Centre for Research on the
Epidemiology of Disasters
CRED

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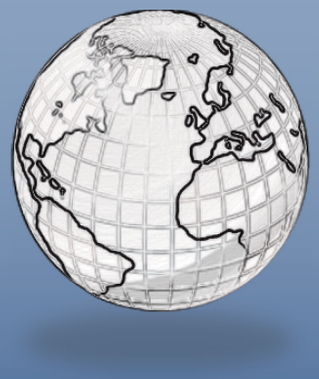
de Louvain

Annual Disaster Statistical Review 2008

The numbers and trends



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About CRED

The Centre for Research on the Epidemiology of Disasters (CRED) has been active for more than 30 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 of 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 wind 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

Table of Contents

Figures

Maps

Tables

Executive Summary

The human and economic losses caused by natural disasters in 2008 were devastating. More than 235 000 people were killed, 214 million people were affected and economic costs were over 190 billion US$.

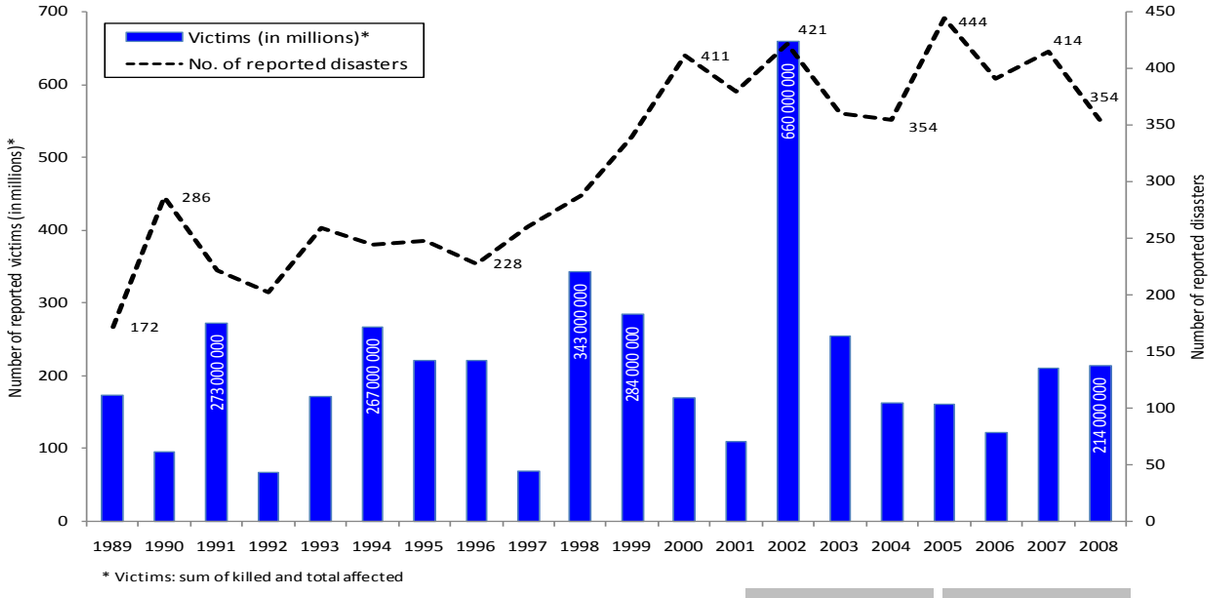
In 2008, 354 natural disasters were recorded in the EM-DAT database, which is less than the 2000-2007 yearly average number of 397 (see Figure 1). The death toll was three times higher than the annual average of 66 813 for 2000-2007, mainly caused by two major events: Cyclone Nargis which killed 138 366 people in Myanmar and the Sichuan earthquake in China which caused the deaths of 87 476 people. Disaster costs in 2008 were more than twice the 82 billion US$ annual average for 2000-2007 and were mainly attributed to the Sichuan earthquake in China (85 billion US$) and hurricane Ike in the U.S. (30 billion US$).

Asia remained the most affected continent. Nine of the top 10 countries with the highest number of disaster-related deaths were in Asia. While China, the U.S., the Philippines and Indonesia reported the largest number of natural disasters, Djibouti, Tajikistan, Somalia and Eritrea topped the list of number of victims per 100 000 inhabitants.

In 2008 once again, large numbers of persons were affected by a few natural disasters. The earthquake and severe winter conditions in China affected a total of 122 million people. Many other people were affected by droughts in Asia (12 million) and Africa (14 million) and severe weather conditions in the U.S. in May and June 2008 (11 million).

Although fewer disasters occurred in 2008, events had a larger impact than usual on human settlements. This is especially true in middle income countries, such as China which was also the largest contributor to economic losses in 2007, and accounted for nearly 57 % of the total of economic losses this year. As countries move up the development ladder, their economic vulnerability tends to increase. These countries need to invest more in disaster risk reduction measures if they want to better protect development gains.

Figure 1 – Trends in occurrence and victims



* Victims: sum of killed and total affected

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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 effects of more than 17 000 disasters in the world from 1900 to the present. The database is 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 Data 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".
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 – Disaster sub-group definition and classification

Disaster Subgroup	Definition	Disaster Main Type
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	Disaster caused by the exposure of living organisms to germs and toxic substances	Epidemic, Insect Infestation, Animal Stampede

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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[1].
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 (current value).
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] Biological disasters are not included in this publication

1.3 Methodology

In EM-DAT and in this report, data are considered at 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. 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.

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 (i.e., 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 total number of persons reported affected.

