WHO collaborating Centre for Research on the Epidemiology of Disasters - CRED

UCL Université catholique de Louvain

Annual Disaster Statistical Review 2012

The numbers and trends

Debarati Guha-Sapir, Philippe Hoyois and Regina Below

Annual Disaster Statistical Review 2012

The numbers and trends

Debarati Guha-Sapir
Philippe Hoyois
and
Regina Below

Centre for Research on the Epidemiology of Disasters (CRED)
Institute of Health and Society (IRSS)
Université catholique de Louvain – Brussels, Belgium

Acknowledgements

The data upon which this report is based are maintained through the long-term support of the US Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA).

We are grateful to Laurence McLean for proofreading and Pandora Kodrou for designing graphs and maps.

This document is available on http://www.cred.be/sites/default/files/ADSR_2012.pdf

Printed by:

Ciaco Imprimerie, Louvain-la-Neuve (Belgium)
This publication is printed in an environmentally - friendly manner.
August 2013

About CRED

The Centre for Research on the Epidemiology of Disasters (CRED) has been active for more than 35 years in the fields of international disaster and conflict health studies, with research and training activities linking relief, rehabilitation and development. It was established in Brussels in 1973 at the School of Public Health of the Catholic University of Louvain (UCL) as a non-profit institution with international status under Belgian law. In 1980, CRED became a World Health Organization (WHO) collaborating centre as part of WHO's Global Program for Emergency Preparedness and Response. Since then, CRED has increased its international network substantially and collaborates closely with numerous UN agencies, inter-governmental and governmental institutions, non–governmental organizations, research institutes and universities.

Objective

The Centre promotes research and provides an evidence base to the international community on the burden of disease and related health issues due to disasters and conflicts, in order to improve preparedness and responses to these humanitarian emergencies. CRED trains field managers, students, relief personnel and health professionals in the management of short and long-term humanitarian emergencies.

CRED's focus

CRED's research focuses on all humanitarian and emergency situations with a major impact on human health. These include all types of natural and human-made disasters, such as earthquakes, floods and storms; longer-term disasters such as famines and droughts; and situations creating mass displacement of people such as civil strife and conflicts.

The Centre focuses on health aspects and the burden of disease arising from disasters and complex emergencies. CRED also promotes research on broader aspects of humanitarian crises, such as human rights and humanitarian law, socio-economic and environmental issues, early warning systems, the special needs of women and children, and mental health care.

The Centre is actively involved in stimulating debate on the effectiveness of various humanitarian interventions. It encourages scientific and policy discussions on existing and potential interventions and their impacts on acute and chronic malnutrition, human survival, morbidity, infectious diseases and mental health.

The CRED team works in four main areas:

- Natural disasters and their impacts
- Civil strife and conflict epidemiology
- Database and information support
- Capacity building and training

The CRED team

The Centre is composed of a multinational and multidisciplinary team that includes experts in medicine and public health, informatics and database management, psychology, nutritional sciences, sociology, economics and geography. The working languages are English and French.

Table of Contents

List of Figures, Maps and Tables

Figures

Maps

Tables

Executive Summary

In 2012, 357 natural triggered disasters[1] were registered. This was both less than the average annual disaster frequency observed from 2002 to 2011 (394), and represented a decrease in associated human impacts of disasters in 2012, which were at their lowest level compared to previous years. However, natural disasters still killed a significant number, a total of 9,655 people were killed (annual average 2002-2011:107,000) and 124.5 million people become victims worldwide (annual average 2002-2011:268 million) (see Figure 1). Contrary to other indicators, economic damages from natural disasters did show an increase to above average levels (143 billion 2012 US $), with estimates placing the figure at US$ 157 billion.

Over the last decade, China, the United States, the Philippines, India and Indonesia constitute together the top 5 countries that are most frequently hit by natural disasters. In 2012, China experienced its fourth highest number of natural disasters of the last decade. The country was affected by a variety of disasters types, including 13 floods and landslides, 8 storms, 7 earthquakes and one period of extreme temperature.

Amongst the top 10 countries in terms of disaster mortality in 2012, six countries are classified as low-income or lower-middle income economies and four as high-income or upper-middle income economies (see World Bank income classification)[2]. These countries[3] accounted for 68.2% of global reported disaster mortality in 2012. The single deadliest disaster was typhoon Bopha which killed 1,901 people in Philippines.

Hurricane Sandy, in the United States, was the most expensive natural disaster in 2012 with estimated economic damages of US$ 50.0 billion. The drought which affected the Mid-West and South-Western regions of the United States during the second half of the year (US$ 20.0 billion), the May 20th and 29th earthquakes in Italy (US$ 15.8 billion), a flood in the Beijing region in China, in July (US$ 8.0 billion) and tornadoes in March in the United States (US$ 5.0 billion) also added significantly to the total disaster damages of 2012.

Most disaster victims in 2012 were sourced the flood that affected China in June, causing 17.4 million victims. Furthermore, China was affected by another flood in April (13.1 million victims) and by two storms in August (9.8 million victims), further contributing to a total of 44.6 million victims, a figure representing 34.7% of global reported disaster victims. Droughts and consecutive famines made many victims in Kenya (3.8 million), Mali (3.5 million), Sudan (3.2 million), Northern Korea (3 million), Niger (3 million) and Burkina Faso (2.9 million). When considering the population size of the country, more than 20% of populations of Lesotho, Gambia, Mali and Niger were made victim of natural disasters in 2012, mostly as a result of drought.

The data 2012 juxtaposed with the figures from the previous decade indicate that the number of victims (124.5 million) has decreased in relation to its annual average for the decade 2001 to 2010, which equated to 268 million. This decrease is explained by the lower human impact from all types of disasters. In 2012, the disaster with the greatest impact was a flood which affected 17 million people in China in June. This contrast with the previous decade, characterized by, irrespective of

[1] Biological disasters are not included in this publication.
[2] *http://data.worldbank.org/about/country-classifications/country-and-lending-groups*. Accessed on 8 July 2013.
[3] High-income: Japan, United States; Upper-middle income: China, Russia; Lower-middle income : India, Indonesia, Philippines; Low income : Afghanistan, Bangladesh, Haiti.

disaster type, at least two major disaster events per year which affected a greater number of people.

In 2012, 53% of victims were from floods, 27 % from droughts and 16 % from storms. The country the most affected was China with 36% of victims, worldwide.

In 2012, the number of people killed by disasters (9,655) was the lowest of the last decade and very far from the 2002-2011 annual average of 107,000 deaths. This is mainly explained by a lower number of deaths from all type of disasters. The number of people killed by earthquakes, floods and wildfire are the lowest of the decade. The number of people killed by earthquakes (711) is particularly low compared to a 2002-2011 average of 67,974. However, hydrological disasters took the largest share of natural disaster fatalities in 2012, causing 3,574 deaths, and representing 39% of global disaster mortality. But 2012 this followed a lower amount than the average, where hydrological disasters killed 5,757 people per year from 2002 to 2011.

The estimated economic losses from natural disasters in 2012 (US$ 157 billion) surpassed of almost 10% the annual average damages from 2001 to 2010 (US$ 143 billion). Hurricane Sandy (US$ 50 billion) was the second costliest storm of the decade, but far behind Hurricane Katrina (2012 US$ 147 billion). Damages from the drought in the South-Western and Mid-West regions of the United States (US$ 20 billion) were the highest reported for the decade. These two disasters accounted for 45% of the total amount of reported damages.

In 2012, geophysical reported damages (US$ 18.6 billion) were low compared to their 2002-2011 average of US$ 47 billion and the two earthquakes in the region of Ferrare, in Italia, (US$ 15.8 billion) account for 85 % of these damages.

The lower number of reported natural disasters in 2012 (357), when compared to the annual average occurrence from 2002 to 2011 (394), was mostly due to a smaller number of hydrological and meteorological disasters, below their 2002-2011 annual average. Hydrological disasters still took by far the largest share in natural disaster occurrence in 2012 (38.5%), followed by meteorological disasters (25.3%), geophysical disasters (8.4%) and climatological disasters (7.3%).

Looking at the geographical distribution of disasters, Asia was the continent most often hit by natural disasters in 2012 (40.7%), followed by the Americas (22.2%), Europe (18.3%), Africa (15.7%), and Oceania (3.1%). This regional distribution of disaster occurrence resembles the profile observed from 2002 to 2011. In 2012, disaster occurrence in Europe was more than three times the one for 2011 and surpassed its 2002-2011 annual average. Inversely, in Africa, the Americas, Asia and Oceania, disaster occurrences were below the decade annual average.

