

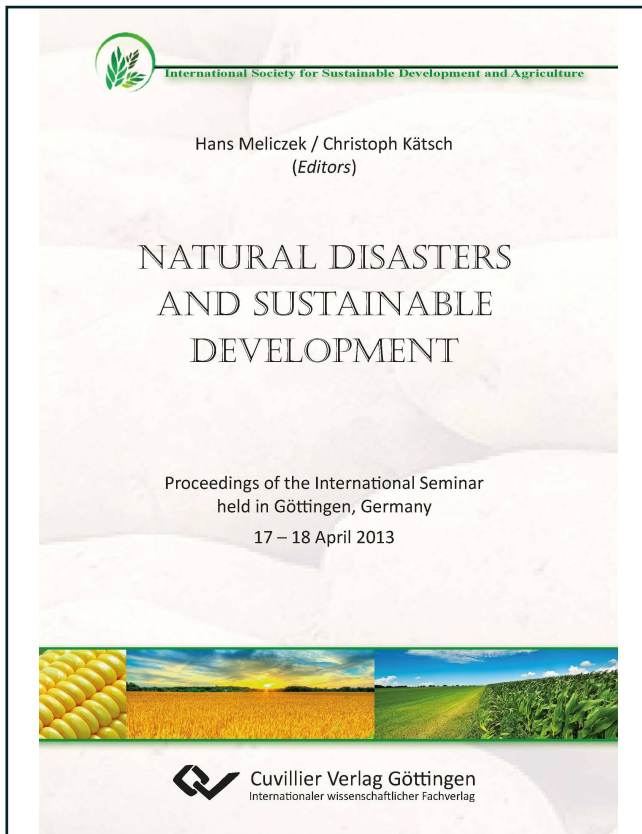


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## **Natural Disasters and Sustainable Development**

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# Natural Disasters and Sustainable Development, an Overview

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## Introduction

Over the last 60 years the world has experienced a dramatic increase in the number of natural disasters such as floods, hurricanes, earthquakes, volcanic eruptions and tsunamis. Disasters constitute a serious impediment to sustainable development and are frequently a major cause for slow social and economic progress.

The concern about the destructive effects of natural disasters on the lives and livelihoods of individuals and communities has been on the agenda of the international community since the UN Conference on Disaster Risk Reduction held in Yokohama in 1994 (UN, 1994). The progress achieved in international efforts for disaster risk reduction was subsequently debated at the World Conference on Disaster Reduction, held in Kobe, Hyogo Prefecture, Japan in January 2005. The conference adopted the Hyogo Framework of Action which emphasizes a shift from reactive emergency relief to pro-active disaster risk reduction. It recognized that disaster loss was on the rise with grave consequences for the survival, dignity and livelihood of individuals and adopted a Framework of Action to promote a strategic and systematic approach to reduce vulnerabilities and risks to hazards (UNISDR, 2005).

Natural disasters are the result of the combination of hazard, vulnerability and insufficient capacity to reduce the potential chances of risk. A disaster happens when a hazard impairs vulnerable populations and causes damage and casualties. An earthquake, for instance, in an unpopulated desert is not considered a disaster. It is disastrous only when it affects people, their properties and activities. Vulnerability factors are environmental degradation, inappropriate locations, unsafe buildings and lack of institutions and inadequate education.

A generally accepted definition of a disaster originates from the Centre for Research on the Epidemiology of Disasters (CRED) in Louvain, Belgium and the International Federation of the Red Cross. They have defined a disaster as “a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance” (IFRC, 2012). A similar, but more elaborate definition is being used by the World Bank (WB, 2006). Natural disasters may be classified by their origin, such as geophysical events (earthquakes, volcanic eruptions), meteorological events (storms), hydrological events (flooding) and climatological events (droughts) (MunicRe, 2012).

A worldwide analysis of the occurrence and trend of natural disasters and their impact requires access to an international data base. The most comprehensive compilation of disaster data is available from CRED. On the basis of information collected by governments of the affected countries and other sources including UN agencies, NGOs, insurance companies, research institutes and press agencies CRED prepares and maintains the Emergency Events



Data Base (EM-DAT). It contains information on some 18.000 disasters which have happened in the world since 1900. Its data are published annually in cooperation with the International Federation of Red Cross and Red Crescent Societies in the yearbooks: Disasters of the World (IFRC)).

Other important sources on the occurrence of natural disasters and the damage created by them are the United Nations Office for Disaster Risk Reduction (UNISDR), the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), the World Bank and Munich Re.

The bases of disaster statistics are data collected by various institutions at the local level such as police officers, teachers, religious leaders, journalists and members of NGOs. However, the information collected from a variety of sources is not specifically gathered for statistical purposes and definitions used are frequently not comparable nationally and internationally. Data on the numbers of people affected are sometimes poorly reported. The definition of people affected remains open to interpretation, political or otherwise. Sometimes data are extrapolated from old census information with assumptions being made about percentages of an area's population affected.