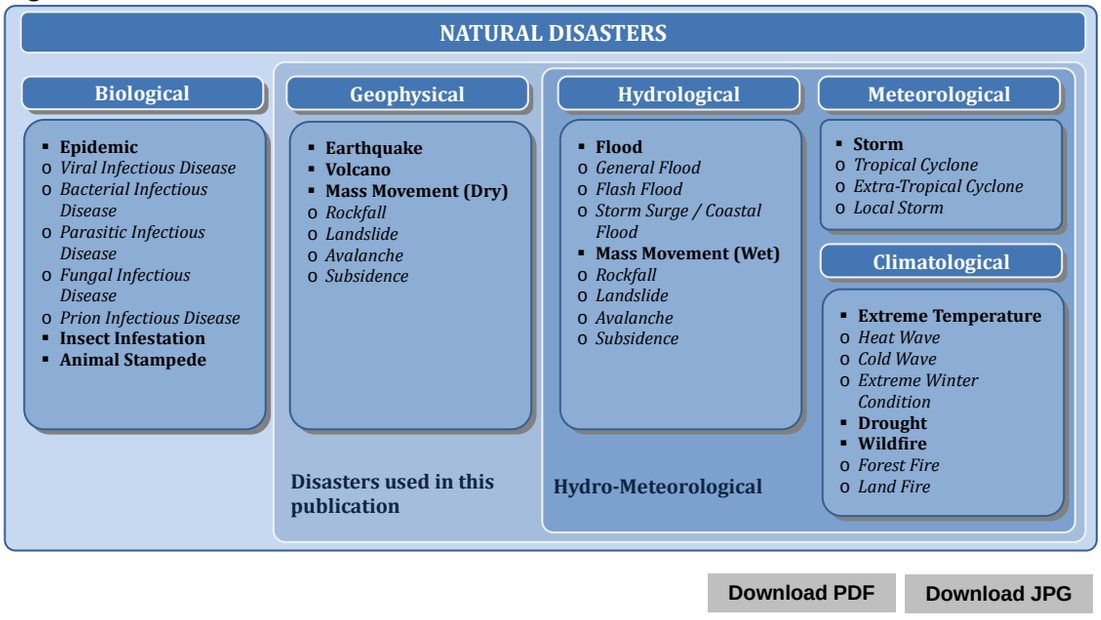
The economic impact of a disaster usually consists of direct consequences on the local economy (e.g. damage to infrastructure, crops, housing) and indirect consequences (e.g. loss of revenues, unemployment, market destabilization). In EM-DAT, the registered figure corresponds to the value of the immediate damage at the time of the event and usually only to the direct damage, expressed in US dollars (current value).

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 being divided into 5 sub-groups, which in turn cover 12 disaster types and more than 30 sub-types (see http://www.emdat.be/ExplanatoryNotes/classification, for complete classification and definition).

Figure 2 – Natural disaster classification



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2. What did 2008 bring?

In 2008, China (29), the United States (22) and the Philippines (20) were most often hit by natural disasters (see Figure 3). These three countries, together with India and Indonesia, have occupied the top ranking of disaster occurrence during the last three years.

Twenty countries, representing 98.9%, 92.3% and 97.4% of the total reported number of deaths, victims and economic damage costs, respectively, made up the top 10 rankings of 2008 (see Figures 4, 5 and 6). These figures give an idea of the unequal impact that disasters have on communities across the world, mostly affecting developing countries.

Despite the constant increase in media coverage of the human impacts of natural disasters, preparedness to mitigate their effects on human populations seems to be insufficient, especially in the case of disasters of great magnitude. In 2008, two "mega-disasters" occurred, cyclone Nargis in Myanmar and the Sichuan earthquake in China. These two events accounted for 95.9%, 57.4% and 61.5% of the reported mortality, victims and economic damage costs, respectively, of natural disasters worldwide during this year (see Tables 2, 3 and 4). These numbers intensified the trend of a small number of events responsible for the majority of the total losses during one year. For comparison, 97.9%, 81.3% and 88.7% of reported mortality, victims and economic damage costs, respectively, were concentrated in the top ten of disasters in 2008, classified according to these impacts.

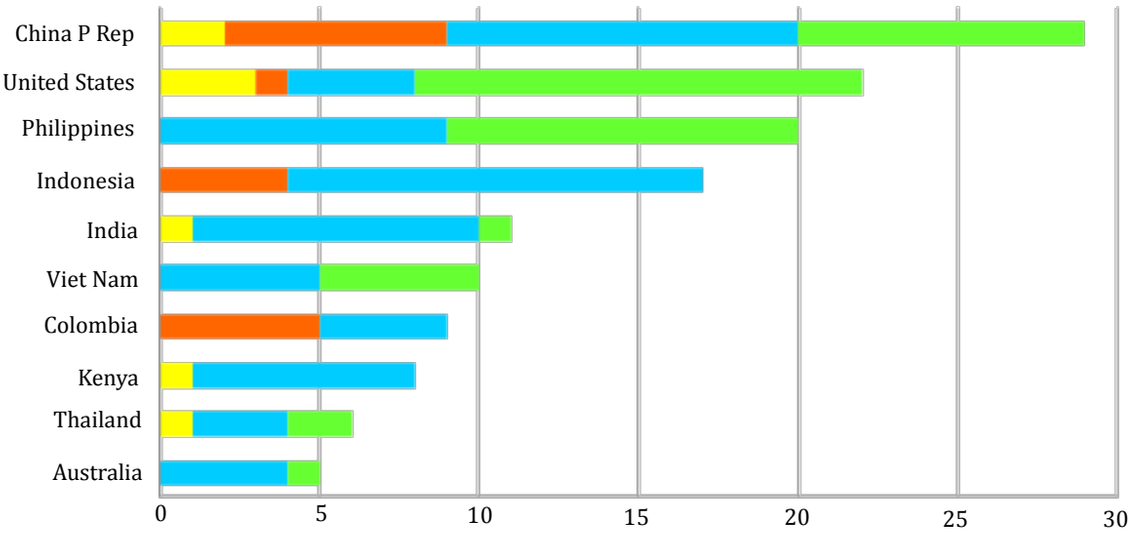
In absolute figures, Myanmar paid a disproportionate toll of human lives, all due to cyclone Nargis which killed over 138 thousand people. China suffered high mortality losses due to diverse disasters, but the devastating impact of the earthquake that hit the Sichuan province accounted for most loss of life (over 87 000 deaths). The extreme impact of few mega-disasters on mortality reveals how they go beyond our preparedness efforts, and highlights the need for improving our prevention measures for disasters of all scales.