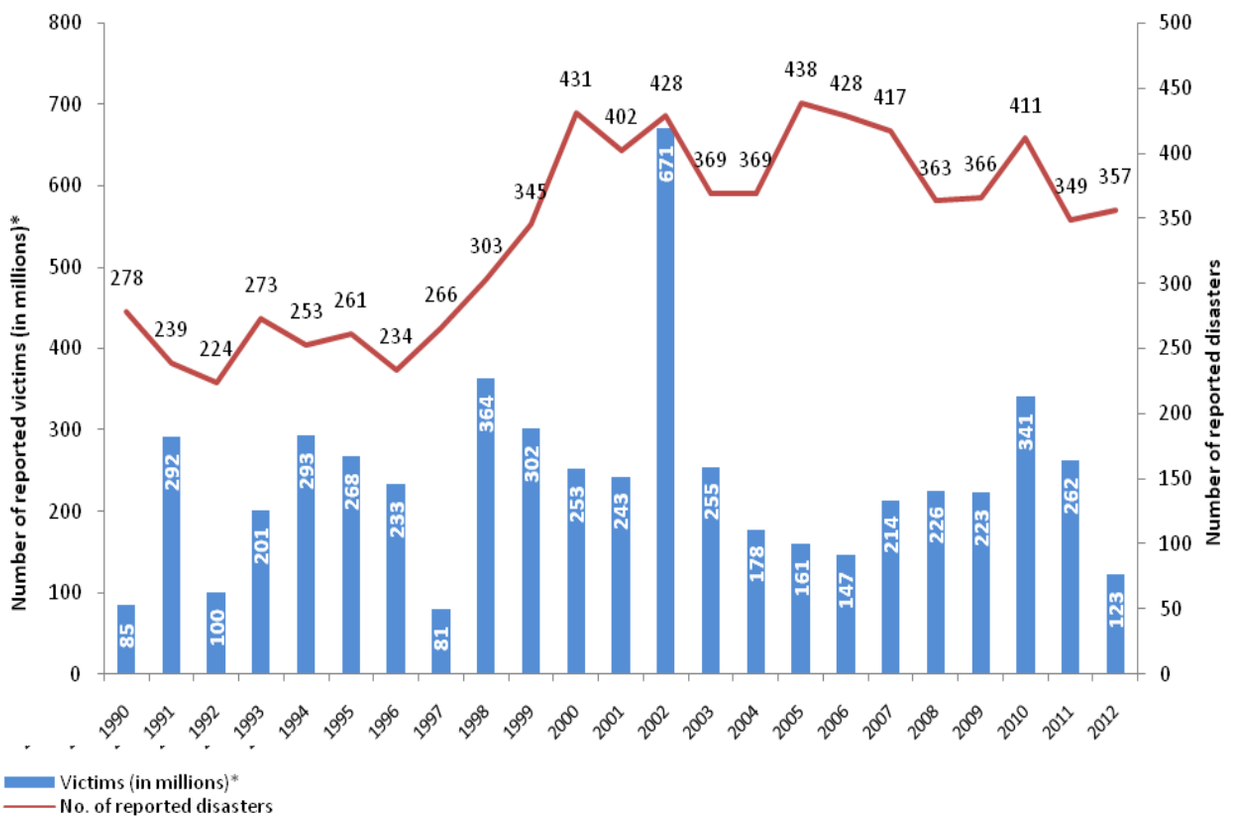
Asia accounted in 2012 for 64.5% of global disaster victims, followed by Africa (30.4%). Compared to their 2002-2011 annual averages, the number of victims in 2012 increased in Africa and Oceania, but decreased in the Americas, Asia and Europe. On a more detailed note, climatological, hydrological and meteorological disasters caused more victims in 2012 in Africa. Climatological and geophysical disasters made also more victims in the Americas and hydrological disasters in Oceania. In Africa, it was floods and droughts which most increased the number of victims.

In 2012, the Americas suffered the most damages (65.7% of global disaster damages), followed by Asia (17.8%) and Europe (15.4%). For both Africa and Oceania, a share of around 0.6% of global disaster damages was reported. This distribution of disaster damages between continents differs from the distribution seen over the last decade when Asia experienced the most damages, followed

by the Americas and Europe. Damages in the Americas increased the most in 2012 compared to the 2002-2011 annual average, but damages in Europe were also higher. In contrast, damages in Asia decreased. More precisely, meteorological and climatological disasters contributed most to the increased damages in the Americas, mainly due to the hurricane Sandy and the drought in the U.S. In Europe, the increase in damages is largely attributable to the two earthquakes in Italy.

EM-DAT's global approach to the compilation of disaster data continuously provides us with valuable information and trends on the occurrence of natural disasters and their impacts on society. However, the development of guidelines and tools for the creation of national and sub-national disaster databases for the compilation of reliable, standardised, interoperable disaster occurrence and impact data should be prioritised for more effective disaster risk reduction.

Figure 1 – Trends in occurrence and victims*



**Victims:Sum of deaths and total affected*

Chapter 1

About EM-DAT: The International Disaster Database

- What is EM-DAT?
- Database definitions, criteria and content
- Methodology
- Disaster classification

1. About EM-DAT: the International Disaster Database

1.1 What is EM-DAT?

Since 1988, with the sponsorship of the United States Agency for International Development's Office of Foreign Disaster Assistance (USAID/OFDA), CRED has maintained EM-DAT, a worldwide database on disasters. It contains essential core data on the occurrence and impacts of more than 20 400 disasters in the world dating from 1900 to the present. The data are compiled from various sources, including UN agencies, non-governmental organizations, insurance companies, research institutes and press agencies. Priority is given to data from UN agencies, followed by OFDA, governments and the International Federation of Red Cross and Red Crescent Societies. This prioritization is not only a reflection of the quality or value of the data, but it also reflects the fact that most reporting sources do not cover all disasters or have political limitations that can affect the figures. The entries are constantly reviewed for redundancy, inconsistencies and incompleteness. The database's main objectives are to assist humanitarian action at both national and international levels; to rationalize decision-making for disaster preparedness; and to provide an objective basis for vulnerability assessment and priority setting.

1.2 Database definitions, criteria and content

CRED defines a disaster as "a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering". EM-DAT distinguishes two generic categories for disasters, natural and technological. Technological disasters are not included in this publication. Table 1 shows the definitions of natural disaster subgroups and their main types. More disaster definitions can be found in Annex 1. For a disaster to be entered into the database, at least one of the following criteria must be fulfilled:

- 10 or more people reported killed;
- 100 or more people reported affected;
- declaration of a state of emergency;
- call for international assistance.

Table 1 – Natural disaster subgroup definition and classification

Disaster Subgroup	Definition	Disaster Main Types
Geophysical	Events originating from solid earth	Earthquake, Volcano, Mass Movement (dry)
Meteorological	Events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days)	Storm
Hydrological	Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up	Flood, Mass Movement (wet)
Climatological	Events caused by long-lived/meso to macro scale processes (in the spectrum from intra-seasonal to multi-decadal climate variability)	Extreme Temperature, Drought, Wildfire
Biological[4]	Disaster caused by the exposure of living organisms to germs and toxic substances	Epidemic, Insect Infestation, Animal Stampede

[4]Biological disasters are not included in this publication.

EM-DAT includes the following fields:

DISNO:	Unique disaster number for each disaster event (8 digits: 4 digits for the year and 4 digits for the disaster number – for example, 19950324).
Country:	Country (ies) in which the disaster occurred.
Disaster generic group:	Two groups are distinguished in EM-DAT – natural and technological disasters.
Disaster sub-group:	Five sub-groups of natural disasters have been defined: geophysical, meteorological, hydrological, climatological and biological.
Disaster main type and sub-type:	Description of the disaster according to a pre-defined classification (for example, type: flood; sub-type: flash flood).
Date (start and end):	Date when the disaster occurred and ended (month/day/year).
Killed:	Number of people confirmed dead and number missing and presumed dead.
Injured:	Number of people suffering from physical injuries, trauma or an illness requiring immediate medical treatment as a direct result of a disaster.
Homeless:	Number of people needing immediate assistance for shelter.
Affected:	Number of people requiring immediate assistance during a period of emergency; this may include displaced or evacuated people.
Total affected:	Sum of injured, homeless and affected.
Victims:	Sum of killed and total affected.
Estimated damage:	Global figure of the economic impact of a disaster; it is given in US dollars.
Additional fields:	Other geographical information (such as latitude and longitude, location), value and scale of the events (such as the Richter scale value for an earthquake), the international status (OFDA response, request for international assistance, disaster/emergency declaration), the aid contribution (in US dollars), and the different sectors affected.

1.3 Methodology

In EM-DAT and in this report, data are considered at the country level. This is for two reasons: first, it is at this level that they are usually reported; and second, it allows the aggregation and disaggregation of data. Annex 2 shows the list of countries per continent. In order to facilitate the comparison over time for the analyses of this report, the event start date has been used as the disaster reference date.

In EM-DAT, the number of people killed includes those confirmed dead and those missing and presumed dead. People affected are those requiring immediate assistance during a period of emergency (e.g. requiring basic survival assistance such as food, water, shelter, sanitation and immediate medical help). People reported injured or homeless are aggregated with those affected to produce the total number of people affected. In this report, the number of victims is used as a measure of the human impact of a disaster. The number of victims is equal to the sum of persons reported killed and the total number of persons reported affected.

The economic impact of a disaster usually consists of direct consequences on the local economy (e.g. damage to infrastructure, crops, housing) and indirect consequences (e.g. loss of revenues, unemployment, market destabilization). In EM-DAT, the registered figure corresponds to the estimated value of the direct damage occasioned by the event, expressed in US dollars and, in this report, converted into 2012 dollar values. Estimates of disaster damages must be treated with caution, because of (a) the financial value of infrastructures which is much higher in high-income countries than in middle- and low-income countries; and (b) the low reporting rates of direct losses which is however better for large disasters.

Droughts or food insecurities are often multi-years disaster; therefore, their impact over time has to be taken into account. Bearing in mind that data on deaths and economic damage from drought are infrequently reported, CRED has adopted the following rules as regards data for multi-year droughts: (a) the total number of deaths reported for a drought is divided by the number of years for which the drought persists. The resulting number is registered for each year of the drought duration; (b) the same calculation is done for the reported economic damages; and (c) for the total number of people reported to be affected, CRED considers that the same number is affected each year that the disaster persists.

