Chapter 1

The global challenge: disaster risk, poverty and climate change

Another crop of disasters

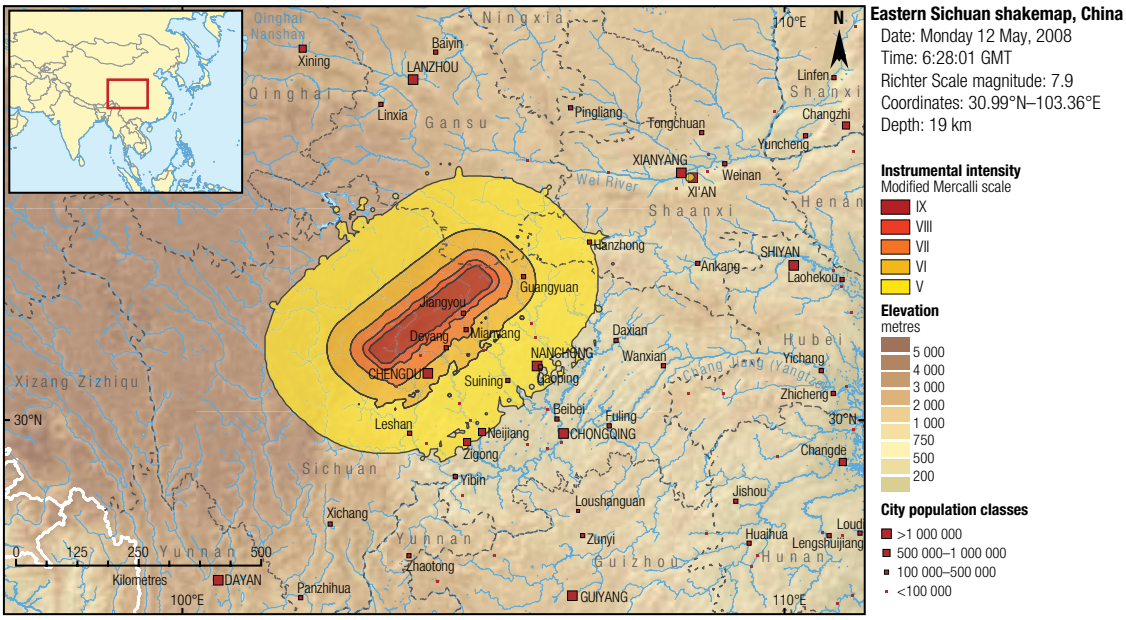
In 2008, numerous major disasters provided a stark reminder of the massive concentrations of disaster risk that threaten human development gains across the world. In May, the tropical cyclone Nargis caused an estimated 140,000 mortalities in Myanmar, primarily due to a storm surge in the low-lying, densely populated Irrawaddy River delta.

In May, China's most powerful earthquake since 1976 affected Sichuan and parts of Chongqing, Gansu, Hubei, Shaanxi and Yunnan killing at least 87,556 people, injuring more than 365,000[1] and affecting more than 60 million people in ten provinces and regions. An estimated 5.36 million buildings collapsed and more than 21 million buildings were damaged. Figure 1.1 shows the locations of large and medium urban centres in areas that experienced strong earthquake intensities.

Also in August 2008, the Kosi River in Bihar, India, broke through an embankment and changed its course 120 km eastwards, rendering useless more than 300 km of flood defences that had been built to protect towns and villages. Flowing into supposedly flood safe areas, the river affected 3.3 million people in 1,598 villages located in 15 districts[2]. It was characterized as the worst flood in the area for 50 years, prompting the Prime Minister of India, Manmohan Singh, to declare a "national calamity" on 28th August.

Figure 1.1: Earthquake intensities and location of cities, China, 12 May, 2008

Source: Cartography: United Nations Environment Programme/Global Resource Information Database-Europe (UNEP/GRID-Europe); data sources for Sichuan earthquake in Modified Mercalli Intensity (MMI), courtesy of United States Geological Survey (USGS), shakemap.



1.1 Intensive and extensive disaster risk

Internationally reported disaster loss is heavily concentrated in a small number of infrequently occurring events. Between January 1975 and October 2008 and excluding epidemics, the International Emergency Disasters Database EMDAT recorded 8,866 events killing 2,283,767 people. Of these, 23 mega-disasters (listed in Table 1.1) killed 1,786,084 people, mainly in developing countries. In other words, 0.26% of the events accounted for 78.2% of the mortality[3].