Densely-populated countries frequently hit by natural disasters, such as China and India, reported an elevated number of victims. This was most pronounced in China, where 133.4 million people, thus 10% of its total population, were affected by natural disasters in 2008 (see Figure 5).

Climatological disasters, mainly droughts, caused many victims in the eastern part of Africa, with more than one third of the populations affected in Djibouti, Somalia and Eritrea. In Asia, Tajikistan also experienced droughts that affected over 2 million people.

In terms of reported economic damage costs, China led the top ten of countries and remained in the third position when these quantities were adjusted for country GDP. The economies of Myanmar and Tajikistan were largely affected during 2008, with damage costs representing nearly 30% and 22% of GDP, respectively (see Figure 6). As was seen in Japan in 2007, an earthquake produced the highest economic damage for a single disaster in 2008. As for regions, Eastern Asia (111.4 billion US$) and North America and the Caribbean (61.9 billion US$) suffered from the highest economic damage costs this year.

Figure 3 – Top 10 countries by number of reported events in 2008



	China P Rep	United States	Philippines	Indonesia	India	Viet Nam	Colombia	Kenya	Thailand	Australia	Total
Climatological	2	3	0	0	1	0	0	1	1	0	**8**
Geophysical	7	1	0	4	0	0	5	0	0	0	**17**
Hydrological	11	4	9	13	9	5	4	7	3	4	**69**
Meteorological	9	14	11	0	1	5	0	0	2	1	**43**
Total	**29**	**22**	**20**	**17**	**11**	**10**	**9**	**8**	**6**	**5**	**137**

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Figure 4 – Top 10 countries in terms of disaster mortality in 2008 and distributed by disaster type

Country	Disaster distribution	No. of deaths	Country	Disaster distribution	Deaths per 100,000
Myanmar		138 366	**Myanmar**		235.3
China P Rep		88 450	**Haiti**		7.9
India		1 808	**China P Rep**		6.7
Afghanistan		1 317	**Afghanistan**		4.7
Philippines		959	**Belize**		2.5
Haiti		698	**Mongolia**		2.0
Viet Nam		411	**Kyrgyzstan**		1.4
United States		303	**Philippines**		1.1
Pakistan		249	**Namibia**		0.9
Brazil		203	**Honduras**		0.9

Climatological Geophysical Hydrological Meteorological

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Figure 5 – Top 10 countries by victims in 2008 and distributed by disaster type

Country	Disaster distribution	No.victims (Millions)	Country	Disaster distribution	Victims/ pop. (%)
China P Rep		133.4	Djibouti		43.4
India		14.0	Tajikistan		43.4
United States		13.4	Somalia		38.5
Thailand		11.6	Eritrea		34.2
Philippines		8.5	Antigua&Barbuda		30.7
Ethiopia		6.5	Thailand		17.3
Somalia		3.4	Belize		15.0
Tajikistan		2.8	Guyana		13.1
Myanmar		2.6	China P Rep		10.0
Brazil		1.8	Philippines		9.4

Climatological Geophysical Hydrological Meteorological

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Figure 6 – Top 10 countries by damages in 2008 and distributed by disaster type

Country	Disaster distribution	Damages (US$ Bn.)	Country	Disaster distribution	% of GDP
China P Rep		111.0	Myanmar		29.5
United States		57.8	Tajikistan		22.3
Myanmar		4.0	China P Rep		3.0
Cuba		3.6	Cuba		2.8
Germany		2.7	Ecuador		2.1
Australia		2.5	Yemen		1.5
Brazil		1.0	Viet Nam		0.8
Ecuador		1.0	Belize		0.7
Ukraine		1.0	Madagascar		0.7
Tajikistan		0.8	Ukraine		0.7

Climatological Geophysical Hydrological Meteorological

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Table 2 – Top 10 most important disasters by number of persons killed

Events	Country	Persons killed
Cyclone Nargis, May	Myanmar	138 366
Earthquake, May	China P Rep	87 476
Snowstorm-Blizzard, January-February	Afghanistan	1 317
Flood, June-July	India	1 063
Typhoon Fengshen (Franck), June	Philippines and China P Rep*	658
Hurricane Hanna, September	Caribbean and Northern America**	537
Landslide, September	China P Rep	277
Flood, June	China P Rep	176
Flood, September	India	173
Earthquake, October	Pakistan	166
	Total	**230 209**

* Philippines (644), China P Rep (14)
** Haiti (529), USA (7), Dominic Rep (1)

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Table 3 – Top 10 most important disasters by number of victims