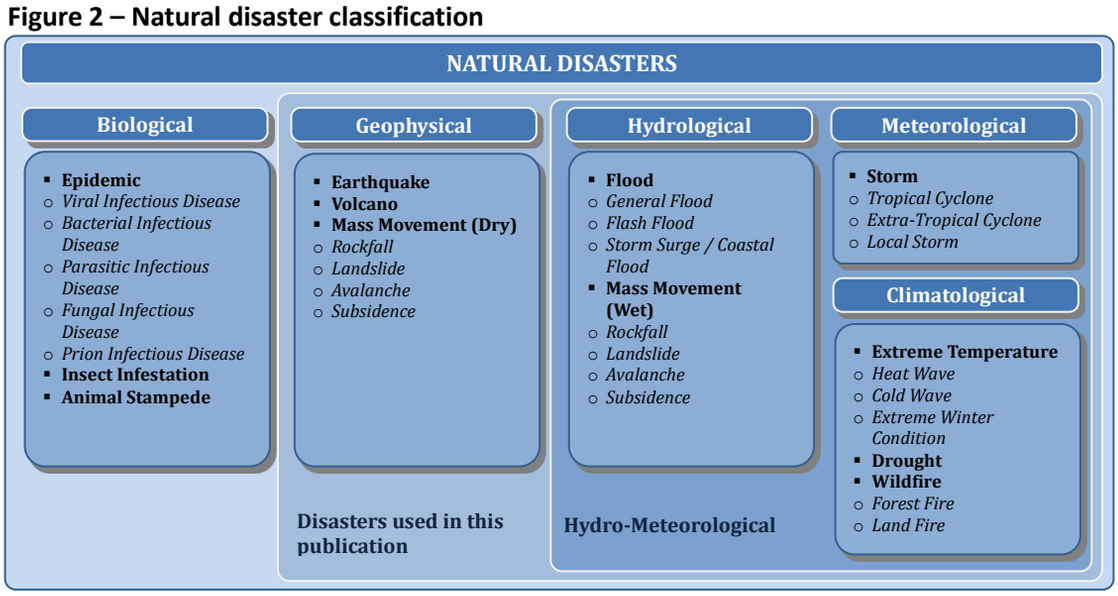
In the computation of annual averages, the fact that some disasters begin at the end of a year and may last some weeks or months into the following year as to be taken into account. In such case, CRED has adopted the following rules: (a) regarding the number of people reported affected, the total number is recorded for both the start year and the end year; (b) for the numbers of people reported to be killed by sudden onset disasters (earthquakes, flash floods, landslides, etc..) all those killed are registered according to “start year” of the disaster; (c) for the numbers of people reported to be killed by slow-onset disasters, the total of all those killed is divided by two and a half is attributed to each year of persistence; (d) reported economic damages are always attributed to the end year of the disaster. This is because damage is related to both the strength of a disaster and its duration.

The CRED/EM-DAT team continuously strives to improve its data reporting methodologies and the EM-DAT database as a whole.

1.4 Disaster classification

EM-DAT distinguishes two generic categories for disasters (natural and technological), the natural disaster category is divided into 5 sub-groups, which in turn cover 12 disaster types and more than 30 sub-types (Figure 2). See "*http://www.emdat.be/classification*" for the complete classification and definitions.

Figure 2 – Natural disaster classification



Chapter 2

What did 2012 bring?

2. What did 2012 bring?

In the year 2012, natural disasters[5] once again had a devastating impact on human society. Worldwide, 357 reported natural disasters caused the death of more than 9,655 people, made 122.9 million victims and caused a record amount of US$ 157.3 billion of damages. A total of 120 countries were hit by these disasters. The five countries that were most often hit, China, the United States, the Philippines, Indonesia and Afghanistan accounted for 38.1% of total disaster occurrence in 2012 (see Figure 3). Year after year, these countries appear prominently in the list of countries experiencing the highest number of disaster events.

The main burden of disaster impacts was carried by a small number of countries in 2012. The countries that made up the top 10 ranking in terms of disaster mortality in 2012 represented 68.2% of global disaster mortality. Also, the top 10 countries for the number of victims and damages accounted for 76.2% and 95.0% respectively of the global reported number of victims and damages from natural disasters in 2012 (see Figures 4, 5 and 6).

Looking at the top 10 countries in terms of disaster mortality, five countries are classified as high-income or upper-middle income economies according to the World Bank income classification[6]. These countries[7] accounted for 45.7% of worldwide reported disaster mortality, for the most part due to the typhoon Bopha in the Philippines on December 4th, 2012. This disaster caused nearly 1,901 deaths, signifying 19.7% of global disaster mortality in 2012.

Six out of the top 10 countries in terms of people killed by natural disasters are located in Asia, and accounted for 53.4% of global reported disaster mortality, while the other four countries are located in Europe, Africa, Southern and Northern America. However, when looking at disaster mortality relative to the number of inhabitants in the country, it is the Pacific region that appears prominently in the top 10 ranking. Samoa, the Philippines, Fiji Islands and Papua New Guinea counted respectively 6.4, 2.5, 2.0, and 0.9 deaths per 100 000 inhabitants due to meteorological and hydrological disasters. Eight out of these top 10 countries are classified as lower-middle income or low-income economies according to the World Bank income classification.

Both five Asian and African countries share the top 10 list in terms of disaster victims. But, in absolute number, the five Asian countries account for 58.7% of victims compared to 17.4% for the five African countries. China alone, with 44.6 million reported victims in 2012, accounted for 36.3% of global disaster victims and the Philippines, with 12.5 million victims, for 10.2%. In terms of victims as a proportion of total population size, with seven countries in the top 10, Africa dominate, mainly due to major droughts and the consecutive famine that affected parts of the continent. Victims of drought accounted for 32.7% of the total population in Lesotho, for more than one fifth of the population in the Gambia and Mali and for more than 15% in Mauritania, Niger and Burkina Faso.

With reported damages from natural disasters of US$ 157.3 billion, the year 2012 was the fifth most expensive since 2002. Three countries, the United States, China and Italy accounted for 86.1% of all reported damages. The United States (US$ 98.5 billion) accounted for 49.3% of worldwide

[5] Biological disasters are not included in this publication.
[6] *http://data.worldbank.org/about/country-classifications/country-and-lending-groups*. Accessed on 8 July 2013.
[7] High-income: Japan, United States; Upper-middle income: China, Russia; Lower-middle income : India, Indonesia, Philippines; Low income : Afghanistan, Bangladesh, Haiti.
.

disaster costs. The hurricane Sandy which affected the US North-East coast and the drought in the South- and Mid-Western regions made damages estimated at US$ 50 billion and 20 billion respectively. Storms accounted for 77% of US damages. Three-quarter of reported disaster costs in China (US$ 19.8 billion) were attributable to floods and 16.2% to storms. With reported damages of US$ 15.8 billion, the Ferrare region earthquakes in Italy was the third most expensive of the year and accounted for 92.2% of all disaster cost in this country.

A different picture is drawn when comparing economic damages from natural disasters to the countries' Gross Domestic Product (GDP)[8]. Damages in Samoa, a low-middle income country, represented 19.5% of the country's GDP, whereas damages from natural disasters in Haiti – a low income country – Fiji Islands and Pakistan - both low-middle income countries, - represented respectively 3.2%, 2.4% and 1.1% of the countries' GDPs. Inversely, disasters in the United States and Italy, two high income countries, represented, respectively, 0.6% and 0.9% of their GDP.

When considering the country top ten for the numbers of disasters, with 5 disasters in 2012, Bangladesh had its best year since 2002.

In countries featuring in the top ten for numbers of people killed, Nigeria had its most deadly year (378 deaths) since 2002, with 363 people killed by a flood in July. In contrast, with only 599 deaths from natural disasters, 2012 was the safest year for India since 2002.

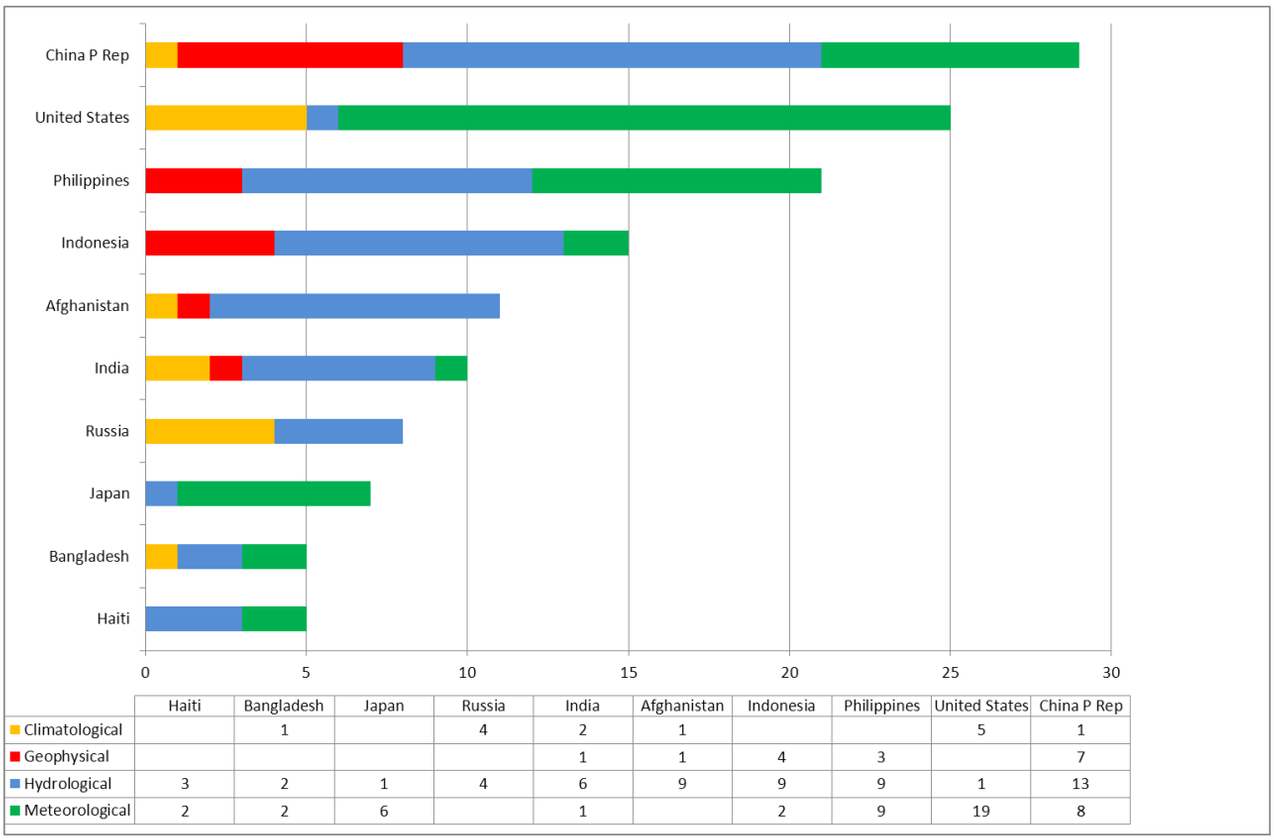
Among countries figuring in the 2012 top ten for the number of victims, the flood in Nigeria made the highest number of victims (7 million) for this country since 2002. Inversely, China (44.6 million victims) and India (4.3 million) knew their lowest numbers of natural disaster victims of the decade.

