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

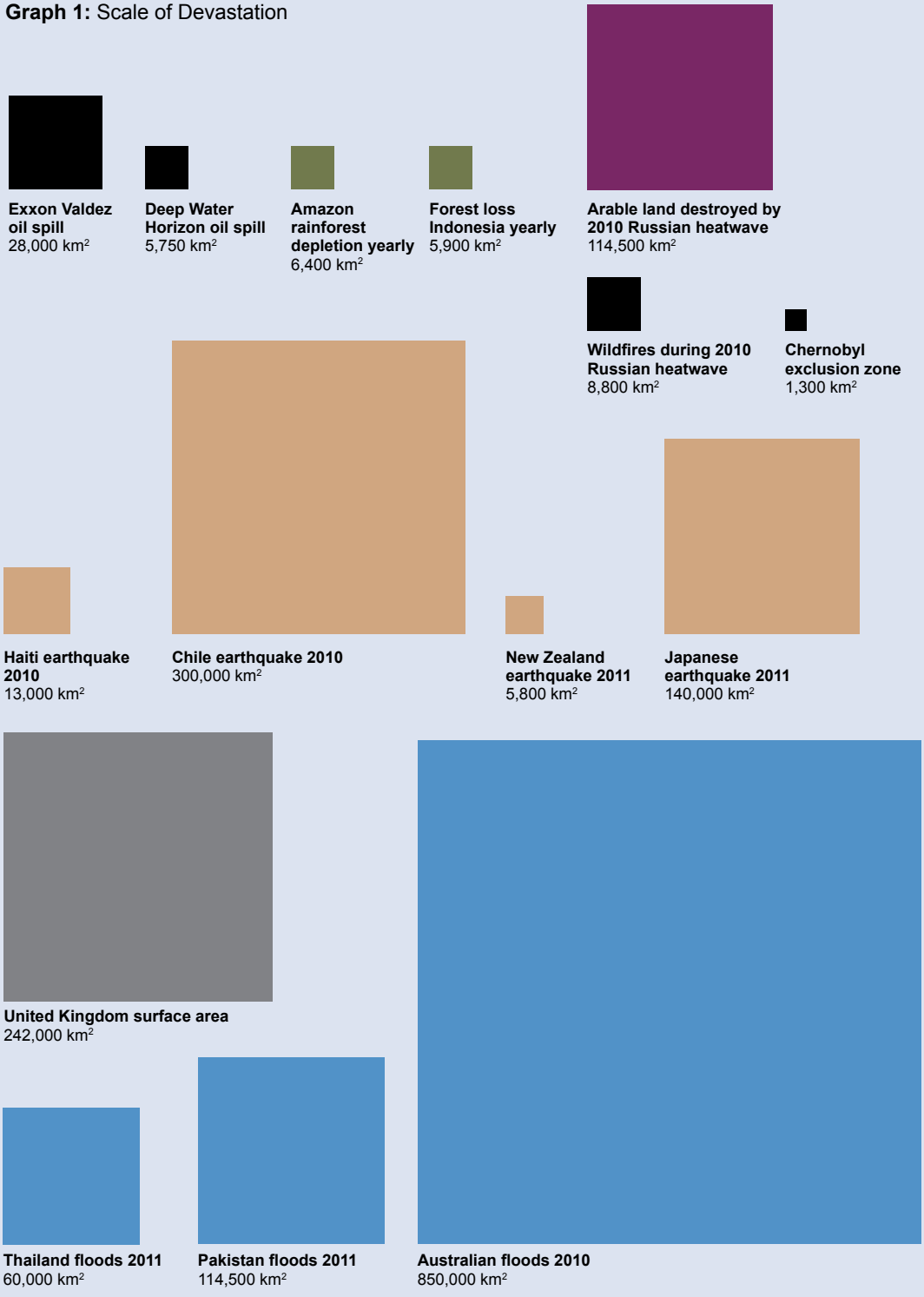
[3] EM-DAT: The OFDA/CRED International Disaster Database, Université catholique de Louvain, Brussels, Belgium, accessed 17 January 2011, www.emdat.be

[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