectancy over that period than developed countries. However, there is still a life expectancy gap between more and less developed regions. For example, a person born in the developed part of the world has a life expectancy approximately eleven years longer than someone from a developing country.[393] In spite of overall trends of increasing longevity, the fact remains that a person born in Japan has a life expectancy of over 82 years, while a person born in Angola can expect to live 38 years.[394] In the next four decades, average global life expectancy is projected to increase by about eight years, with the difference between the developed and developing world shrinking to eight years in life expectancy as compared with the present eleven year difference as developing countries on average are projected to achieve higher life expectancy gains than developed countries.[395]

There are also significant differences between female and male life expectancy, with women currently living on average 3.5 years longer than men. Thus the majority of older persons in the world are women, with the phenomenon being especially pronounced in the more developed regions of the world, where women outlive men by an average of 6.9 years.[396]

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392 *Ibid.,* p. 6.

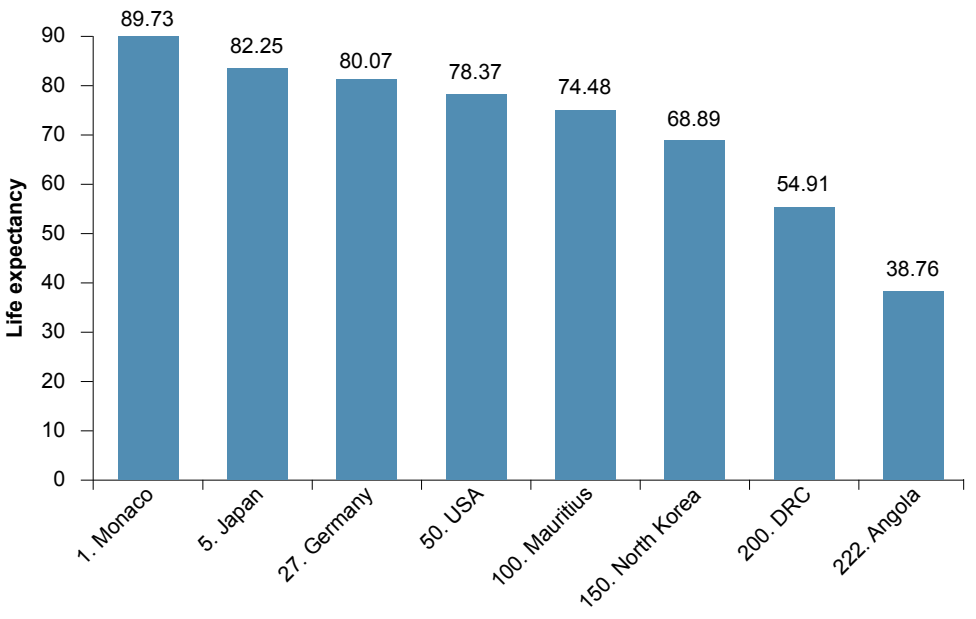
393 UN, *World Population Aging 2009, op. cit.*, p. 6.

394 CIA World Factbook, "Country Comparison: Life expectancy at birth, 2011 est.," https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html

395 UN, *World Population Aging 2009, op. cit.,* p. 7.

396 *Ibid.,* p. 9.

Graph 10: Life Expectancy in Select Countries[397]



The scale of aging

The number of people aged 60 and over has been constantly increasing since the 1950s, but that growth has been accompanied by an overall robust growth in of the world's population. In 1950 around eight percent of the world population was aged 60 or over while projections for 2050 are that this number will rise to 22 percent (see Table 26). While the world's population will have grown by around 3.6 times from 1950 to 2050, the number of older people will have grown almost tenfold within that time span. Indeed the UN projects that 58 percent of the world's population growth will come from increases in the number of people over 60 while only six percent will come from people under 30.[398]

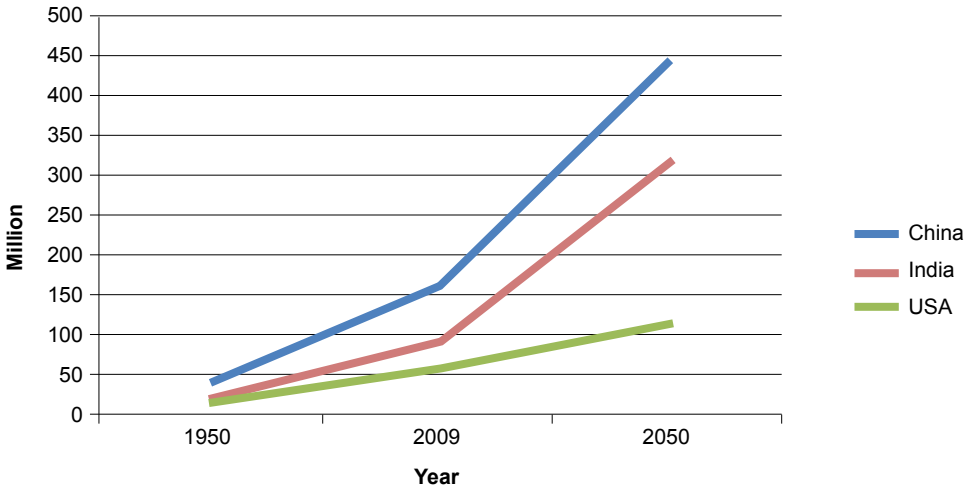
[397] CIA World Fact Book, "Life expectancy at birth," 2011 estimates, accessed 5 February 2012, https://www.cia.gov/library/publications/the-world-factbook/

[398] Philip Longman, "The world will be more crowded – with old people," *Foreign Policy*, September-October 2011, p. 87.

Table 26 Global Population Growth and Growth of Population over 60[399]			
Year	**World population**	**Population over 60**	**Percentage of pop.**
1950	2529	205	8
2009	6829	737	11
2050[400]	9150	2000	22

While the global percentage of older people in 2009 stood at eight percent, there are vast differences between how many older people live in specific countries. For example, Japan and several European countries lead the field with almost 30 percent of the population over 60 years old, while Qatar is on the tail end with only 1.9 percent of people aged over 60. India and China occupy midfield positions in this category (see Graph 12).[401] Projections show that nearly 35 percent of the European population will be categorized as older people in 2050 while only eleven percent of Africans will fall into that category.

Graph 11: Growth of Older People in Select Countries[402]



Still, while Europe, Japan and other developed countries will have higher percentages of older people, developing countries are catching up fast and the WHO estimates that already more than half of all older people live in developing countries today.[403] Middle-level countries such as Iran and Mexico will have a larger percentage of their populations over

[399] UN, *World Population Aging 2009, op. cit.,* p. 10.; population numbers from: UN, *World Population Prospects, The 2008 Revisions, Highlights, 2008,* p. 21.