Events	Country	Victims (in millions)
Extreme winter conditions, January-February	China P Rep	77.0
Earthquake, May	China P Rep	46.0
Flood, June	United States	11.0
Drought, April	Thailand	10.0
Drought, May '08-February '09	Ethiopia and Eritrea*	8.1
Flood, June-July	India	7.9
Typhoon Fengshen (Franck), June	Philippines and China P Rep**	5.1
Drought, January-October	Somalia	3.3
Flood, July	China P Rep	3.0
Hurricane 'Gustav', August-September	Caribbean and Northern America***	2.6
	Total	**174.1**

* Ethiopia (6.4 million), Eritrea (1.7 million)
** Philippines (4.8 million), China P Rep (340 014)
*** United States (2.1 million), Cuba (450 000), Haiti (73 091), Dominican Rep (6 265), Jamaica (4 012), Turks and Caicos Is (4)

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Table 4 – Top 10 most important disasters by economic damages

Events	Country	Damages (in 2008 US$ bn)
Earthquake, May	China P Rep	85.0
Hurricane Ike, September	Caribbean and Northern America*	32.0
Extreme winter conditions, January-February	China P Rep	21.1
Flood, June	United States	10.0
Hurricane 'Gustav', August-September	Caribbean and Northern America**	9.1
Cyclone Nargis, May	Myanmar	4.0
Flood, June	China P Rep	2.2
Wildfire, November	United States	2.0
Extratropical cyclone 'Emma', February-March	Northern Europe***	1.8
Tornado, May	United States	1.6
	Total	**168.8**

* United States (30 billion), Cuba (1.5 billion), Turks and Caicos Is (500 million)
** United States (7 billion), Cuba (2 billion), Jamaica (66 198)
*** Germany (1.2 billion), Austria (500 million), Czech Rep (50 000), Poland (50 000)

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Thematic Frame: Cyclone Nargis, Myanmar, 2nd and 3rd of May 2008

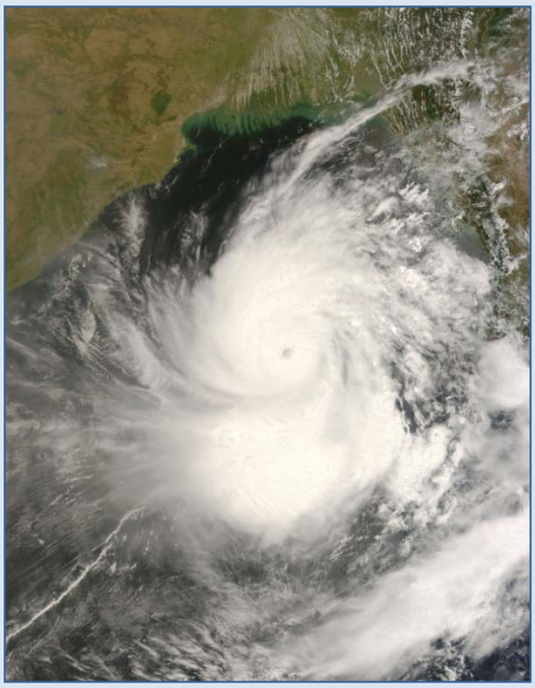


Photo Credit: NASA

Category: 4 on Saffir-Simpson scale
People killed: 84 530 deaths and 53 836 missing
People affected: 2.4 million
Economic Losses: 4 billion US$

In May 2008, Myanmar was struck by cyclone Nargis, the most devastating cyclone to hit Asia since 1991. Nargis, with very high wind speeds, record rainfalls and storm surge, caused devastation primarily in the low-lying Irrawaddy delta and in the former capital Rangoon. The World Meteorological Organization (WMO) confirmed that the major factor in the tragedy was a storm surge of over 3 meters and heavy precipitation.
Like Bangladesh, Myanmar has a densely populated low-lying delta vulnerable to storms. However, Bangladesh has a 48-hour early warning system in place, coupled with robust programs for community-based disaster preparedness, evacuation and mitigation. This system has drastically reduced the number of death from Bola in 1970 through Sidr in 2007, from 300 000 to 3 000, respectively.

The Hyogo Framework for Action (HFA), negotiated in January 2005, sets out priorities for disaster risk reduction and calls upon the international community to take practical steps to make communities safer by 2015. These include strengthening flood prevention measures and early warning systems. Also, the HFA encourages protecting precious ecosystems such as coral reefs or mangrove forests, that act as natural storm barriers. Indeed, large parts of the mangrove forests have disappeared in recent years from Myanmar's coastal zone, allowing the storm surge to strike easily 40 km inland and affect millions of people.

Moreover, the consequences of climate change-induced natural hazards will be particularly severe in the coastal cities. Some experts predict that with the migration of people into the cities, East Asia's urban population is expected to double by 2030. "With climate change inducing a rise in sea levels, East Asian cities are facing greater risk from storm surges and annual flooding. A projected one-meter rise in sea levels could lead to a two percent loss of Gross Domestic Product arising from shortage of fresh water, impacts on agriculture and fisheries, disruption of tourism, and reduced energy security. China, Myanmar, Thailand and Vietnam are expected to be most affected by rising sea levels" noted the World Bank.

Some actions should be taken urgently. This year, two majors events, the second session of the Global Platform for Disaster Risk Reduction (June) and the COP15-United Nations Climate Change Conference Copenhagen (December), will give the chance for all actors, decision makers, and business leaders to meet. The window of opportunity is closing fast and the coming months will be the decisive period for stakeholders from all sectors, across the globe, to call on political leaders to agree to an ambitious treaty to succeed the Kyoto Protocol.