Since 2002, within top ten countries for amounts of damages were, in 2012, the highest in Italia (US$ 15.8 billion from Ferrare region earthquakes), the Philippines (US$ 1.7 billion caused by typhoon Bopha), Ukraine and Brazil (droughts with, respectively, US$ 1.7 and 1.5 billion damages).

In 2012, the 10 most important disasters in terms of mortality, victims and damages accounted for 43.3%, 58.6% and 73.6 % of total disaster figures, respectively (see Tables 2, 3 and 4). This clearly shows the impact that a few singular disaster events can have on human society, both in high-income and low-income countries.

[8] GDP data from the World Bank. *http://databank.worldbank.org/ddp/home.do*. Accessed on June 4, 2013.

Figure 3 – Top 10 countries by number of reported events in 2012



	Haiti	Bangladesh	Japan	Russia	India	Afghanistan	Indonesia	Philippines	United States	China P Rep
Climatological		1		4	2	1			5	1
Geophysical					1	1	4	3		7
Hydrological	3	2	1	4	6	9	9	9	1	13
Meteorological	2	2	6		1		2	9	19	8

Figure 4 – Top 10 countries in terms of disaster mortality in 2012 and distributed by disaster type

Country	Disaster distribution	No. of deaths	Country	Disaster distribution	Deaths per 100 000
Philippines		2 385	**Samoa**		6.42
China P Rep		802	**Philippines**		2.48
Pakistan		671	**Fiji**		2.01
India		599	**Haiti**		1.27
Russia		415	**Afghanistan**		1.13
Afghanistan		378	**Peru**		1.07
Nigeria		378	**Lithuania**		0.94
Peru		321	**Papua New Guinea**		0.92
Iran Islam Rep		319	**Korea Dem P Rep**		0.60
United States		318	**Niger**		0.56

Figure 5 – Top 10 countries by victims in 2012 and distributed by disaster type

Country	Disaster distribution	No. victims (millions)	Country	Disaster distribution	Victims/ pop. (%)
China P Rep		44.6	Lesotho		32.7
Philippines		12.5	Gambia The		23.5
Nigeria		7.0	Paraguay		22.4
Bangladesh		5.7	Mali		21.9
Pakistan		5.1	Niger		21.7
India		4.3	Mauritania		19.3
Kenya		4.0	Chad		18.7
Niger		3.5	Burkina Faso		16.4
Mali		3.5	Philippines		13.0
Sudan		3.3	Korea Dem P Rep		12.8

Figure 6 – Top 10 countries by damages in 2012 and distributed by disaster type

Country	Disaster distribution	Damages (US$ bn.)	Country	Disaster distribution	% of GDP
United States		98.5	Samoa		19.5
China P Rep		19.8	Haiti		3.2
Italy		17.1	Fiji		2.4
United Kingdom		2.9	Pakistan		1.1
Pakistan		2.5	Madagascar		1.0
Philippines		1.8	Ukraine		1.0
Russia		1.8	Italy		0.9
Japan		1.7	Comoros		0.8
Ukraine		1.7	Philippines		0.7
Brazil		1.6	United States		0.6

Climatological Geophysical Hydrological Meteorological

Table 2 – Top 10 natural disasters by number of deaths

Event	Country	No. of deaths
Tropical cyclone (Bopha), December	Philippines	1 901
Flood, August-October	Pakistan	480
Flood, July-October	Nigeria	363
Earthquake, August	Iran Islam Rep	306
Cold wave, June	Peru	252
Cold wave, December	India	249
Flood, July	Russia	172
Cold wave, December	Russia	170
Flood, July	China P Rep	151
Avalanche, April	Pakistan	135
	Total	**4 179**

Table 3 – Top 10 natural disasters by number of victims

Event	Country	Victims (in millions)
Flood, June	China P Rep	17.4
Flood, April	China P Rep	13.1
Flood, July-October	Nigeria	7.00
Tropical cyclone (Bopha), December	Philippines	6.2
Tropical cyclone (Haikui), August	China P Rep	6.0
Flood, June	Bangladesh	5.1
Flood, August-October	Pakistan	5.0
Flood, August	Philippines	4.5
Tropical cyclone (Damrey), August	China P Rep	3.8
Drought	Kenya	3.8
	Total	**72.00**

Table 4 – Top 10 natural disasters by economic damages

Event	Country	Damages (in 2012 US$ bn.)
Tropical cyclone (Sandy), October	United States	50.0
Drought, June	United States	20.0
Earthquakes, May[9]	Italy	15.8
Flood, July	China P Rep	8.0
Tornado, March	United States	5.0
Severe storm, April	United States	4.5
Severe storm, June	United States	4.0
Thunderstorm, May	United States	3.4
Flood, April	China P Rep	2.5
Flood, August	Pakistan	2.5
	Total	**115.7**

[9] Include both earthquakes of 20th and 29th of May

Chapter 3

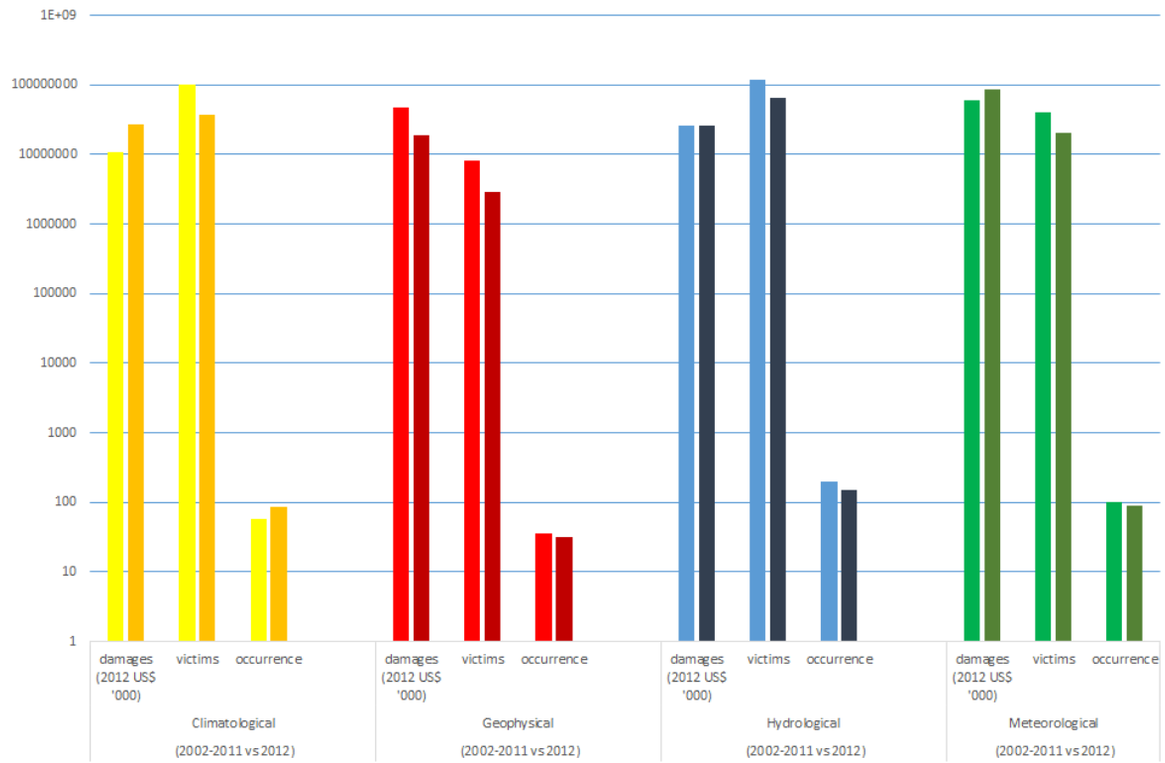
How different was 2012?

3. How different was 2012?

The number of reported natural disasters in 2012 (357) showed an increase of 2.3% compared to 2011's number (349). Being the second lowest for the last decade, it remained 9.3% below the annual average disaster occurrence for 2002-2011 (394), confirming the stabilization of the growth in the number of reported disasters observed in previous decade and a possible slow decrease. Less people were killed by disasters in 2012 (9,655) compared to 2011 (31,331) and to the 2002-2011 annual average (106 816). This number of people reported killed is also the lowest since 2009, when 10,885 people were reported killed and is far below the peaks of 2010 (297,598), the year of Haiti's earthquake, 2004 (241,698) year of the Indian Ocean tsunami and 2008 (235,293) when cyclone Nargis hit Myanmar. The number of reported victims in 2012 (124.5 million) was the lowest since 2006, when 147.4 million victims were registered, and 53.5% below the decade's annual average of 267.9 million victims. The estimated economic losses from natural disasters in 2012 (US$ 157.3 billion) were 9.7% above the damages annual average for years 2002-2011. Damages in 2012 were the fifth highest since 2002, but far below 2011 (2012 US$ 356.6 billion), year of the tsunami in Japan and the large flood in Thailand and 2005 (2012 US$ 253.4 billion), year of the hurricane Katrina.

Compared to 2011, the higher number of reported natural disasters in 2012 was mainly due to a greater number of climatological disasters and extreme winter conditions and cold waves in Eastern, Southern and Western countries in Europe and some countries in Central and Southern Asia. The lower number of victims in 2012, compared to 2011, is observed for all disasters types except for tropical cyclones whose number of victims knew an increase of almost 20%. The drop in the reported number of people killed by natural disasters in 2012, compared to the 2011 is mostly explained by a lower number of deaths from geophysical, hydrological and meteorological disasters. The increase in damages in 2012 is mostly attributable to tropical storms and droughts. Three disasters, the hurricane Sandy in the United States (US$ 50 billion), the drought in South-Western and Mid-Western regions of the United States (US$ 20 billion) and the two earthquakes in Ferrare region in Italy (US$ 15.8 billion) accounted for 54% of all damages. Disaster trends are greatly influenced by single, high-impacts events.