[400] UN Projections.

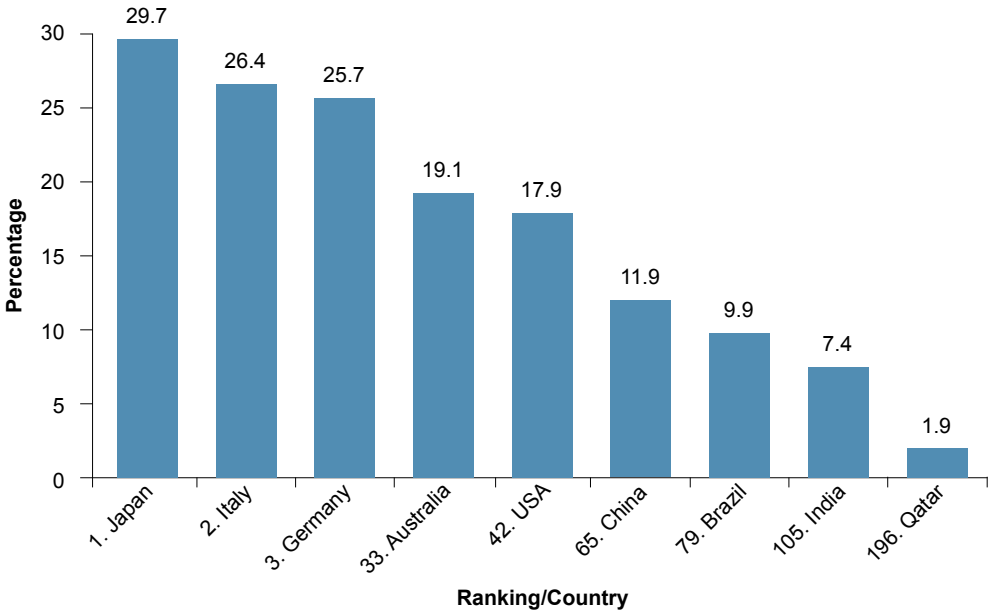
[401] UN, *World Population Aging 2009*, *op. cit.,* p. 65.

[402] *Ibid*.

[403] Help Age International and UNHCR, *Older people in disasters and humanitarian crises: Guidelines for best practice,* 1999, p. 10.

the age of 60 than France does today.[404] Graph 11 shows the rapid growth of older people in both China and India projected for 2050. Brazil and Indonesia will also each have more than 50 million older people by 2050.[405]

Graph 12: Percentage of Population Aged 60 or Over (2009)[406]



Another fact that brings into focus the scale and scope of population aging is that the older population is the fastest growing segment in nearly all regions of the world. Moreover, the fastest-growing age group in the world is the "oldest-old," those aged 80 and over, who by 2050 will account for four percent of the world's population, up from one percent today.[407]

The statistics discussed so far show an aging process of the world's population that has no precedent in human history and it is thus difficult to make predictions about the implications of this process, especially as many countries that have the highest percentage of older people today only experienced this aging once their economies and social security systems were well developed. For many developing countries, population aging will occur in the context of far lower levels of economic development and therefore different policies and approaches might be needed. The current financial problems that many of the aging developed societies show in regards to paying for rising pension and health care costs

404 Longman, *op. cit.,* p. 87.
405 UN, *World Population Aging 2009*, *op. cit.,* p. 10.
406 UN, *World Population Aging 2009*, *op. cit.*
407 Jo Wells, *Protecting and assisting older people in emergencies*, Humanitarian Practice Network at the Overseas Development Institute, Network Paper Number 53, December 2005.

are an indication that many of the issues related to an aging population have not yet been resolved.

Population aging will also shift the relative proportions of generations within societies and could lead to inter-generational conflicts related to the distribution of wealth and income. As older persons make up an increasing part of the electorate, they may have more political clout than younger generations and will be able to better participate in and have greater influence on decision-making processes. Population aging will go hand in hand with several other mega-trends such as urbanization and climate change and the interlinking of those issues will pose a variety of new challenges. Rural areas, for example, may face specific challenges. Many countries have particularly high percentages of older people and children in rural areas, because young adults are migrating to urban areas at a high percentage, leaving the younger and older generations behind.[408] Should this trend continue or accelerate, there will be important social and economic consequences and it will impact humanitarian and development policies targeting rural areas. Keeping in mind the enormous social transformations that population aging will bring, the next section of this chapter takes a closer look at the vulnerabilities of older people when disasters strike and the implications of these vulnerabilities for preparing for and responding to disasters.

[408] *Ibid*.

An elderly Southern Sudanese, part of a group of recently returned from Darfur, shortly after disembarking the group's bus, near Aweil, Northern Bahr el Ghazal State. Photo: UN Photo/Paul Banks

Section 2

Older Persons as a Vulnerable Group, Implications for Disaster Planning and Response

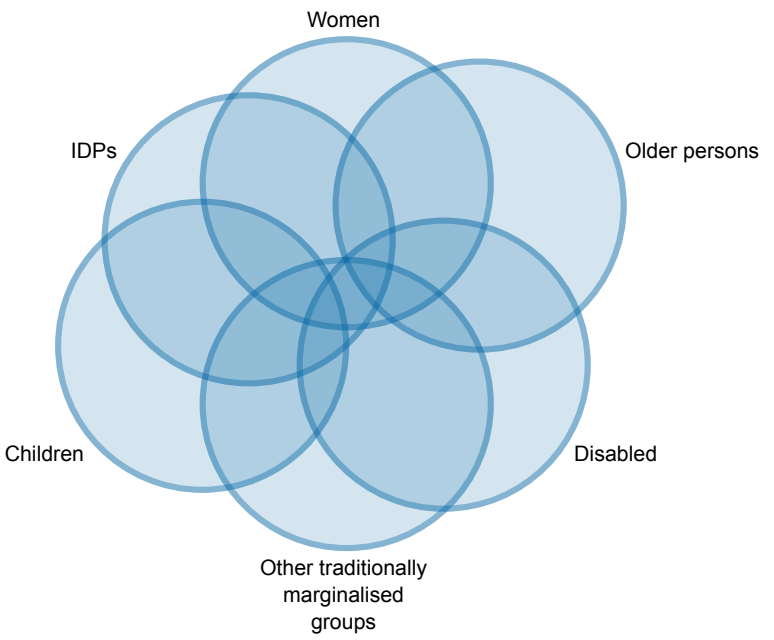
Humanitarian actors classify older people as a vulnerable group, meaning that older people in many cases have specific assistance needs which are related to the process of aging. Mobility issues might make it more difficult for an older person to evacuate an area that is in danger of being affected by a natural hazard. Greater physical frailty might cause higher fatalities among older people. Lack of medication for chronic illnesses might lead to complications after a disaster has struck. Reconstruction might bring more challenges for older people who live on their own with only meager pensions or income. Still, classifying older people as a vulnerable group should not lead us to assume every single older person is vulnerable. Especially in developed countries, many people are active and healthy up until old age, and around the world older people may make important contributions in disaster situations rather than simply needing special attention and assistance.