Contributed by UNISDR

3. How different was 2008?

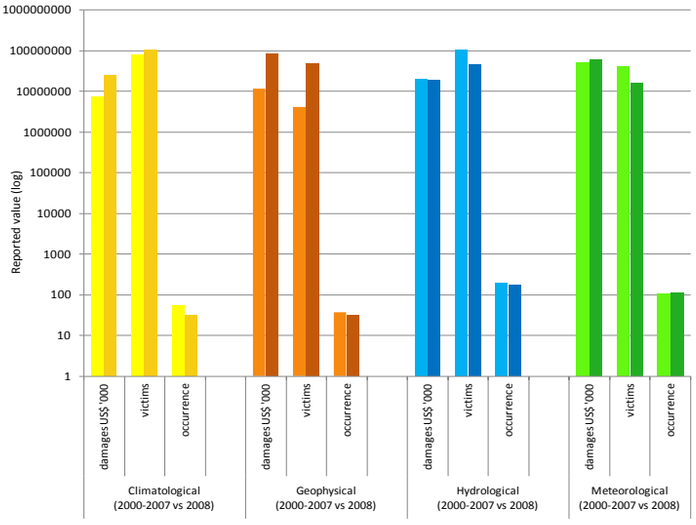
Although less pronounced than in other years, 2008 contributed to the upward global trend in natural disaster occurrence observed over the last decade. As in previous years, hydrological and meteorological disasters were the main contributors to this pattern. Though fewer disasters occurred in 2008 compared to 2000-2007, events had a larger impact on human settlements.

In 2008, the number of **geophysical** disasters (32) increased compared to 2007 (26), but still remained below the 2000-2007 annual average of 37 disasters. However, the human impacts of these geophysical disasters in 2008 can be described as enormous, as they were multiplied by a factor of 10 compared to the annual average over the last 8 years (see Figure 7). This is not a steady increasing trend over the last years; rather it shows the impact of few single geophysical events in 2008 that had major human impact, in particular the Sichuan earthquake in China that resulted in a total of 46 million victims. Similar to the human impacts, the economic damages of geophysical disasters were tremendous in 2008, again mostly due to the earthquake in China.

Meteorological disasters tend to show a cyclical pattern over time, with major disasters occurring some years and being absent other years. Although the number of meteorological events increased slightly in 2008, the reported number of victims decreased when compared to the 2000-2007 annual average. However, cyclone Nargis in Myanmar caused the highest number of disaster-related deaths in 2008.

Despite the fact that **hydrological** disasters remained the most common disaster in 2008, their impact was relatively small compared to previous years. The number of hydrological disasters (178) was below the 2000-2007 annual average (196). The number of victims of hydrological disasters decreased in 2008, whereas economic damages remained relatively stable.

Figure 7 – Natural disasters impacts by disaster sub-group: 2008 versus 2000-2007 annual average



Although **climatological** disasters were less numerous in 2008 compared to the annual average of 2000-2007, the number of victims increased by 30%, mainly due to extreme winter conditions in China (77 million victims), and droughts in Africa (14 million victims) and Asia (12 million victims). 2008 was marked by the occurrence of unusually costly climatological disasters, with extreme winter conditions in China costing 21 billion US$, and wildfires in the US causing 2 billion US$ damages.

It is worth noting that, although worldwide disaster occurrence seems to follow an upward trend, some of their impacts on societies (victims and economic damages) are much more stable. Human adaptation, adopted mitigation measures and the magnitude and extent of disasters could be some of the factors involved in the moderation of these numbers. In addition, these data should be understood within the context of current global population growth that should predict an increase in these impacts over time, in absence of any adaptation.

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Thematic Frame: Sichuan Earthquake, China, 12 May 2008

Yingxiu Elementary School, Sichuan - Photo credit: Julia Kao on Flickr

Magnitude: 7.9 Richter scale
People killed: 68 858 deaths and 18 618 missing
People affected: 45.6 million
Economic Losses: 85 billion US$

In May 2008, the Sichuan province of China was hit by the most powerful earthquake since 1976. Around 45 million people in 10 provinces were affected. More than 26 million buildings were damaged and around 5 million totally collapsed.

Moreover, the data collected show that "more than 10 000 school buildings in Sichuan were badly damaged by the 12 May earthquake. Almost 7 000 schools were completely destroyed and many others suffered partial damage. UNICEF estimates that the number of school children affected is in the millions." At least 9 000 children died under schools that crumbled.

The collapsed schools are a sign of poor construction despite 'adequate' buildings codes. Why? In the 21st century, it is possible for buildings to resist an earthquake of magnitude 7 or 8, but it is often considered cost prohibitive, adding 7 to 8 percent in building costs.

The UNISDR Secretariat, UNESCO & UNICEF jointly launched a global campaign in 2006-2007 called "Disaster risk reduction begins at schools" to promote school safety and disaster risk reduction. This was followed by the 2008-2009 world campaign with WHO and the World Bank to promote safe hospitals and health facilities. Both schools and hospitals, if they are properly designed and built, can play an important role in saving the lives of society's most vulnerable people during disasters.

However, it has been difficult to place responsibility for the school and hospital "killers" partly because in many cases it is unclear which levels of government or ministries are responsible for school and hospital construction following building codes and for ongoing inspections. This is the case in the People's Republic of China, but also in many countries around the world. The synergies between ministries should be improved and start upstream, before a disaster strikes.

Remember why people die in earthquakes: ill-constructed buildings are the main killers when earthquakes strike – which is why constructing resilient buildings in earthquake-prone zones is vital.