Data can also be skewed because of the rationale behind data gathering. Reinsurance companies, for instance, gather data on disaster occurrence in order to assess insurance risks, but with a priority in areas of the world where disaster insurance is widespread. Their data may therefore miss out poor, disaster-affected regions where insurance is unavailable (IFRC, 2012).

## Types of Disasters

Following the CRED definition natural disasters are divided into several sub-groups of which the following are of relevance to this review: Floods, droughts and wild fires, storms, earthquakes and volcanic eruptions.

**Floods** are the most destructive disasters in terms of the number of persons affected, their number amounting between 2002 and 2011 to 1.175.849 people (IFRC, 2012). Floods are caused by unusual amounts of rain, the silting up of rivers and the loss of absorptive capacity of the soil, both legacy of poor agricultural practices that destroy ground cover and other natural defences (WB, 2006, p. 4). Big floods are terrifying because they come quickly and with massive force, sparing nothing in their path. The death toll can be enormous. Floods are rapid onset hazards and perhaps the most difficult of all hazards to assess in terms of impact.

In 2011 the most severe floods occurred in China in June and September affecting 68 and 20 million persons respectively. Fifteen other floods affected during this year 1 to 10 million people for a total of 45 million persons (IFRC, 2012). Mozambique experienced a major flood in 2000. It covered much of the country for three weeks resulting in 1.000 deaths and leaving the country devastated for years afterwards.

**Droughts** have long been considered to be a hazard responsible for ups and downs of many civilizations in the world. They are more frequent and affect almost as many persons as floods. As a slow onset hazard that often extends for more than a year droughts have the



potential to cause longer-term economic disruptions than a rapid onset hazard (INGC, 2011). Droughts occur when rainfall is absent for a prolonged period of time, causing earth to parch, wells to dry, underground water levels to fall and crops to wither leading to crop failure and scarcity of fodder for livestock. Drought problems associated with shortage of water are intensified by deforestation, soil erosion and inappropriate land use.

The United States of America experienced in 2012 the most severe drought since the start of weather recording in 1895. In the Middle West almost 50 % of the cultivated area was affected by drought. In the corn belt of Iowa, Indiana and Illinois crop failure extended to even 70 %. The drought happened in the months June to September and caused crop losses of Euro 15 billion (MunicRe, 2013). During the same year extensive drought losses also happened in Russia, Kazakhstan, Ukraine, Brazil and Argentina. At the international level these national droughts have led to increased grain prices, particularly for Maize and Soya (FAO, 2012). Intensive droughts have occurred in several years in Ethiopia, the most serious one happened in 1984 causing more than 300.000 deaths.

Droughts are often accompanied by wild fires. A most recent example is the occurrence of over 90 bush fires that have destroyed forests and houses in New South Wales and Tasmania in January 2013.

**Cyclones** are low atmospheric pressure systems rotating in the same direction of the earth. Depending on its location and strength a tropical cyclone is referred to by names such as hurricane, typhoon, tropical storm, tropical depression or simply cyclone. Cyclones have wind gusts in excess of 90 km/h around their centres and may exceed 280 km/h. They are often associated with heavy rainfall and flooding and can cause extensive property damage.

During the period 2002 to 2011 a total of 1.022 cyclones have been reported worldwide. They killed more than 170.000 persons and caused a damage of US\$ 580 billion (IFRC, 2012). In 2008 typhoon Nargis caused 138.375 deaths in Myanmar.

The Philippines is one of the countries that are frequently haunted by typhoons. In a typical year 20 tropical cyclones enter the Philippines Area of Responsibility. The latest and strongest typhoon, named Bopha, hit the country in December 2012 and affected 6.3 million people. More than 1.200 persons were killed and over 216.000 houses were destroyed (OCHA, 2013). The typhoon disrupted communication, caused power outages and flooding and triggered excessive landslides.

In August 2005 hurricane Katrina battered the Gulf coast of the USA and killed 1.836 persons. Katrina is estimated as the costliest tropical cyclone worldwide, causing US\$ 81.2 billion (in 2008 US\$) in property damage (Knabb, et al., 2005). In Bangladesh the 1991 Gorky cyclone killed 138.000 persons, affected 15 million people and caused US\$ 1.7 billion damage.

**Earthquakes** are the result of a sudden release of energy in the earth's crust that creates seismic waves. They are caused mostly by the rupture of geological faults. The magnitude of a quake is measured by the Richter scale whereby quakes with a magnitude of seven and above cause serious damage over large areas, while the more frequent events with magnitudes below five are imperceptible or weak.

The deadliest natural disaster worldwide since 1900 was the earthquake that affected Haiti in January 2010. It caused 316.000 deaths. More than 300.000 persons were injured and 1.3 million were made homeless (NOAA, 2010). One year later, in September 2011 a



severe earthquake affected 575.00 people in India and in February of the same year 300.000 persons were affected by earthquakes in New Zealand.