Natural disasters cause a shock to the normal functioning of a society. As discussed in the Introduction to this *Review*, natural disasters are defined as events that overpower some of the coping capacities of individuals and societies, and often pose specific challenges to older people. In this section we therefore want to highlight some of the specific issues that are encountered by older persons in situations of natural disasters, by looking at some of the evidence encountered in previous disaster situations and at specific vulnerabilities of older persons (keeping in mind that this group's vulnerabilities often intersect with vulnerabilities linked to factors such as gender, race, economic status, employment, and displacement (see Graph 13).

One of the observations in disaster situations is that older people typically have higher fatality rates than other population groups. Even though comprehensive data regarding the age breakdown of fatalities is rarely available in natural disaster situations, there is strong evidence that in many disasters most fatalities occur among persons over the age of 60. In many cases the death rate of older people is as high as 70 percent. The following examples underline the increased vulnerability older people often encounter in disaster situations:

- Data from the Tohoku earthquake and tsunami in Japan in March 2011 show that the death toll of elderly people from the tsunami was much higher than the percentage of that age group in the total population, reflecting the fact that many older people did not manage to escape the destructive waves. In the most severely hit prefectures of Iwate, Miyagi and Fukushima, more than 90 percent of people killed by the tsunami died from drowning, with 65 percent of the casualties aged 60 or older (around 30 percent of the Japanese population are over 60 years old).

Graph 13: Intersections of Potentially Vulnerable Populations in Situations of Natural Disasters[409]



Among 11,108 victims of the disaster whose ages were identified, those aged 60 or older accounted for 65.2 percent of fatalities. Among that group, 19.1 percent of the casualties were in their 60s; 24.0 percent were in their 70s; and 22.1 percent were aged 80 or older, showing that the disaster took an especially high toll among the oldest-old.[410] This is an even more dramatic indication than death rates of older people in the Kobe earthquake, where 53 percent of fatalities were over 60 years old.[411]

- A mortality survey among tsunami-displaced persons in Aceh, Indonesia after the 2004 Indian Ocean tsunami also found that the highest death rate was among elderly persons over 70 years of which 28.1 percent of the age group was killed by the tsunami). The second highest fatality rate was for persons aged 60-69 (22.6 percent of the age group killed).[412]

[409] Brookings-LSE Project on Internal Displacement, "Training Modules on Protection in Situations of Natural Disasters," 2011, www.brookings.edu/idp

[410] Japan Times, "90 percent of disaster casualties drowned," 21 April 2011, http://www.japantimes.co.jp/text/nn20110421a5.html

[411] David Hutton, *Older People in Emergencies: Considerations for Action and Policy Development,* World Health Organization, 2008, p. 1.

[412] Shannon Doocy et al., *Tsunami Mortality in Aceh Province, Indonesia*, Bulletin of the World Health Organization, 2007, Vol. 85, No. 4, p. 273-8.

- The 2003 heat wave in France had an even higher death toll among elderly persons. Of the 14,800 people who died, 70 percent were over 75 years old.
- During Hurricane Katrina, most of the 1,300 fatalities were older persons. In Louisiana, 71 percent of those who died were older than 60 years; 47 percent of this group were over 77 years old.[413]

These are stark numbers. While our observations are not based on a representative sample, it appears that in many disasters 50 to 75 percent of fatalities are persons aged 60 years or older, with people above 75 or 80 being particularly likely to die when a sudden-onset disaster strikes. Scattered data from slow-onset disasters show that in droughts and famines infants and children bear the brunt of the crisis; however, older persons are also among the groups who are especially hard hit.[414]

Humanitarian experience shows that certain groups of older people are especially vulnerable in situations of natural disasters:

Frail older people

Frailty indicates an inability to cope with environmental stressors (such as disasters). When a person's physical and mental capacities become sufficiently low that relatively small stressors overwhelm the individual's capacity to cope, that person is considered to be frail.[415] Frailty usually increases with age, so while many people in their 60s and 70s are not considered frail, virtually all persons above 85 are physically frail. In situations of disasters, authorities and humanitarian organizations need to plan and prepare for those older people who are in need of constant care, such as hospitalized persons, persons with limited mobility or who are cognitively impaired, such as those with Alzheimer's disease. In the US, for example, it is estimated that fifteen percent of men and eleven percent of women aged 65 and older have either moderate or severe memory impairment, a percentage likely to rise as life expectancy increases.[416] Rest-home residents are especially vulnerable as many of them are frail and so relocation is often physically dangerous and emotionally taxing. A fifth of rest-home residents evacuated from Christchurch, New Zealand after the February earthquake died within six months of the disaster.[417]

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413 Hutton, *op. cit.*, p. 1.

414 See: Cormac O Grada, *Famine: A Short History*, 2009, p. 98ff.; see also: Peter Salama et al., *Malnutrition, Measles, Mortality, and the Humanitarian Response During a Famine in Ethiopia,* JAMA, Vol. 286, No. 5, 1 August 2001.

415 John A. Tone et al., *Geriatric Mental Health Disaster and Emergency Preparedness,* 2010, p. 33.

416 Hutton, *op. cit.*, p. 6.

417 The Press, "One in five quake-evacuated elderly die," 14 September 2011, http://www.stuff.co.nz/the-press/news/christchurch-earthquake-2011/5619376/One-in-five-quake-evacuated-elderly-die. It is difficult to put these figures into perspective without knowing either the age of nursing home residents or the 'normal' death rates of these ages, but nonetheless the figures seem high.

Another group of older people requiring special assistance during emergency situations are persons with disabilities. By 2050, the prevalence of disability in some developing countries is projected to rise by 400 percent as the population ages. Presently in developed countries over one third of the population aged 80 and over cannot walk outside their homes without assistance.[418] Older people with disabilities need special attention and assistance when it comes to evacuations and require special facilities and assistance in the post-disaster phase. People with disabilities also risk losing assistance devices such as wheelchairs or hearing aids during the often chaotic phase when the disaster strikes.