Contributed by UNISDR

4. Regional analysis

As in previous years, Asia remained in 2008 the most affected continent by natural disasters, followed by the Americas and Africa. In contrast, Africa showed the smallest share in reported economic damage costs of natural disasters in 2008 (see Maps 1, 2 and 3).

Table 5 – Natural disaster occurrence and impacts: regional figures

No. of Natural Disasters	Africa	Americas	Asia	Europe	Oceania	Global
Climatological 2008	10	4	9	9	0	**32**
Avg. 2000-07	9	14	13	19	2	**57**
Geophysical 2008	3	8	18	2	1	**32**
Avg. 2000-07	3	7	22	3	2	**37**
Hydrological 2008	48	39	73	9	9	**178**
Avg. 2000-07	42	39	82	28	5	**196**
Meteorological 2008	10	44	43	13	2	**112**
Avg. 2000-07	9	34	42	15	7	**107**
Total 2008	**71**	**95**	**143**	**33**	**12**	**354**
Avg. 2000-07	**63**	**94**	**160**	**65**	**16**	**397**

No. of Victims (millions)	Africa	Americas	Asia	Europe	Oceania	Global
Climatological 2008	14.5	0.1	91.1	0.00	0.0	**105.6**
Avg. 2000-07	9.6	1.1	68.4	0.33	0.0	**79.5**
Geophysical 2008	0.0	0.1	47.6	0.01	0.0	**47.8**
Avg. 2000-07	0.1	0.4	3.6	0.01	0.0	**4.2**
Hydrological 2008	1.0	15.9	27.7	0.24	0.1	**44.9**
Avg. 2000-07	2.5	1.3	101.7	0.39	0.0	**105.9**
Meteorological 2008	0.8	3.7	11.4	0.00	0.0	**15.9**
Avg. 2000-07	0.4	2.8	38.0	0.41	0.0	**41.7**
Total 2008	**16.2**	**19.9**	**177.8**	**0.26**	**0.1**	**214.3**
Avg. 2000-07	**12.6**	**5.6**	**211.8**	**1.13**	**0.1**	**231.2**

Damages (2008 US$ bn)	Africa	Americas	Asia	Europe	Oceania	Global
Climatological 2008	0.4	2.0	21.9	0.0	0.0	**24.4**
Avg. 2000-07	0.0	2.4	1.1	3.5	0.4	**7.4**
Geophysical 2008	0.0	0.0	85.8	0.0	0.0	**85.8**
Avg. 2000-07	0.8	1.0	9.5	0.3	0.0	**11.6**
Hydrological 2008	0.3	12.1	3.7	1.3	2.1	**19.5**
Avg. 2000-07	0.4	1.9	9.7	7.7	0.3	**19.9**
Meteorological 2008	0.1	50.0	6.8	3.4	0.5	**60.7**
Avg. 2000-07	0.1	38.6	10.7	3.0	0.3	**52.6**
Total 2008	**0.9**	**64.0**	**118.2**	**4.7**	**2.5**	**190.3**
Avg. 2000-07	**1.3**	**43.8**	**31.0**	**14.5**	**1.0**	**91.6**

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Africa

In 2008, Africa accounted for 20% of global natural disaster occurrence (see Table 5). The continent showed a small decrease in reported natural disaster occurrence compared to the 2000-2007 annual average, mostly due to a decline in hydrological disasters. However, the number of victims increased compared to 2000-2007. Climatological disasters were an important contributor to this increase, as Africa was hit by severe droughts, leading to over 14 million victims. Data on Africa reveal a crucial lack of reporting of natural disasters in general, and more particularly of economic losses due to disasters. Africa accounted for less than 0.5% of global reported economic damage costs from natural disasters in 2008, a share that is likely to be underestimated.

Americas

The number of reported natural disasters in the Americas remained stable in 2008 compared to the annual average of 2000-2007. The Americas accounted for more than 25% of global natural disaster occurrence in 2008. A shift in disaster types was seen, as climatological disaster occurrence decreased from 15% to 4% and meteorological disaster occurrence increased from 36% to 46% of total reported natural disasters in this continent (2000-2007 avg. versus 2008). The Americas showed a 4-fold increase in the number of victims in 2008 compared to the previous years' average. Hydrological disasters caused the most victims in 2008 (80%). Although the number of hydrological disasters in the Americas remained the same, they caused more economic damage in 2008 (4% of total costs in 2000-2007 versus 19% in 2008). Meteorological disasters contributed most to economic damage costs in the Americas in 2008 (78%).

Asia

In 2008, 40% of all reported natural disasters occurred in Asia, which is approximately the same share as seen in the annual average of 2000-2007. More than 80% of the reported victims of natural disasters in 2008 are from Asia, which is 10% less than the average in previous years (see Table 5). Despite a decrease in the number of victims, the economic damage costs in Asia increased greatly in 2008 compared to the annual average of 2000-2007. Asia's contribution to the global economic damage costs due to natural disasters almost doubled from 34% in the period 2000-2007 to 62% in 2008. The impact of natural disasters on middle income countries, such as China, which was the largest contributor to economic losses in 2008, seems to be on the rise. As countries move up the development ladder, their economic vulnerability tends to increase. These countries need to invest more in disaster risk reduction measures if they want to better protect development gains.