Figure 7 – Natural disaster impacts by disaster sub-group: 2012 versus 2002-2011 annual average



Hydrological disasters (floods and wet mass movements) still took the largest share in natural disaster occurrence in 2012 (49.4%). Hydrological disasters caused 64.7 million victims, or 51.9% of total disaster victims, and were responsible for 42.2% of the total reported number of people killed and 16.3% of total damages. The number of hydrological disasters (150) decreased compared to 2011 (177) and was also below the 2001-2010 annual average (197). The number of victims from hydrological disasters decreased by 45.1% compared to the decade annual average. Damages (US$ 25.6 billion) were close to their decade's annual average (2012 US$ 26.4 billion). The most expensive flood (US$ 8 billion) occurred in the Beijin region in China but the amount was far below the estimated US$ 40.0 billion of damages for the major flood which hit Thailand in 2011 and was the most expensive hydrological disaster ever registered.

Meteorological disasters (storms) represented 25.2% of the total disaster occurrence in 2012. Ninety meteorological disasters were reported, less than the 2002-2011 annual average of 102. This evolution reflected in a sharp decrease in the human impacts from these disasters, compared to the annual averages from 2002 to 2011, as the numbers of victims decreased by 49.1%. Damages were 46.1% above their decade's annual average, linked with the severe costs from hurricane Sandy. In 2012 Meteorological disasters accounted for 31.8% of total reported fatalities, 16.2% of total victims, and 54.9% of total damages from natural disasters.

Climatological disasters (extreme temperatures, droughts and wildfires) took in 2012 a 23.8% share of total disaster occurrence, far above the share of 14.9% per year on average for 2002-2011. Out of the 85 climatological disasters, 51 were extreme temperatures, mostly cold waves; 28 droughts and 6 wildfires. Climatological disasters took the second-largest share of total disaster victims in 2012 (36.6 million or 29.4% of total disaster victims), as was also the case for the period 2002-2011. However, compared to their decade's annual average, the number of victims from climatological disasters decreased by 64.2%. In 2012, the reported damages from climatological disasters (US$ 26.6 billion) increased by 148.4% compared to the 2002-2011 annual average damages from these

disasters (2012 US$ 10.7 billion). Droughts affecting the United States caused US$ 20.0 billion damages, while four droughts in Ukraine, Russia, Brazil and Italy cost each at least US$ 1 billion. It should be noted that reported damages from climatological disasters are often underestimated due to a lack of standardized methods for quantifying and reporting losses.

In 2012, 32 **geophysical** disasters (earthquakes/tsunamis, volcanoes and dry mass movements) were registered, representing a share of 8.9% of total disaster occurrence, very close to its decade's annual average of 9.1%. However, deaths from geophysical disasters were extremely low in 2012 and accounted for only 7.5% of total reported deaths from natural disasters, compared to a share of 63.7% per year on average for 2002-2011. They caused only 2.9 million victims, less than the annual average number of victims from 2001 to 2010 (8.1 million). Geophysical disasters took a share of 11.8% of total damages caused by natural disasters in 2012, compared to a share of 32.9% per year on average from 2002 to 2011. In absolute terms, damages decreased from an annual average of US$ 47.1 billion for 2002-201 to US$ 18.6 billion in 2012.

In 2012, compared to their annual average damages from 2002 to 2011, damages from climatological and meteorological disasters increased, while damages from geophysical disasters decreased and costs of hydrological disasters remained stable. This led to a peculiar distribution of damages between disaster sub-groups, which has not been observed in the past decade.

Chapter 4

Regional analysis

- Africa
- Americas
- Asia
- Europe
- Oceania

4. Regional analysis

In 2012, Asia was most often hit by natural disasters (40.6%), followed by the Americas (22.1%), Europe (18.2%), Africa (16.0%) and Oceania (3.1%). This regional distribution of disaster occurrence is comparable to the profile observed from 2001 to 2010 (see Table 5), but all continents except Europe showed numbers of disasters below their 2002-2011 average. In Europe, in 2012, disasters occurred three times more than in 2011.

Asia accounted in 2012 for 64.5% of worldwide reported disaster victims, while Africa accounted for 30.4%. Compared to the annual average number of victims from 2002 to 2011, the number of victims in Africa and Oceania increased, whereas fewer victims were reported in the Americas, Asia and Europe.

Table 5 – Natural disaster occurrence and impacts: regional figures

No. of natural disasters	Africa	Americas	Asia	Europe	Oceania	*Global*
Climatological 2012	16	12	12	45	0	***85***
Avg. 2002-11	14	14	12	17	1	***59***
Geophysical 2012	0	6	23	3	0	***32***
Avg. 2002-11	3	7	22	2	2	***36***
Hydrological 2012	30	26	71	16	7	***150***
Avg. 2002-11	46	41	82	23	5	***197***
Meteorological 2012	11	35	39	1	4	***90***
Avg. 2002-11	9	34	39	14	7	***102***
Total 2012	**57**	**79**	**145**	**65**	**11**	**357**
Avg. 2002-11	***72***	***95***	***156***	***56***	***16***	***394***

No. of victims (millions)	Africa	Americas	Asia	Europe	Oceania	Global
Climatological 2012	28.01	1.82	6.37	0.45	0.00	***36.65***
Avg. 2002-11	23.86	1.36	76.80	0.27	0.00	***102.29***
Geophysical 2012	0.00	1.41	1.48	0.03	0.00	***2.91***
Avg. 2002-11	0.08	0.83	7.13	0.01	0.07	***8.12***
Hydrological 2012	9.34	1.54	53.52	0.10	0.24	***64.74***
Avg. 2002-11	2.08	4.26	111.05	0.28	0.06	***117.71***
Meteorological 2012	0.47	0.80	18.93	0.00	0.02	***20.22***
Avg. 2002-11	0.37	2.19	37.05	0.11	0.04	***39.75***
Total 2012	**37.82**	**5.57**	**80.29**	**0.58**	**0.26**	***124.52***
Avg. 2002-11	***26.38***	***8.64***	***232.03***	***0.66***	***0.17***	***267.88***

Damages (2012 US$ bn)	Africa	Americas	Asia	Europe	Oceania	Global
Climatological 2012	0.00	22.46	0.02	4.15	0.00	**26.63**
Avg. 2002-11	0.04	2.79	3.50	2.76	0.39	**9.49**
Geophysical 2012	0.00	0.68	2.14	15.80	0.00	**18.62**
Avg. 2002-11	0.57	4.08	36.73	0.53	2.47	**44.36**
Hydrological 2012	0.83	0.58	19.25	4.24	0.70	**25.61**
Avg. 2002-11	0.31	3.95	13.51	4.73	1.16	**23.66**
Meteorological 2012	0.10	79.67	6.56	0.01	0.15	**86.48**
Avg. 2002-11	0.07	39.14	8.19	3.64	0.77	**51.81**
Total 2012	**0.93**	**103.38**	**27.97**	**24.20**	**0.85**	**157.34**
Avg. 2002-11	***0.99***	***49.96***	***61.93***	***11.66***	***4.78***	***129.33***

The Americas suffered the most damages in 2012 (65.7% of worldwide natural disaster damages), followed by Asia (17.8%) and Europe (15.4%). A share of 0.6% of global disaster damages was reported for Africa and of 0.5% for Oceania. This distribution of disaster damages between continents is different from the one observed over the last decade, where Asia had the most damages, followed by the Americas and Europe. Damages in the Americas increased from an annual average of US$ 56.5 billion from 2002-2011 to US$ 103.4 billion in 2012, mostly due to two disasters which occurred in the U.S.A: hurricane Sandy and the drought in the South-Western and Mid-West regions. However, damages in Europe also increased from an annual average of US$ 13.5 billion during 2002-2011 to US$ 24.2 billion in 2011. On the other side, in 2012 compared to the annual average for 2002-2011, damages decreased by 83% in Oceania, by 58% in Asia and by 21% in Africa.

4.1 Africa

The distribution of disaster frequency in Africa in 2012 presented a similar profile to the one seen over the last decade. Hydrological disasters represented 52.6% of occurrence, followed by climatological (28.1%) and meteorological disasters (19.3%). No geophysical disasters were recorded in 2012.

However, the number of victims increased in 2012 by 43.4% compared to the annual average number of disaster victims in Africa during 2002-2011, due to the impact of climatological and hydrological disasters. The number of reported climatological disaster victims in 2012 (28 million) surpassed their 2002-2011 annual average (23.9 million) and the number of reported hydrological disaster victims (9.3 million) was far above their 2002-2011 annual average (2.1 million). Droughts and food crises made one million victims or more in Angola, Burkina Faso, Chad, Ethiopia, Kenya, Malawi, Mali, Niger, Sudan, Tanzania and Zimbabwe caused 25.3 million victims, with one flood in Nigeria causing 7 million alone. These twelve disasters represent 85% of the total of victims in Africa in 2012.

The estimation of natural disaster damages in Africa remains extremely challenging as data are often poorly reported or lacking altogether. In 2012, like in previous years, no damages for climatological disasters in Africa were reported. Reported damages from hydrological disasters (US$ 0.83 billion) increased in 2012 compared to their annual average reported damages during 2002 to 2011 (US$ 0.3 billion) and reported damages from meteorological disasters (US$ 0.1 billion) surpassed also their 2002-2012 average (0.07 billion).

4.2 Americas

The Americas suffered in 2012 from 79 natural disasters. Hydrological disasters (32.9%) and meteorological disasters (44.3%) occurred most often, followed by climatological (15.2%) and geophysical (7.6%) disasters. Compared to their occurrence in the decade 2002-2011, meteorological disasters were more frequent in 2012 and hydrological disasters less frequent.