An even larger group that might not be especially frail in the early stages of a disaster but might be at higher risk in the post-disaster phase are people with chronic illnesses. As the population ages, the number of people with chronic diseases such as diabetes, hypertension and heart disease also increases. If not properly treated, chronic conditions can become acute and lead to a large number of fatalities in post disaster situations. Studies in developed countries indicate that up to 40 percent of persons over 65 suffer from a chronic illness or disability that limits their daily activities. Of those 75 and over, less than one third experience good health.[419] 90 percent of the people who died of the Kobe earthquake's secondary effects within six months were over 60, an indication that disasters can have severe medium-term health consequences for older people.[420] Authorities and humanitarian responders are well advised to make provisions for assistance to those with chronic illness in planning for evacuations and disaster response.

Older people living alone

Frailty and other age-related challenges are especially pronounced in a disaster situation when older persons live on their own, especially if they don't receive any family support. The rise of the nuclear family, low birth-rates and high divorce rates have, especially in the developed world, led to large numbers of older people living alone. Projections from England for example show that most of the increase in single person households until 2031 will come from older person households (42 percent), with 18 percent of the population projected to be living on their own by 2031 (compared to 13 percent in 2006).[421] While more older people are living on their own in developed countries, they are usually better protected as most countries have health care, social services and pension schemes for older persons. In the US for example, the poverty rate among older people has fallen from more than 35 percent in the late 1950s to 8.9 percent in 2009. While in the 1950s older people were by far the most likely to be poor, in 2009 the poverty rate of persons aged 65 and older was lower than the

[418] Hutton, *op. cit.*, p. 2ff.
[419] *Ibid.,* p. 5.
[420] *Ibid.,* p. 1.
[421] Department for Communities and Local Government, "Household Projections to 2031," England, 2009.

poverty rate for both adults (12.9 percent) and children (20.7 percent).[422] Meanwhile, studies show that up to 80 percent of older people in developing countries have no regular income. In Malaysia, for example, older people make up 5.6 percent of the population, but 37 percent of the poor.[423] Economic development usually goes hand in hand with smaller family sizes and a breakdown of traditional family and community support mechanisms, so the number and percentage of older people living on their own or without family support can be expected to increase in developing as well as developed countries. There is also a gender dimension as women live longer than men and remarry less often. A large percentage of one-person households will therefore be older women. In many cases, living alone increases social isolation, which heightens vulnerability and invisibility when a disaster strikes.

Displaced older people

Displacement is especially hard on older people. Being displaced is stressful whether it results from conflict or a natural disaster. Fleeing to safety might be physically strenuous and the adjustment to living in an evacuation center, a camp or with a host family is often challenging. Older people often find it more difficult to adjust to new environments as daily routines change and care and medical services might be disrupted. UNHCR estimates that worldwide older persons make up to 8.5 percent of the refugee population. In 2005, approximately 2.7 million people over the age of 60 were living as refugees or IDPs.[424] Evaluations show that older people's needs are given too little consideration in camp settings; this "invisibility" of older people leads to a lack of assistance specific to their needs, including appropriate nutrition, medical care, and psychosocial care.[425] While there is in many cases a lack of attention to older people in camp situations, it is also often more difficult for older people to return home after the emergency is over. Research by HelpAge in Uganda and Pakistan showed that a large number of those left behind when camps close are people who cannot return because of age-related reasons.[426] Research on the return of IDPs in Northern Uganda notes that "the situation for older people is characterised by social uncertainty and a lack of active participation in determining and implementing their own durable solution," with those retuning having strong "family and community/clan support enabling their return," while those remaining in camps are "people with special needs, in particular older people and people with disabilities."[427]

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422 Laura Norén, "Poverty in America | US Census Bureau graphics, 1959 – 2009," Graphic Sociology, 16 September 2010, http://thesocietypages.org/graphicsociology/2010/09/16/poverty-in-america-us-census-bureau-graphics-1959-2009/

423 Hutton, *op. cit.,* p. 11.

424 *Ibid.,* p. 1.

425 HelpAge International and IASC, *Strong and Fragile: Learning from older people in emergencies*, November 2007, p. 9.

426 *Ibid.,* p. 9.

427 Susan Erb, *The Protection of Older People in Northern Uganda: Needs, Contributions, and Barriers to Return,* June 2008.

On the other end of the spectrum, older people often also stay or are left behind when families flee. During the 2011 drought and famine crisis in the Horn of Africa, 12 million people were affected in Ethiopia, Kenya and Somalia. While an estimated 4.3 percent of Somalia's population is over 60, UNHCR statistics for refugee camps in Kenya and Ethiopia show the proportion of older people is significantly lower, at 3.4 percent in Kenya and just 0.85 percent in Ethiopia, suggesting that many older people did not make the journey to the refugee camps or succumbed along the way.[428]

Older people who lack certain skills or face cultural/ religious restrictions

A lack of certain skills might make it more difficult for older people to be resilient in emergency situations. For example, in many countries, the rate of illiteracy is much higher among older populations then among younger ones. Older people, especially older women, may also lack life-saving skills such as the ability to drive or swim. Cultural or religious traditions observed more often by older populations might put additional strain on elderly people in disaster situations. Numbers show that in many emergencies, especially in societies with low gender-equality, for every one adult male who drowns in a flood, there are three to four women who die.[429]

Older people who are care givers

While many older people need to receive care, large numbers of older people also serve as care givers and face particular challenges in disaster situations. Particularly in countries with a high prevalence of HIV/AIDS, grandparents are usually the ones caring for AIDS orphans. A 2003 study from HelpAge, for example, shows that at that time in South Africa and Uganda, 40 percent of children were living with their grandparents, while in Zimbabwe over half of all children stayed with their grandparents.[430] In many developing countries, poverty is more prevalent among older people, with those older people who care for dependents under additional strain. Post-disaster, they are at risk of being cut off from livelihood opportunities and therefore concerted efforts need to be made to ensure they are included in assistance schemes.

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[428] HelpAge International, "Drought in East Africa," *Aging and Development*, Issue 30, September 2011.

[429] Ferris, *When Disaster Strikes: Women's Particular Vulnerabilities and Amazing Strengths, op. cit.,* p. 2.

[430] HelpAge International and the International HIV/AIDS Alliance, *Forgotten families: Older people as carers of orphans and vulnerable children,* 2003.

Section 3

Humanitarian Challenges in Assisting Older Persons

Given older people's vulnerabilities in the face of natural disasters, humanitarian actors need to pay special attention to their needs and vulnerabilities. Although older persons are specified as a vulnerable group by humanitarian actors, many agencies do not develop specific programs and tools for assisting older persons, and there are few organizations that deal specifically with assisting older people in emergencies. In this section we will look at some of the possible reasons for this shortcoming, and assumptions that undermine effective assistance for older people in situations of natural disasters.