Europe

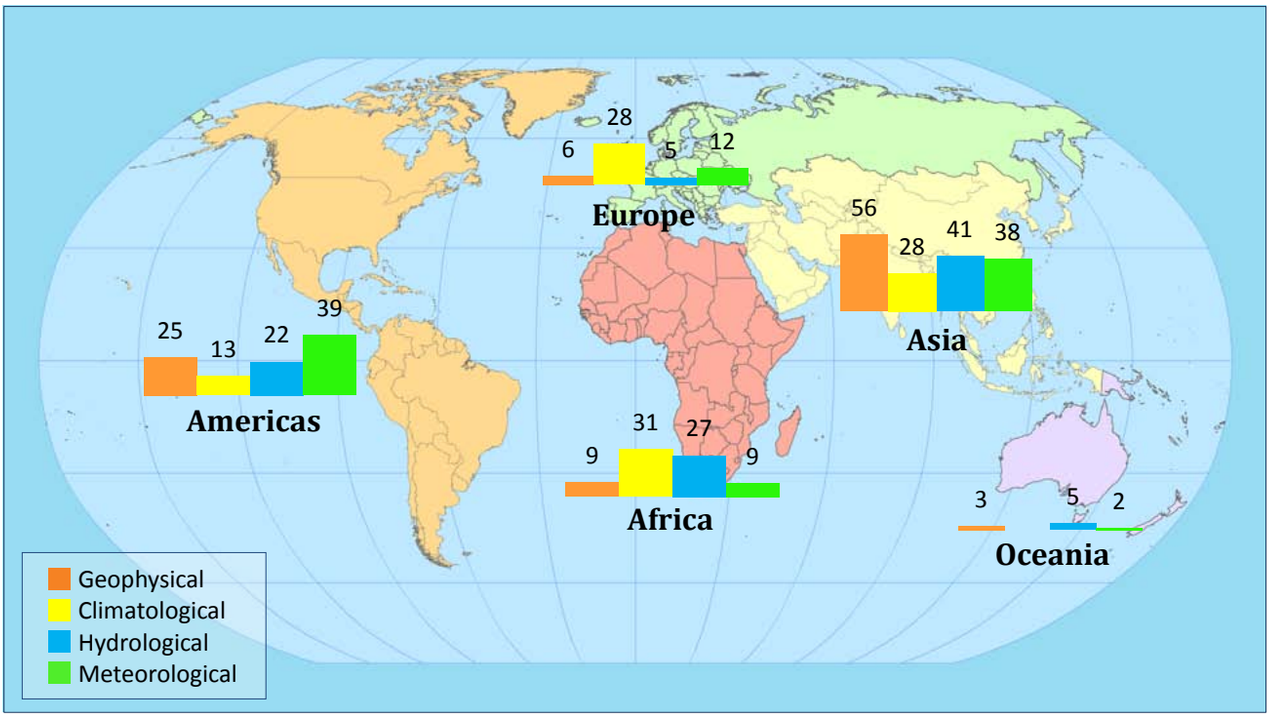
Compared to previous years, Europe in 2008 showed the greatest decline in reported natural disaster occurrence among the five continents. Europe's share in disaster occurrence was 9% in 2008, compared to 16% during 2000-2007. This drop is mostly explained by a decrease in both reported hydrological and climatological disasters. Likewise, Europe experienced a decrease in victims. However, this was mostly seen in climatological and meteorological disasters. Europe's decrease in economic damage costs was mainly due to the impacts of hydrological and climatological disasters, which were much smaller in 2008 compared to the annual average of 2000-2007. On a global scale, economic damage costs due to natural disasters in Europe dropped from 16% (2000-2007) to 2.5% (2008) of worldwide damage costs. This does not reflect a decreasing trend in damage costs in Europe; rather it reflects the impact of mega-disasters that happened in 2008 on other continents.

Oceania

In 2008, Oceania was, as in previous years, mostly affected by hydrological and meteorological disasters. Hydrological disasters were responsible for over 85% of total reported victims in Oceania in 2008 and also caused most economic losses. Because the continent, with the exception of Australia and New-Zealand, covers many small islands states, natural disasters have a relatively large human and economic impact when taking into consideration country surface, number of inhabitants and Gross Domestic Product (GDP).

When comparing low, middle and high income countries, for the first time in 2008 the middle income countries were the main contributors to economic damage costs from natural disasters. Middle income countries are likely to suffer increasing disaster related losses in the future, since their developing economies put many at risk if disaster risk reduction measures are not included in policy programs. This calls for higher awareness and action of development planners and decision makers at national and local level, in order to build disaster resilient communities and decrease disaster losses in the future.