In 2012, the total number of victims from natural disasters decreased by 35.5% compared their 2002-2011 annual average. But the figure was contrasted. While the numbers of victims from hydrological and meteorological disasters decreased, both, by more than 63% compared to their 2002-2011 annual average, the number of climatological and geophysical disaster victims increased by, respectively, 33% and 70%. Climatological disasters in 2012 caused 32.6% of total disaster victims in the Americas, whereas a share of 15.7% per year on average was observed from 2002 to 2011. Victims of geophysical amounted to 25.3% of the total numbers of victims versus a 2002-

2011 average of 9.6%. Inversely, meteorological disasters in 2012 were responsible for 27.6% of total disaster victims in the Americas, compared to a share of 49.3% per year on average during the past decade. For meteorological disasters the proportion of victims in 2012 (14.4%) is also far below its 2002-2011 annual average of 25.4%.

In 2012, disaster damages in the Americas (US$ 103.4 billion) more than doubled compared to the annual average damages from 2002 to 2011 (US$ 50 billion). This increase was mostly due to damages from meteorological and climatological disasters. Damages reported for meteorological disasters in the Americas in 2012 (US$ 79.7 billion) were the highest since 2005, hurricane Katrina's year(US$ 169.8 billion) and were mostly due to hurricane Sandy which affected the United States and cost US$ 50.0 billion. The US$ 22 billion damages due to climatological disasters is ten times higher than their 2002-2011 annual average (US$ 2.8 billion) and largely explained by the drought which affected the South-Western and Mid-West regions of the United States and cost US$ 20 billion.

In contrast, reported damages from geophysical disasters (US$ 0.68 billion) and from hydrological disasters (US$ 0.58 billion) appear to have been very limited when compared to their 2002-2011 annual average (US$ 4.1 and 4.0 billion, respectively). Meteorological disasters accounted for the largest share of disaster damages in the Americas in 2012 (77.1%), similar to the share of 78.4% per year on average from 2002 to 2011. Compared to its last decade annual average of 5.6 %, the share of climatological damages was fourfold higher.

4.3 Asia

The number of disasters in Asia in 2012 (145) was similar to their number in 2011 (147), but below the annual average disaster occurrence during 2002-2011 (156). In particular, less hydrological disasters were reported in 2012 (71), compared to the annual average occurrences from 2002 to 2011 (82). Numbers of all other disaster types were similar to their 2002-2011 annual average. In 2012, 49.0% of disasters were hydrological disasters, 26.9% meteorological and 15.9% geophysical, while climatological disasters accounted for 8.3% of total disaster occurrence in Asia. These proportions do not differ significantly from the annual averages.

The number of victims in Asia in 2012 (80.3 million) was far below the 2002-2011 annual average (232.0 million). Compared to their annual averages for this period, the number of victims in Asia decreased in 2012 by 91.7% for climatological disasters, 79.3% for geophysical disasters, 51.8% for hydrological disasters and 48.9% for meteorological disasters. Hydrological disasters represented 66.6% of total disaster victims in Asia in 2012, followed by meteorological (23.6%), climatological (7.9%), and geophysical (1.8%) disasters.

In Asia, 14 disasters – 8 floods, 3 typhoons, 2 droughts and one food shortage - made more than one million victims each, for a total of 72.7 million or 90.5% of all Asian victims. Fifty-six percent of victims lived in China, 15.6% in the Philippines, 7.1% in Bangladesh, 6.3% in Pakistan and 5.3% in India.

Disaster damages in Asia in 2012 (US$ 28.0 billion) were below their annual average for years 2002 to 2011 (US$ 61.9 billion). At a global level, Asia's share of global damages in 2012 (17.8%) was largely below its annual average (47.9%) and the lowest since 2005 (12.7%). Only damages from hydrological disasters increased from an annual average of US$ 13.5 billion during 2002-2011 to US$ 19.3 billion in 2012, mostly due to floods in China which made damages estimated at US$ 15 billion. Reported damages from climatogical disasters decreased by 99.4% compared to their

annual average for 2002-2011, those from geophysical disasters decreased by 94.2% and damages from meteorological disasters by almost 20%. Typhoons and tropical storms made damages of US$ 3 billion in China and of 1.7 billion in the Philippines. These two countries amounted for 71% of reported meteorological damages.

In 2012, hydrological disasters took a share of 68.8% of total damages in Asia, followed by meteorological (23.4%), geophysical (7.7%) and climatological (0.1%) disasters, compared to an average share per year of 21.8% (hydrological), 13.2% (meteorological), 59.3% (geophysical), and 5.7% (climatological) from 2002 to 2011.

4.4 Europe

The number of reported disasters in Europe (65) was above the annual average disaster occurrence from 2002 to 2011 (56). This is largely due to cold waves and extreme winter conditions which affected most European countries in the beginning of the year. The number of such climatological disasters (45) is almost three times superior to its annual average for years 2002-2011 (17). Inversely, 2012 shows a strong decrease in the number of hydrological disasters (16), compared to an annual average of 23. Such decrease is still more pronounced for meteorological disasters: only one was reported in 2012 – the lowest number ever reported since years 1990 - compared to an annual average of 14 in years 2002-2011. Therefore, compared to the previous decade, 2012 appears, in Europe, as an atypical year, with disasters occurring in proportions distinctly different from those of previous years.

In 2012, the decrease in the number of victims (0.58 million) compared to their 2002-2011 annual average (0.66 million) is largely explained by the decrease of their number in meteorological disasters (-99.7% in 2012 compared to the 2002-2011 annual average) and in hydrological disasters (-62.2%). In contrast, compared to annual average of the years 2002-2011, the number of victims of geophysical disasters increased of 76.6% and of climatological disasters of 68.2%. Two earthquakes in Emilia-Romagna and in the Ferrare region made 14,367 and 11,057 victims, respectively. Extreme winter conditions made 230,005 victims in Albania and 18,243 in Serbia. Cold waves made 87,612 victims in Ukraine, 70,010 in Serbia and 10,351 in Bosnia-Hercegovenia. These five climatological disasters account for 71.7% of the total of victims of disasters in Europe.

Whereas per year on average from 2002 to 2011, hydrological disasters took the largest share of total disaster victims in Europe (41.5%), followed by climatological (40.3%), meteorological (16.0%) and geophysical (2.2%) disasters, in 2012 the picture is different. Climatological disasters took the largest share (77.6%) and hydrological disasters took a share of 18.0%, only followed by geophysical disasters with 4.4% and meteorolological disasters with 0.1%.

Damages from natural disasters in Europe in 2012 (US$ 24.2 billion) were the highest of the decade, more than two times the annual average damages for 2002-2011 (US$ 11.7 billion), largely explained by the cost associated with the Ferrare region earthquake in Italia (US$ 15.8 billion) which is the highest cost ever reported in Europe for a geophysical disaster since the year 1990 and is thirty times higher than the 2002-2011 annual damages average for such disasters. The costs associated with the other Italian earthquake are, actually, not reported. Damages from climatological disasters (US$ 4.2 billion) are 1.5 higher than the 2002-2011 annual damages average for these disasters and are explained by damages from three droughts in Ukraine (US$ 1.7 billion), Italia (US$ 1.2 billion) and Russia (US$ 1.1 billion). Damages from hydrological disasters (US$ 4.2 billion) are close to their 2002-2011 annual average (US$ 4.7 billion) and are largely explained by four floods in the United Kingdom which cost a total of US$ 2.9 billion or 69% of all damages

caused by hydrological disasters. The damage arising from the only meteorological disaster reported in Europe in 2012 is directly attributable to a tornado which occurred in Poland and cost US$ 0.006 billion.

4.5 Oceania

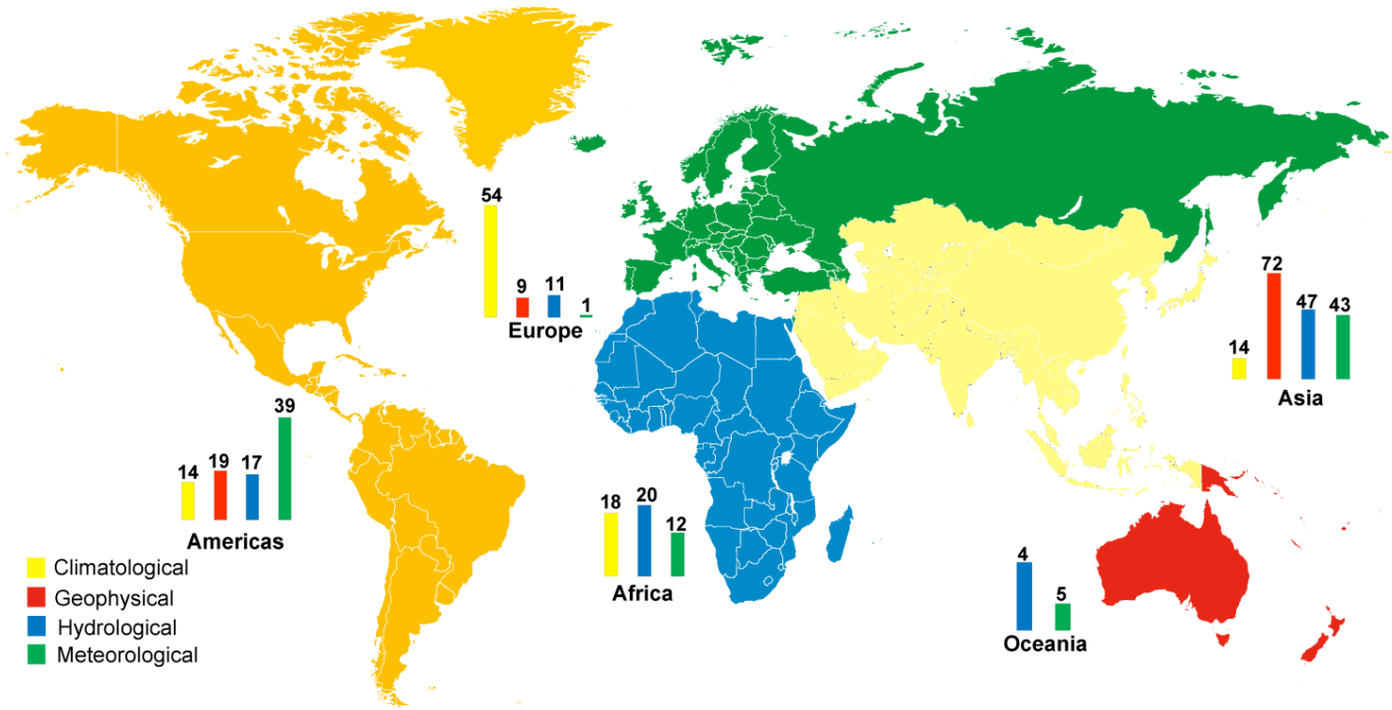
In 2012, the number of disasters (11) was largely below their 2002-2011 annual average (16). None climatological and geophysical disasters were reported. Seven hydrological – higher than the 2002-2011 annual average of 5 – and 4 meteorological disasters – lower than their annual average of 7 – were reported.