Social Darwinism

Emergencies, especially when resources are scarce, can lead, consciously or unconsciously, to social Darwinist cost/benefit calculations in terms of whom to save and whom not. When resources are scarce and the needs are widespread, older people might be perceived as less important than other segments of the population. Older people may play into this perception by altruistically "deselecting" themselves from assistance programs in favor of younger people.[431]

On the wrong end of the curve

Many humanitarian emergencies take place in countries that are still in the early stages of population aging, where median ages are still low, children are plentiful, and older people are relatively rare. In such situations, elderly people inevitably make up a relatively small proportion of the humanitarian caseload. Given the data analyzed in this chapter, it is clear that this pattern is changing, with many of the most disaster-prone countries aging at a fast pace. The sooner humanitarian agencies pay specific attention to older persons' needs and vulnerabilities, the better we will be able to deal with the dramatic demographic shifts arising in the next few decades.

No agencies: no agency

The lack of a designated agency for older people (there is for example no UN agency that deals specifically with older persons) translates into a lack of action and advocacy in respect to older people's needs in emergencies. While there are many experts and agencies which focus on children, for example, who provide both expertise and advocacy, the

[431] Wells, *op. cit.,* p. 21.

number of organizations offering equivalent expertise and advocacy for the elderly are few indeed. Without a specialized agency, there is often a lack of experts on older persons' needs in emergencies which can lead to discrimination. This lack of advocacy can also explain why there are fewer references to older people in international law than to other vulnerable groups such as children, women, minorities and people with disabilities.

The "invisible" elderly

In research and evaluations on older people in emergencies, the word "invisible" frequently comes up. There are a number of reasons why older people might be less visible in emergencies:

- Lack of data:
  Governments might lack detailed demographic data and data about persons who need special assistance in case of an emergency, so when a disaster strikes that information is simply not available to emergency responders. This problem can be compounded when data on older people is not collected during emergency assessments. If data are not disaggregated by sex and age, it is difficult to identify the vulnerable groups within the affected population.

- Frailty:
  As mentioned previously, frail older people may be hidden from public view as they are unable to leave their residences or temporary shelters in camps or evacuation centers. As with all persons with disabilities, data assessments and aid distribution systems need to account for frail older people.

- Exclusion:
  Older people might not be included in consultation and/or decision making processes, which in turn easily leads to under-representation of their needs. On the one hand, they may lack awareness of societal biases and discrimination against older persons. On the other hand, they may lack knowledge of the skills and capacities of older people which can contribute to the disaster response. Moreover, there is almost always a generation gap between aid workers and older beneficiaries, which can inhibit communication. Research shows, for example that when it comes to early recovery and reconstitution of livelihoods, older people are often excluded from income-generating activities on the assumption that they will either be taken care of by the state or by family members. This assumption is especially problematic for older persons who are caregivers or who have dependents.[432]

[432] HelpAge International and IASC, *Strong and Fragile*, *op. cit.,* p. 13.

Delivery systems may also be unconsciously biased against older people. For example, if people have to queue for hours to receive food, water or other goods, it will be difficult for older people with impaired mobility and without family support to access these goods. As mentioned above, older people might also decide to exclude themselves for the benefit of younger persons.

Money, money, money

There is little specific funding for projects that target older people. A HelpAge study analyzing humanitarian aid explicitly directed at older people through the UN Consolidated Appeals Process and Flash Appeals looked at 12 humanitarian crises since 2007, covering a total of 1,912 projects and found that only 4.9 percent of all projects made any explicit reference to older people as a vulnerable group (compared to 32 percent for women and children). Only 0.94 percent of the projects included activities that targeted older people and in total only five projects (0.2 percent) that included activities for older people were funded.[433] Given UNHCR estimates that worldwide 8.5 percent of the global refugee population was 60 years old or above, this shows the meager amount of attention given specifically to the needs of older persons.[434] In some post-conflict settings, the number of elderly IDPs is as high as 14 or 15 percent (Azerbaijan and Armenia, respectively).[435]

A lack of focus on older persons in all phases, from planning to emergency management to post-disaster reconstruction, can lead to a range of negative consequences. These include higher fatalities among older people, long-term chronic health issues, psychosocial trauma, and isolation. Treating older people simply as "normal" disaster victims denies the specific vulnerabilities that many older people face.

The issue of institutional responses within the humanitarian system for the elderly merits further discussion. Should issues of aging be mainstreamed into the work of all humanitarian agencies? Or is the establishment of a specialized agency for older people needed? Such an agency could at the minimum improve training and increase the number of specialists that deal with older persons in post-disaster responses. In recent years there have been some important developments in this respect, particularly due to the efforts of HelpAge International which has consistently advocated for the elderly. In 2007 HelpAge carried out an inter-agency review of the inclusion of older people in humanitarian action on behalf of the Inter-Agency Standing Committee (IASC). The IASC tasked the WHO and HelpAge to disseminate good practices and lessons learned to humanitarian actors with the IASC Working Group reviewing progress 18 months later. The review showed that there was "no indication to date that the needs of older people are now systematically

433 HelpAge International, *A Study of Humanitarian Funding for Older People,* November 2010.

434 Hutton, *op. cit.,* p. 1.

435 IDMC and Refugees International, *Protracted internal displacement in Europe, Current Trends and Ways Forward*, May 2009, p. 11.

identified or acted upon within mainstream humanitarian response or coordination."[436] In response the Working Group requested cluster lead agencies to integrate the humanitarian needs of older persons into the work of clusters and asked that multi-sector assessments include reference to all vulnerable groups, including the needs and capacities of older persons. Also in 2010, the UN General Assembly decided to set up a working group to consider how to strengthen the protection of older people's rights by looking at the adequacy of the existing international human rights framework, identifying any gaps and considering the possibilities of new human rights instruments.[437] Whether these efforts will succeed in closing protection gaps for older persons in humanitarian emergencies remains to be seen.

[436] IASC Standing Committee, "Older Persons and Humanitarian Action," 78th IASC Working Group Meeting, WO/1010/3595, 10-12 November 2010.

[437] HelpAge International, "UN adopts landmark resolution on older people's rights," 22 November 2010.