Map 1 – Percent share by disaster sub-group by continent in 2008



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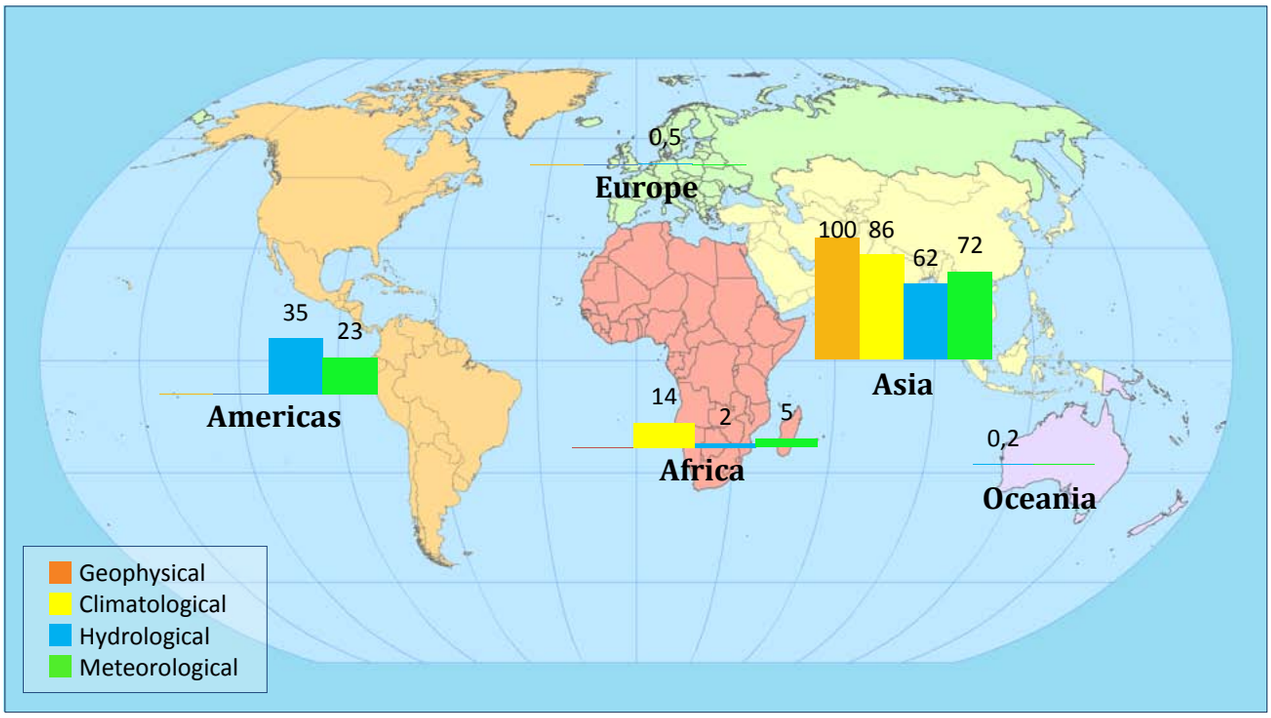
Map 2 – Percent share of victims by disaster sub-group by continent in 2008



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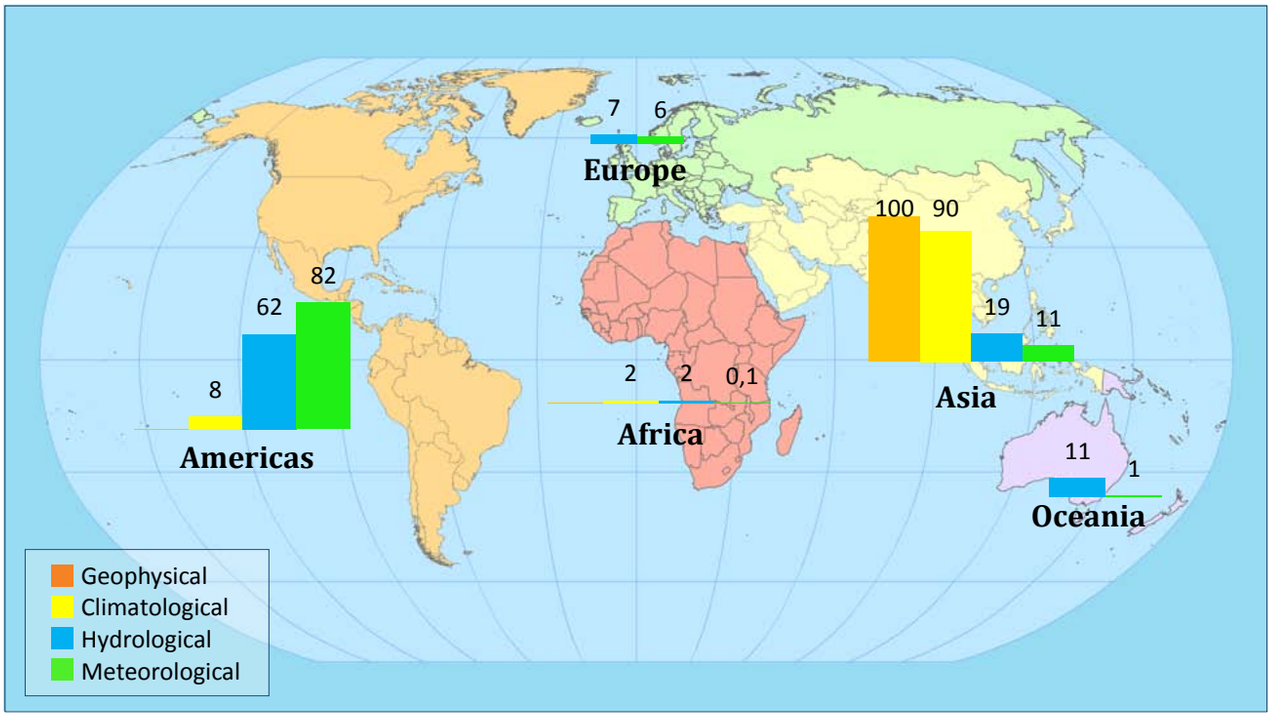
Map 3 – Percent share of economic damages by disaster sub-group by continent in 2008



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ANNEX 1: Definition table

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: Disaster 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.

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 (esp. 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.

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

This Symbology Standard was developed by the Federal Geographic Data Committee's Homeland Security Working Group (FGDC HSWG). Please note that these symbols are a draft prototype.

ANNEX 2: List of countries

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

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
Macao (China)
Malaysia
Maldives
Mongolia
Myanmar
Nepal
Occupied Palestinian Territory
Oman
Pakistan
Philippines
Qatar
Saudi Arabia
Singapore
Sri Lanka
Syrian Arab Republic
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
Faeroe 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

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