Number of victims of natural disasters in 2012 in Oceania (258,330) is higher than its 2002-2011 annual average reported in 2011 (165,776). This number is, for the most part, explained by a flood in Papua New Guinea which made 200,000 victims; the highest number of victims of flood in Oceania since the flood which made 175,000 victims in Australia in 2010. Two other floods in the Fiji Islands and Australia which made 14,989 and 13,002 victims, respectively, explain the over-representation of hydrological disasters victims in Oceania. The number of meteorological disasters (17,865) is lower than his 2002-2011 annual average (40,143) and almost entirely attributable to the cyclone Evan which made 8,402 victims in the Fiji Islands, 7,751 in Samoa and 1,212 in Wallis and Futuna or 97.2% of all victims of meteorological disasters.

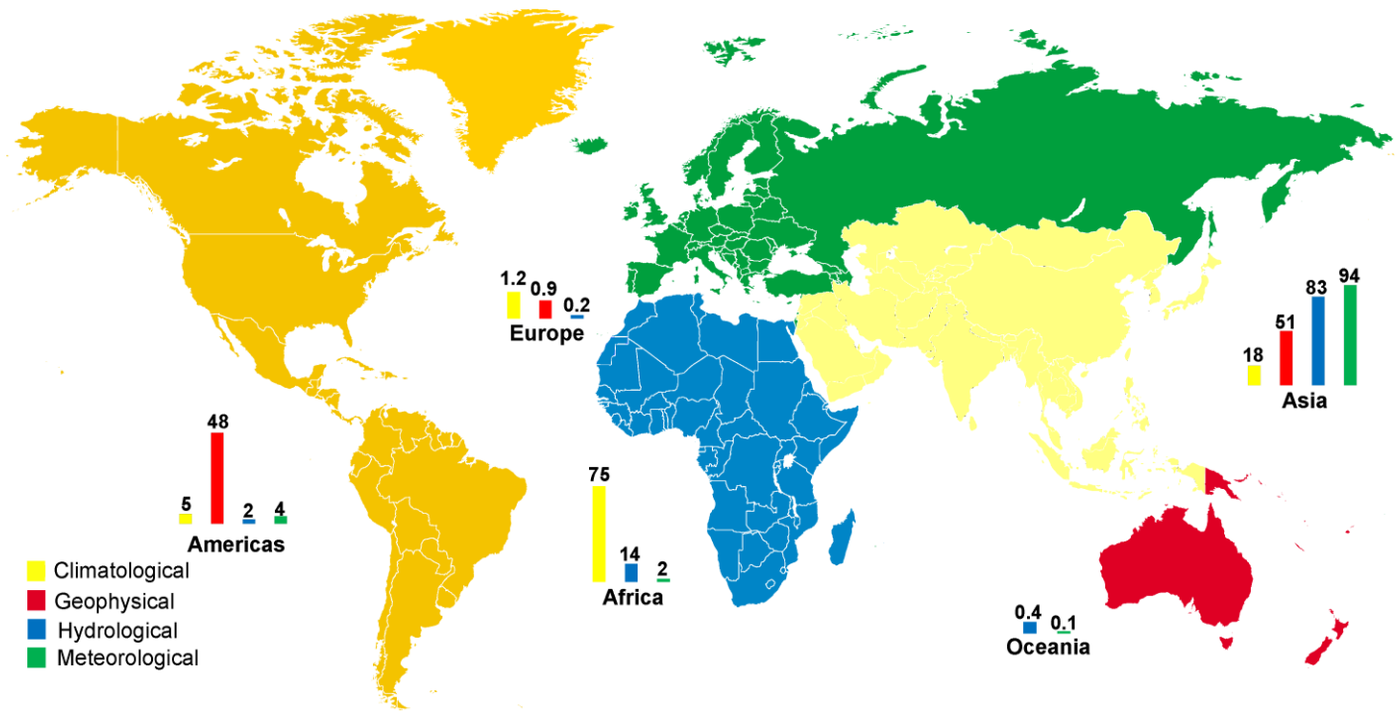
In 2011, disaster damages in Oceania (US$ 854 million) are largely below their 2002-2011 annual average (US$ 4,780 million). Hydrological disasters took the largest share of damages (US$ 704 million), lower than their 2002-2011 average of US$ 1,156 million. Two floods in Australia cost US$ 588 million or 83.5% of damages from these disasters. The costs of meteorological disasters (US$ 151 million) are also largely below their previous decade annual average (US$ 768 million). The cyclone Evan is the main cause of these costs, making damages for US$ 133.0 million in Samoa and US$ 8.4 million in the Fiji Islands. A tornado in New Zealand made also damages of US$ 9.1 million.

A comparison between continents of the occurrence and impacts of natural disasters in 2012 is shown in Maps 1, 2 and 3. Geophysical, hydrological and meteorological disasters were most frequent in Asia (71.9%, 47.3% and 43.3% respectively) but meteorological disasters were also frequent in the Americas (38.9%). Climatological disasters occurred most often in Europe (53.6%). The human impact, measured in terms of the number of victims, was essentially concentrated in Asia, with shares of 93.6%, 82.7% and 50.7% for meteorological, hydrological and geophysical, disasters respectively. Geophysical disasters are also frequent in the Americas (48.4%). Victims of climatological disasters are most often reported in Africa (75.3%). The highest proportion of damages from meteorological (92.1%) and climatological (84.3%) disasters occurred in the Americas. Most damages from geophysical disasters occurred in Europe (84.9%) and from hydrological disasters in Asia (75.2%).

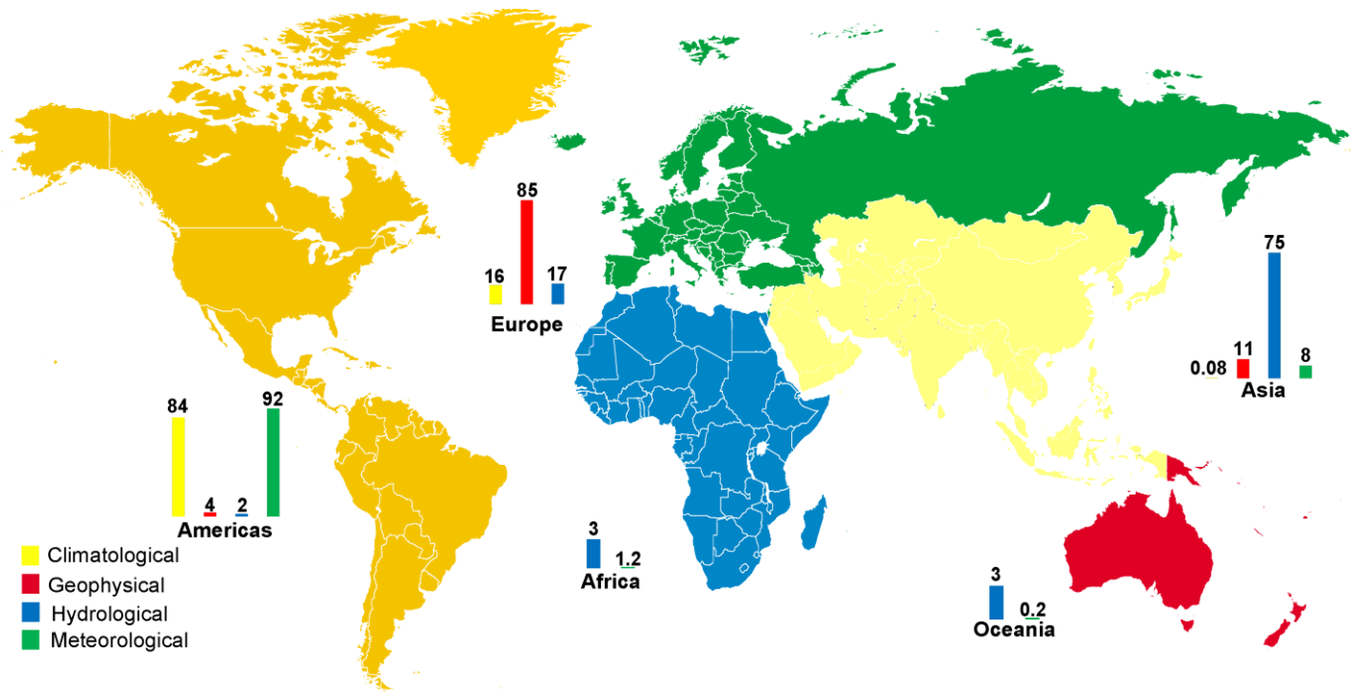
Map 1 – Percent share of reported occurrence by disaster sub-group and continent in 2012



Map 2 – Percent share of reported victims by disaster sub-group and continent in 2012*



Map 3 – Percent share of reported economic damages by disaster sub-group and continent in 2012*



*Percentages ≤ 0.05 are displayed as zeros

ANNEX 1: Definitions[16]

Avalanche: Avalanche describes a quantity of snow or ice that slides down a mountainside under the force of gravity. It occurs if the load on the upper snow layers exceeds the bonding forces of the entire mass of snow. It often gathers material that is underneath the snowpack like soil, rock etc. (debris avalanche). Any kind of rapid snow/ice movement.

Biological Disasters: Disasters caused by the exposure of living organisms to germs and toxic substances.

Climatological Disasters: Events caused by long-lived/meso to macro scale processes (in the spectrum from intraseasonal to multidecadal climate variability).