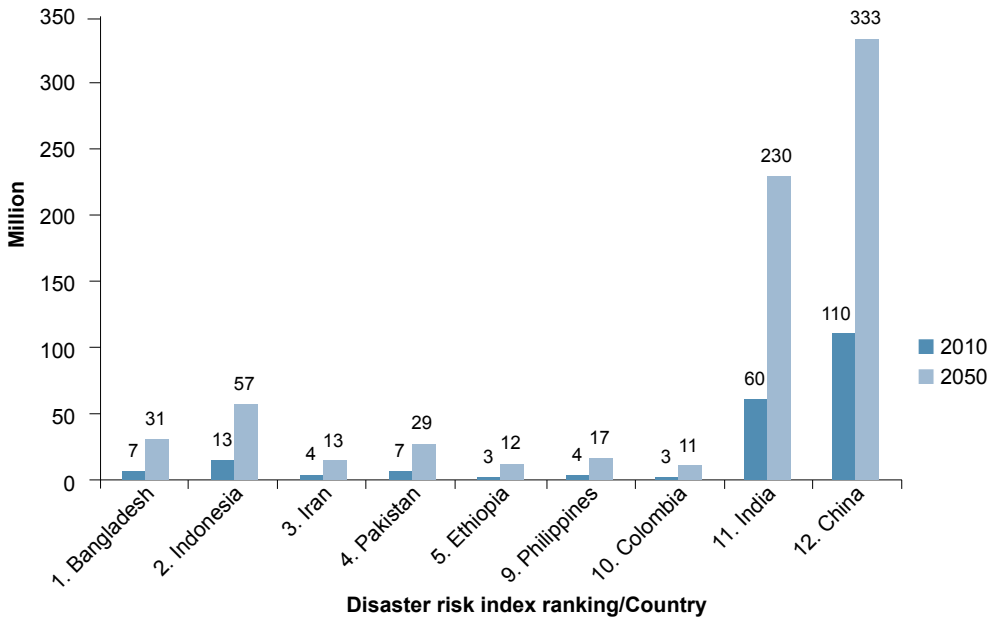
By 2050, the number of people 60 years or older is expected to be close to 2 billion. At that time, seniors will outnumber children 14 and under for the first time in history. Photo: Thinkstock.com

Section 4

The Old are the Future: The Mega-Trend of Population Aging and an Active Role for Older People When Dealing With Disasters

Two of the mega-trends expected to influence future life on this planet are climate change and the aging of the world's population. Although there is uncertainty about how quickly temperatures will rise, most experts predict an increase in the ferocity and frequency of sudden-onset natural disasters. The aging of the world's population is already well underway (discounting unforeseen major pandemics or other crises) as those who will constitute the older people of 2050 have already been born. The intersection of these two trends – heightened disaster risk and an aging population – is presented in Graph 14, which provides projections of the number of older people in some of the countries ranking at the top of the 2010 disaster risk index.

Graph 14 Population Age 65+ in Select Countries with High Disaster Risk[438]



[438] The countries ranking 6th to 8th (Sudan, Mozambique, Haiti) in the disaster risk statistics have been left out due to secession (Sudan) or small population size (Mozambique, Haiti). Population Data (approximations from chart): United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section, "Probabilistic Projections: Population age 65 and over (thousands)," 31 October 2011, http://esa.un.org/unpd/wpp/P-WPP/htm/PWPP_Population-Age_65Plus.htm; Risk Ranking Data from: Maplecroft, "Natural Disaster Risk Index 2010," www.maplecroft.com

While in the previous sections we have focused on some of the vulnerabilities of older people and some of the issues that impede a better humanitarian response for this age group, in this section we will focus on more positive aspects and resources which older people bring to disaster prevention, relief and recovery efforts.

Traditionally, in many societies, the elders in a community were respected for their wisdom and life experience. Elders often continue to play important leadership roles within their communities, their countries and the world, as evidenced by such revered leaders as Nelson Mandela and the Dalai Lama. In Pacific Island societies, community elders are seen as reservoirs of indigenous knowledge about tsunamis and other natural hazards; communicating this knowledge can save lives in their communities. For example, elderly residents of Tapurai village on Simbo Island (Solomon Islands) in the South Pacific who had experienced a smaller tremor and tsunami in 1959, warned younger residents to run for higher ground when tremors began. In April 2007 this advice saved many lives after an 8.1 magnitude quake occurred and caused a tsunami, killing only seven of the community's 241 residents, while other communities had much higher casualty figures.[439]

In terms of future trends, older people in many societies are becoming much more active than in previous decades. With increasing life expectancy due to healthier lifestyles and better health care, many older people are able to stay active and independent through a much later stage in their life. And perceptions of age are changing. Particularly in developed countries, people in their 60s are often no longer considered elderly. And while the debate over increasing retirement ages has largely focused on the financial costs of pensions and health care for older people, the fact is that the age of retirement is already increasing. Several countries have already increased retirement ages to 65 or 67 and it is likely that with rising life expectancies retirement ages will further increase in the near future. A higher percentage of older people in the work force will certainly refocus public perceptions about the abilities of older people, and might reshape understandings and perceptions about aging. More than half of the global population over 60 is economically active, with a third of those over 70 and about a fifth of those over 75 still working.[440]

The steady and assured incomes that older people have in developed countries through pensions can also be a strong asset in disaster recovery. In Japan, the areas affected by the tsunami were inhabited by large numbers of older people, most of whom want to return. Their pension incomes will make it easier for them to return, and will be a positive contribution to the reconstruction of local economies.[441] Even if it takes a while for factories

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439 Sid Perkins, "Heed your elders, survive a tsunami," Science News, 16 February 2008; see also for more examples: Shaw et al., *Indigenous Knowledge and Disaster Risk Reduction: From Practice to Policy,* 2009.

440 IFRC, *World Disaster Report 2007: Focus on Discrimination,* 2007, p. 80, http://www.ifrc.org/Global/Publications/disasters/WDR/WDR2007-English.pdf

441 John Creighton Campbell, Presentation at USJI Week Panel Discussion on "Reconstruction after the Great East Japan Earthquake," Washington DC, 9 September 2011.

to be rebuilt and new jobs to be created, the fact that pensioners have a stable income will stimulate local economies.

Almost all around the world the older people of tomorrow will be more highly skilled and better educated than the generations before them, allowing them to be actively involved in their societies. As we have seen, many of them are caregivers in the lives of their grandchildren or great-grandchildren. Already, one fifth of orphaned children in 22 of 28 countries in Africa and Latin America are living with their grandparents.[442] Other studies from Africa show the positive correlation between the presence of a grandmother in the household and the reduction of infant mortality and improvements in nutritional status and child development.[443]

The key to ending discrimination against older people in post-disaster situations is inclusion and participation. A necessary first step is to collect data about the needs of older persons as well as to include them directly, wherever possible, in needs assessments. Older people should at least be able to determine representatives that are involved in the distribution of aid and in decision making processes that concern older people. Because they are often knowledgeable about and respected in their communities, they also can provide leadership and reassurance when communities are traumatized. There are scores of examples of post-disaster situations where the involvement of older people in camp management as well as in disaster recovery planning and activities has brought about very positive outcomes. In Bangladesh, during Cyclone Sidr, for example, older persons' committees played very important roles from disseminating early warning information, to compiling beneficiaries' lists and assisting with the distribution of relief goods.[444] Once older people (and other potentially vulnerable groups) are not seen as passive aid recipients but as actors with specific skills who can play important parts in disaster response, ways can be found to use their experience in responding to natural hazards. In fact, some governments, humanitarian agencies and NGOs have already done very valuable work in incorporating the specific needs of older people into humanitarian responses, lessons that need to be collected, studied and disseminated. More work is also needed to lift up positive examples of the contributions which older people can make in both disaster risk reduction and disaster response.