Earthquakes are particularly deadly when they happen in the proximity to either heavily populated areas or close to oceans where they may create tsunamis. The most recent combination of earthquake and tsunami happened in Japan in March 2011 and affected 369.000 people (IFRC, 2012, p. 248). The Tohotu earthquake and tsunami had a magnitude of 9, caused 15.840 fatalities and generated economic loses of US\$ 210 billion making it the costliest catastrophe of all time (Schlein, 2012, MunicRe, 2012).

The second deadliest event worldwide since 1990 was the Indian Ocean Tsunami of December 2004 which has caused 240.000 deaths in Indonesia, Sri Lanka, Thailand and the Maldives (NOAA). Among all the disasters which happened worldwide between 2002 and 2011 earthquakes and tsunamis were by far the deadliest phenomena causing some 680.000 deaths.

## Effects of Disasters

A review of the effects of all natural disasters that happened between 2002 and 2011 shows that Asia has been the most affected continent in terms of their numbers, the number of people killed and affected and in terms of economic damage (see Table 1).

**Table 1:** Natural disasters and their effects by continent, 2002-2011

	<b>No. of disasters</b>	<b>No. of people killed</b>	<b>No. of people affected in thousands</b>	<b>Damage in millions of US\$*</b>
Africa	734	13.222	291.897	11.495
Americas	947	247.807	87.637	554.913
Asia	1.524	744.138	2.294.310	672.430
Europe	601	138.335	7.299	135.641
Oceania	157	1.493	1.657	50.423
<b>Total</b>	<b>3.963</b>	<b>1.145.015</b>	<b>2.682.800</b>	<b>1.424.902</b>

\* In 2011 prices

Source: IFRC, 2012

Asia continued to be even in 2012 the most disaster prone region of the world. During the first 10 months of 2012 83 disaster events caused 3.103 deaths, affected 64.5 million people and triggered US\$ 15.1 billion damages. The disasters of the three regions, Southern, South-Eastern and Eastern Asia accounted for 57 % of the total deaths worldwide, 74 % of the affected people and 34 % of the total economic damages worldwide (UNISDR, Evidence, 2012).

With regard to the frequency of disasters the year 2011 was about 10 % below the 10 year average but natural disasters costs were the highest of the decade. The reason for this high amount of costs was the earthquake and tsunami in Japan which caused economic loss-



es of US\$ 210 billion making it the costliest natural catastrophe of all time (Schlein, 2012). Thirty earthquakes caused the highest share of casualties and with 2/3 of the damage produced they also created the largest share of damage during 2011. Damages from floods accounted for more than US\$ 72 billion (see Table 2) and were the highest reported for this type of disaster in the decade. The most expensive flood in 2011 happened in Thailand with a cost of US\$ 40 billion.

On a worldwide scale the economic losses are distributed relatively evenly among the origins of the disasters: storms, floods and earthquakes each make up 30 % of the recorded losses, while other hazards account for the remaining 10 % (Von Braun, et al., 2002).

**Table 2:** Natural disasters and their effects by type of phenomenon, 2011

	<b>No. of disasters</b>	<b>No. of people killed</b>	<b>No. of people affected in thousands</b>	<b>Damage in million US\$</b>
Droughts	15	--	21.759	8.142
Earthquakes	30	20.946	1.607	230.300
Floods	158	5.923	143.067	72.551
Forest fires	7	10	15	2.937
Volcanic eruptions	6	3	46	--
Storms	84	3.103	38.520	50.872
Other disasters	54	1.120	4.498	781
<b>Total</b>	<b>336</b>	<b>31.105</b>	<b>209.512</b>	<b>365.583</b>

Source: IFRC, 2012

Developing countries suffer the greatest costs when a disaster hits, more than 95% of all deaths by disasters occur in developing countries and losses due to natural disasters are 20 times greater (in terms of GDP) in developing countries than in industrialized countries (WB, 2013). The situation is particularly serious in developing countries where no comprehensive insurance against natural disasters exist (Liebrich, 2013).

It has been estimated that since the United Nations Conference on Environment and Development held in Rio de Janeiro i.e. from 1992 up to 2012 damage caused by disasters worldwide amounted to US\$ 2.0 trillion, similar to 25 years of total Overseas Development Aid (UNISDR, 2012).

2011 was the most expensive year since the introduction of crop insurance. MunichRe estimates losses in the amount of US\$ 20 billion. Because of crop insurance introduced in the United States after the drought in 1988 more than 80% of the cultivated area was insured and therefore economic failure in 2012 was less as compared to the drought of 1988 in the cause of which 30 % of the farmers lost their existence. In Europe farmers may receive in the case of natural disasters some compensation against crop losses from the European Union (Liebrich, 2013).