Cold wave: A cold wave can be both a prolonged period of excessively cold weather and the sudden invasion of very cold air over a large area. Along with frost it can cause damage to agriculture, infrastructure, and property. Damage caused by low temperatures.

Drought: Long-lasting event triggered by a 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 in agriculture, affect inland navigation and hydropower plants, and cause a lack of drinking water and famine.

Earthquake: Shaking and displacement of ground due to seismic waves. This is the earthquake itself without secondary effects. An earthquake is the result of a sudden release of stored energy in the Earth's crust that creates seismic waves. They can be of tectonic or volcanic origin. At the Earth's surface they are felt as a shaking or displacement of the ground. The energy released in the hypocenter can be measured in different frequency ranges. Therefore there are different scales for measuring the magnitude of a quake according to a certain frequency range. These are: a) surface wave magnitude (Ms); b) body wave magnitude (Mb); c) local magnitude (ML); d) moment magnitude (Mw).

[16] These definitions have been established by MünichRe/Geo Risks Research Department and CRED. More information on definitions can be found on the EM-DAT website in the "Glossary" section.

Epidemic: Either an unusual increase in the number of cases of an infectious disease that already exists in the region or population concerned, or the appearance of an infection disease previously absent from a region.

Extreme winter condition: Damage caused by snow and ice. Winter damage refers to damage to buildings, infrastructure, traffic (especially navigation) inflicted by snow and ice in the form of snow pressure, freezing rain, frozen waterways, etc.

Flash flood: Rapid inland floods due to intense rainfall. A flash flood describes sudden flooding with short duration. In sloped terrains the water flows rapidly with a high destruction potential. In flat terrains the rainwater cannot infiltrate into the ground or run off (due to small slope) as quickly as it falls. Flash floods typically are associated with thunderstorms. A flash flood can occur at virtually any place.

Flood: Significant rise of water level in a stream, lake, reservoir or coastal region.

Forest fire: Fires in forests that cover extensive damage. They may start by natural causes such as volcanic eruptions or lightning, or they may be caused by arsonists or careless smokers, by those burning wood, or by clearing a forest area.

General flood: Gradually rising inland floods (rivers, lakes, groundwater) due to high total depth of rainfall or snowmelt. A general flood is caused when a body of water (river, lake) overflows its normal confines due to rising water levels. The term general flood additionally comprises the accumulation of water on the surface due to long-lasting rainfall (water logging) and the rise of the groundwater table above surface. Furthermore, inundation by melting snow and ice, backwater effects, and special causes such as the outburst of a glacial lake or the breaching of a dam are subsumed under the term general flood. General floods can be expected at certain locations (e.g. along rivers) with a significantly higher probability than at others.

Geophysical disasters: Events originating from solid earth.

Heat wave: A heat wave is a prolonged period of excessively hot and sometimes also humid weather relative to normal climate patterns of a certain region.

Hydrological Disasters: Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up.

Insect infestation: Pervasive influx and development of insects or parasites affecting humans, animals, crops and materials.

Landslide: Any kind of moderate to rapid soil movement including lahar, mudslide and debris flow. A landslide is the movement of soil or rock controlled by gravity and the speed of the movement usually ranges between slow and rapid. It can be superficial or deep, but the materials have to make up a mass that is a portion of the slope or the slope itself. The movement has to be downward and outward with a free face.

Local Windstorm (orographic storm): Local windstorm refers to strong winds caused by regional atmospheric phenomena which are typical for a certain area. These can be katabatic winds, foehn winds, Mistral, Bora etc.

Meteorological disasters: Events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days).

Rockfall: Quantities of rock or stone falling freely from a cliff face. It is caused by undercutting, weathering or permafrost degradation.

Storm surge: Coastal flood on coasts and lake shores induced by wind. A storm surge is the rise of the water level in the sea, an estuary or lake as result of strong wind driving the seawater towards the coast. This so-called wind setup is superimposed on the normal astronomical tide. The mean high water level can be exceeded by five and more metres. The areas threatened by storm surges are coastal lowlands.

Subsidence: Downward motion of the Earth's surface relative to a datum (e.g. the sea level). Dry subsidence can be the result of geological faulting, isostatic rebound, human impact (e.g. mining, extraction of natural gas). Wet subsidence can be the result of karst, changes in soil water saturation, permafrost degradation (thermokarst), etc.

Tropical cyclone: A tropical cyclone is a non-frontal storm system that is characterized by a low pressure centre, spiral rain bands and strong winds. Usually it originates over tropical or sub-tropical waters and rotates clockwise in the southern hemisphere and counter-clockwise in the northern hemisphere. The system is fuelled by heat released when moist air rises and the water vapour it contains condenses ("warm core" storm system). Therefore the water temperature must be >27°C. Depending on their location and strength, tropical cyclones are referred to as hurricane (western Atlantic/eastern Pacific), typhoon (western Pacific), cyclone (southern Pacific/Indian Ocean), tropical storm, and tropical depression (defined by wind speed; see Saffir-Simpson-Scale). Cyclones in tropical areas are called hurricanes, typhoons and tropical depressions (names depending on location).

Volcanic eruption: All volcanic activity like rock fall, ash fall, lava streams, gases etc. Volcanic activity describes both the transport of magma and/or gases to the Earth's surface, which can be accompanied by tremors and eruptions, and the interaction of magma and water (e.g. groundwater, crater lakes) underneath the Earth's surface, which can result in phreatic eruptions. Depending on the composition of the magma, eruptions can be explosive and effusive and result in variations of rock fall, ash fall, lava streams, pyroclastic flows, emission of gases etc.

Wildfire: Wildfire describes an uncontrolled burning fire, usually in wild lands, which can cause damage to forestry, agriculture, infrastructure and buildings.

ANNEX 2: List of countries per continent

AFRICA		
Algeria	Gambia	Rwanda
Angola	Ghana	Sao Tome and Principe
Benin	Guinea	Senegal
Botswana	Guinea-Bissau	Seychelles
Burkina Faso	Kenya	Sierra Leone
Burundi	Lesotho	Somalia
Cameroon	Liberia	South Africa
Cape Verde	Libyan Arab Jamahiriya	South Sudan
Central African Republic	Madagascar	St. Helena
Chad	Malawi	Sudan
Comoros	Mali	Swaziland
Congo	Mauritania	Togo
Cote d'Ivoire	Mauritius	Tunisia
Democratic Republic of Congo	Mayotte	Uganda
Djibouti	Morocco	United Republic of Tanzania
Egypt	Mozambique	Western Sahara
Equatorial Guinea	Namibia	Zambia
Eritrea	Niger	Zimbabwe
Ethiopia	Nigeria	
Gabon	Reunion	

AMERICAS		
Anguilla	Dominican Republic	Panama
Antigua and Barbuda	Ecuador	Paraguay
Argentina	El Salvador	Peru
Aruba	Falkland Islands (Malvinas)	Puerto Rico
Bahamas	French Guiana	St. Barthélemy
Barbados	Greenland	St. Kitts and Nevis
Belize	Grenada	St. Lucia
Bermuda	Guadeloupe	St. Martin (French part)
Bolivia	Guatemala	St. Pierre and Miquelon
Brazil	Guyana	St. Vincent and the Grenadines
British Virgin Islands	Haiti	Suriname
Canada	Honduras	Trinidad and Tobago
Cayman Islands	Jamaica	Turks and Caicos Islands
Chile	Martinique	Uruguay
Colombia	Mexico	Venezuela
Costa Rica	Montserrat	United States of America
Cuba	Netherlands Antilles	United States Virgin Islands
Dominica	Nicaragua	

ASIA

Afghanistan
Armenia
Azerbaijan
Bahrain
Bangladesh
Bhutan
Brunei Darussalam
Cambodia
China
Cyprus
Georgia
Hong Kong (China)
India
Indonesia
Iran
Iraq
Israel
Japan
Jordan
Kazakhstan
Korea (Dem Rep)
Korea (Rep)
Kuwait
Kyrgyzstan
Laos
Lebanon
Macau (China)
Malaysia
Maldives
Mongolia
Myanmar
Nepal
Palestine (West Bank)
Oman
Pakistan
Philippines
Qatar
Saudi Arabia
Singapore
Sri Lanka
Syrian Arab Republic
Taiwan (China)
Tajikistan
Thailand
Timor-Leste
Turkey
Turkmenistan
United Arab Emirates
Uzbekistan
Viet Nam
Yemen

EUROPE

Aland Islands
Albania
Andorra
Austria
Belarus
Belgium
Bosnia and Herzegovina
Bulgaria
Channel Islands
Croatia
Czech Republic
Denmark
Estonia
Faroe Islands
Finland
France
Germany
Gibraltar
Greece
Guernsey
Holy See
Hungary
Iceland
Ireland
Italy
Jersey
Latvia
Liechtenstein
Lithuania
Luxembourg
Macedonia, FYR
Malta
Man, Isle of
Moldova
Monaco
Montenegro
Netherlands
Norway
Poland
Portugal
Romania
Russian Federation
San Marino
Serbia
Slovakia
Slovenia
Spain
Svalbard & Jan Mayen Islands
Sweden
Switzerland
Ukraine
United Kingdom

OCEANIA		
American Samoa Australia Cook Islands Federated States of Micronesia Fiji French Polynesia Guam Kiribati Marshall Islands	Nauru New Caledonia New Zealand Niue Norfolk Island Northern Mariana Islands Palau Papua New Guinea Pitcairn	Samoa Solomon Islands Tokelau Tonga Tuvalu Vanuatu Wallis and Futuna

Centre for Research on the Epidemiology of Disasters
Institute of Health and Society (IRSS)
Université catholique de Louvain

Clos Chapelle-aux-Champs, 30 - B1.30.15
1200 Brussels –Belgium
Phone: +32 (0)2.764.33.27 Fax: +32 (0)2.764.34.41
E-mail: contact@cred.be URL: www.cred.be

USAID
FROM THE AMERICAN PEOPLE

The EM-DAT project gratefully acknowledges support from USAID/OFDA