In an aging world with a changing climate, it is imperative for our societies to make use of the experience and energy of older people. If we don't, we may fail to create a sustainable future for all of humanity.

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442 Hutton, *op. cit.*, p. 1.

443 Well, *op. cit.,* p. 17.

444 IASC, *Humanitarian Action and Older Persons: An Essential Brief for Humanitarian Actors,* 2008.

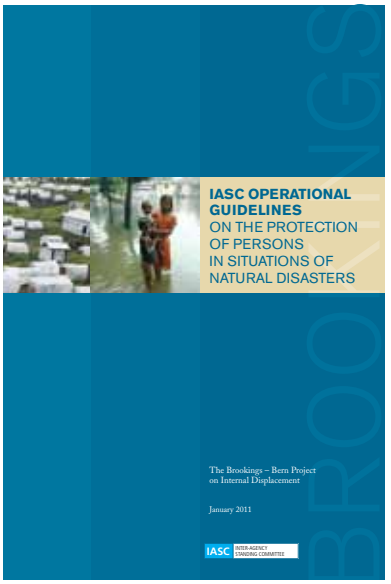
This year's *Review of Natural Disasters* has focused on the disasters that affected the rich world with a corresponding emphasis on both the economic costs of disasters and the particular impact of disasters on the elderly. But population statistics indicate that the elderly are making up a growing percentage of the population of the developing world as well. Responding to the particular needs of the elderly and using their potential contributions more effectively are thus issues of global concern. As discussed in the chapter on Somalia, the disproportionately small percentage of elderly Somali refugees suggests that we need to better understand the particular displacement dynamics associated with aging.

While developed countries are generally better-prepared to respond to the effects of natural hazards than developing countries, this *Review* has also highlighted some of the common challenges facing all countries in preparing for and responding to the effects of natural hazards. While Japan is the world leader in developing earthquake-resistant technologies, it was unprepared for the scale of the tsunami waves which struck its northeastern coast with deadly force. Nor was it prepared for the nuclear accident which followed. This should be a warning sign to both developed and developing countries – and to humanitarian actors – that better planning is needed for the worst-case scenarios. In a very different context, the fact that highly-developed early warning systems were able to predict impending famine in Somalia but were not followed by effective action to prevent that famine, suggests the need for better early response mechanisms but even more pressing is the need to end the decades-long conflicts in Somalia.

The *Review* has also identified areas where further clarity is needed, particularly around the methodologies of defining populations which are affected by disasters and the methodologies used to estimate the economic costs of disasters, particularly the indirect costs and secondary impacts. These costs are likely to increase in the future as a consequence of population growth, rising urbanization, and continuing globalization.

We hope that this *Review* has added to our understanding of natural disasters in 2011 and beyond. But we are acutely conscious that much, much more work is needed.

ANNEX 1: PUBLICATIONS ON NATURAL DISASTERS AND CLIMATE CHANGE BY THE PROJECT ON INTERNAL DISPLACEMENT[445]



IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters

Human rights don't disappear the moment an earthquake, a hurricane, or a tsunami strikes. As witnessed after the Indian Ocean tsunami, the earthquake in Haiti and many other disaster situations, the protection of human rights grows in importance during relief and recovery efforts because it safeguards the dignity and wellbeing of all those affected. People are at their most vulnerable in times of crisis, so preventing discrimination and abuse of their rights is vital to effective disaster response operations.

To promote and facilitate a rights-based approach to disaster relief, the Inter-Agency Standing Committee (IASC) adopted *Operational Guidelines on Human Rights and Natural Disasters* in 2006. The Guidelines are a major contribution to the promotion of a rights-based approach in situations of natural disasters. Following the feedback from the field-testing of the guidelines, the IASC incorporated lessons learned from the field into a revised version of the *Guidelines*. This revised version also expands the rights-based approach to address preparedness measures. Small steps in preparedness can have a major impact once a disaster strikes.

The Brookings-LSE Project on Internal Displacement published the IASC *Operational Guidelines* in January 2011. The *Operational Guidelines* are available on the website of the Brookings-LSE Project on Internal Displacement in Bahasa Indonesia, Bengali, English, French, Hindi, Russian and Spanish.

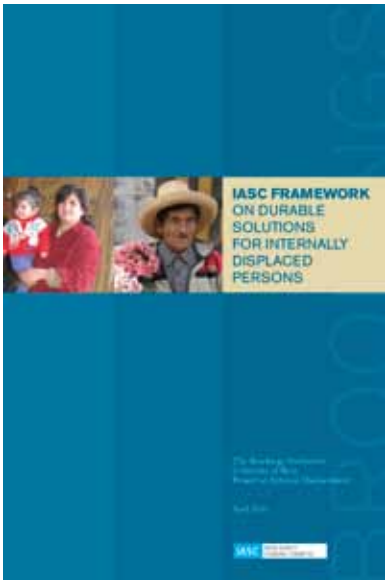
[445] All publications are available on our website: www.brookings.edu/idp

Promoting and Protecting Rights in Natural Disasters: Workshop Modules and Facilitator's Guide

For the past four years the Project on Internal Displacement has organized workshops on "Promoting and Protecting Rights in Natural Disasters" in all regions of the world with the participation of representatives from national and local governments, UN agencies, international and local NGOs, and Red Cross/Crescent representatives. These workshops have introduced the IASC Operational Guidelines on Human Rights and Natural Disasters and have provided a forum for discussion of good practices in promoting and upholding human rights in disaster risk reduction, emergency response and recovery.

The workshops have shown that there is both broad interest in strengthening protection in situations of natural disasters and a need for training about what it means to apply a rights-based approach. These training modules are intended to encourage others to organize similar training courses or sessions on human rights and natural disasters. The materials include a comprehensive agenda, facilitator's guide, session modules, PowerPoint presentations, and resource materials for a two-day workshop on "Promoting and Protecting Rights in Natural Disasters." The modules are based on the workshops we have previously held and have been reviewed by international protection specialists with a specific focus on introducing the IASC *Operational Guidelines on Human Rights and Natural Disasters*.

The content ranges from basic information about rights-based approaches and protection issues to more specific areas such as protection of specific at-risk groups and protection monitoring tools. The program can be used in its entirety or incorporated into larger workshop agendas. The modules can easily be adapted to local contexts and a wide variety of audiences.

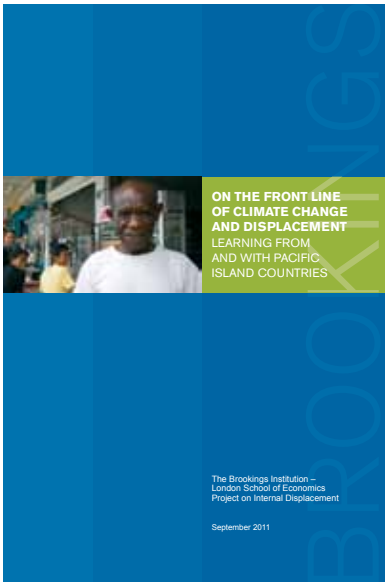


IASC Framework on Durable Solutions for Internally Displaced Persons

Displacement is a life-changing event. While the often traumatic experience of displacement cannot be undone, internally displaced persons (IDPs) need to be able to access durable solutions to their displacement in order to increase their safety and wellbeing. As articulated in Principle 28 of the *Guiding Principles on Internal Displacement*, IDPs have a right to, and often need assistance in their efforts to achieve, a durable solution. Guiding Principles 28-30 set out the rights of IDPs to durable solutions, the responsibilities of national authorities, and the role of humanitarian and development actors to assist durable solutions.

Principle 28 recognizes that the competent authorities have the primary duty and responsibility to establish conditions, as well as provide the means, which allow IDPs to return voluntarily, in safety and with dignity, to their homes or places of habitual residence, or to resettle voluntarily in another part of the country. Securing durable solutions for the internally displaced is also in the State's best interests. Leaving IDPs in continued marginalization without the prospect of a durable solution may become an obstacle to long-term peace stability, recovery, and reconstruction in post-crisis countries.

Facilitating durable solutions requires that all stakeholders – including national and local authorities as well as humanitarian and development actors – work together, identify the right strategies and activities to assist IDPs in this process, and set criteria that will help to determine to what extent a durable solution has been achieved. The *Framework on Durable Solutions for Internally Displaced Persons* aims to provide clarity on the concept of durable solutions and general guidance on how to achieve them. This version of the Framework builds on a pilot version released in 2007, which the Inter-Agency Standing Committee welcomed and recommended for field-testing. The Framework was revised and finalized in 2009, taking into account valuable feedback from the field.



On the Front Line of Climate Change and Displacement: Learning From and With Pacific Island Countries

The Pacific Island countries are internationally regarded as a barometer for the early impacts of climate change. Their geophysical characteristics, demographic patterns and location in the Pacific Ocean make them particularly vulnerable to the effects of global warming. Small Island Developing States, a UN-established category which includes most Pacific Island countries, are characterized by a high ratio of shoreline to land, low elevation, settlement patterns concentrated in coastal areas and a narrow economic basis—all of which put them at heightened risk of natural disasters, particularly rising sea levels. Perhaps more than in any other region, the populations and governments of Pacific Island countries are keenly aware that they face severe and multifaceted risks as a result of climate change. Their lives and livelihoods are linked to the Pacific Ocean; rising sea levels and other effects of global warming threaten not only their physical assets and coastal zones, but also their way of life and perhaps their national identities.

In the Pacific Islands, this acute awareness of the potential impact of climate change comes not only from books and studies, but from first-hand knowledge and ongoing ex-

periences with the effects of the world's changing climate. The value and relevance of these experiences are not confined to the Pacific Islands, but are relevant for the world at large. This paper aims to conceptualize and distill some dimensions of these experiences, in light of the discussions and presentations made at the "Regional Workshop on Internal Displacement caused by Natural Disasters and Climate Change in the Pacific" (May 2011) organized by the Brookings-LSE Project on Internal Displacement in conjunction with the UN Humanitarian team in the Pacific. The synthesis report on the workshop's proceedings contains additional information on the issues outlined and examined in this paper.

2011 Articles, Blogs, Books, Reports and Speeches on Natural Disasters and Climate Change Issues

January

IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters

A Research Trip to Haiti: Personal Reflections
Elizabeth Ferris

February

Climate Change and Internal Displacement: A Contribution to the Discussion
Elizabeth Ferris

March

Protecting Civilians in Disasters and Conflicts
Elizabeth Ferris

Beyond the Disaster: A Call for Japanese Leadership in International Disaster Response Law
Elizabeth Ferris, Kei Hakata

What a Difference a Government Makes: Japan's Earthquake
Elizabeth Ferris

April

The Politics of Protection: The Limits of Humanitarian Action
Elizabeth Ferris

A Year of Living Dangerously – A Review of Natural Disasters in 2010
Elizabeth Ferris, Daniel Petz

June

A Human Rights-Based Approach to Protection of Environmentally Displaced Person
Chaloka Beyani

A Human Rights-Based Approach to Building Resilience to Natural Disasters
Walter Kälin

Natural Disaster Response in Japan and Fiji
Elizabeth Ferris

Internal Displacement caused by Natural Disasters and Climate Change in the Pacific
Workshop Report

July

Protecting and Promoting Rights in Natural Disasters in the Great Lakes Region and East Africa
Workshop Report

Famine in Somalia Once Again
Elizabeth Ferris

September

On the Front Line of Climate Change and Displacement: Learning From and With Pacific Island Countries
Elizabeth Ferris, Michael Cernea, Daniel Petz

November

Planned Relocations, Disasters and Climate Change
Elizabeth Ferris

2011 Events and Workshops on Natural Disasters and Climate Change Issues

January

Haiti: One Year After the Earthquake
Brookings Institution, Washington DC

March

Devastation in Japan: The Aftermath and Implications of the World's Fifth Largest Earthquake
Brookings Institution, Washington DC

Climate Change and Displacement
Brookings Institution, Washington DC

May

Regional Workshop on Internal Displacement Caused by Natural Disasters and Climate Change in the Pacific
Suva, Fiji

June

Responding to Natural Disasters
Brookings Institution, Washington DC

Regional Workshop on Protecting and Promoting Rights in Natural Disasters in the Great Lakes Region and East Africa
Kampala, Uganda

August

Famine in Somalia: An Expected Turn for the Worse
Brookings Institution, Washington DC

October

Rebuilding a City: The Dos and Don'ts in Post-Disaster Urban Recovery
Brookings Institution, Washington DC

Conversations about Climate Change Adaption: Displacement, Migration and Planned Relocation
Brookings Institution, Washington DC

Roundtable on Climate Change Adaptation and Human Mobility
Brookings Institution, Washington DC

Transcripts and audio versions of the events hosted at the Brookings Institution are available on our website: http://www.brookings.edu/idp

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