In the same period, recorded economic losses were US$ 1,527.6 billion. Table 1.2 lists 25 mega-disasters that represented only 0.28% of the events, yet accounted for 40% of that loss, mainly in developed countries.

Of the ten disasters with the highest death tolls since 1975, no fewer than half (highlighted in Table 1.1) have occurred in the five year period between 2003 and 2008. Table 1.2 likewise indicates that four of the ten disasters with the highest economic losses occurred in the same period.

Nationally reported disaster loss is similarly highly concentrated. Losses reported between 1970 and 2007 at the local government level in a sample of 12 Asian and Latin American countries[5] showed that 84% of the mortality and 75% of the destroyed housing was concentrated in only 0.7% of the loss reports. Destruction in the housing sector usually accounts for a significant proportion of direct economic loss in disasters.

At whatever scale disaster losses are viewed, therefore, mortality and direct economic loss appear to be highly concentrated geographically and associated with a very small number of hazard events. These are areas where major concentrations of vulnerable people and economic assets are exposed to very severe hazards. In this report the term *intensive risk* is used to refer to these concentrations.

In contrast, and at whatever scale disaster losses are viewed, wide regions are exposed to more frequently occurring low-intensity losses. These widespread low-intensity losses are associated with other risk impacts such as a large number of affected people and damage to housing and local infrastructure, but not to major mortality or destruction of economic assets. For example, 99.3% of local loss reports in the 12 countries mentioned accounted for only 16% of the mortality but 51% of housing damage. These losses are pervasive in both space and time. In the country sample, 82% of local government areas

Table 1.1: Disasters with more than 10,000 fatalities, January 1975 – June 2008[4]

(Highlighting denotes disasters within the five-year period, 2003–2008.)

Source: EMDAT; Analysis by ISDR, 2008 (data as of September 2008)

Year	Country	Disaster	Fatalities
1983	Ethiopia	Ethiopian drought	300,000
1976	China	Tangshan earthquake	242,000
2004	South Indian Ocean	Indian Ocean tsunami	226,408
1983	Sudan	Sudan drought	150,000
1991	Bangladesh	Cyclone Gorky	138,866
2008	Myanmar	Cyclone Nargis	133,655
1981	Mozambique	Southern Mozambique drought	100,000
2008	China	Sichuan earthquake	87,476
2005	India, Pakistan	Kashmir earthquake	73,338
2003	Europe	European heat wave	56,809
1990	Iran	Manjil-Rudbar earthquake	40,000
1999	Venezuela	Vargas floods	30,000
2003	Iran	Bam earthquake	26,796
1978	Iran	Tabas earthquake	25,000
1988	Soviet Union	Spitak earthquake	25,000
1976	Guatemala	The Guatemala earthquake	23,000
1985	Colombia	Nevado Del Ruiz volcano	21,800
2001	India	Gujarat earthquake	20,005
1999	Turkey	Izmit earthquake	17,127
1998	Honduras	Hurricane Mitch	14,600
1977	India	Andhra Pradesh cyclone	14,204
1985	Bangladesh	Bangladesh cyclone	10,000
1975	China	Haicheng earthquake	10,000

Table 1.2: Disasters leading to losses of more than US$ 10 billion, January 1975 – June 2008

(Highlighting denotes disasters within the five-year period, 2003–2008.)

Source: EMDAT; Analysis by ISDR, 2008 (data as of September 2008)

Year	Country	Hazard	Total loss (billion US$)
2005	United States of America	Hurricane Katrina	125
1995	Japan	Kobe earthquake	100
2008	China	Sichuan earthquake	30
1998	China	Yangtze flood	30
2004	Japan	Chuetsu earthquake	28
1992	United States of America	Hurricane Andrew	26.5
1980	Italy	Irpinia earthquake	20
2004	United States of America	Hurricane Ivan	18
1997	Indonesia	Wild fires	17
1994	United States of America	Northridge earthquake	16.5
2005	United States of America	Hurricane Charley	16
2004	United States of America	Hurricane Rita	16
1995	Democratic People's Republic of Korea	Korea floods	15
2005	United States of America	Hurricane Wilma	14.3
1999	Taiwan (China)	Chichi earthquake	14.1
1988	Soviet Union	Spitak earthquake	14
1994	China	China drought	13.8
1991	China	Eastern China floods	13.6
1996	China	Yellow River flood	12.6
2007	Japan	Niigataken Chuetsu-oki earthquake	12.5
1993	United States of America	Great Midwest flood	12
2002	Germany	River Elbe floods	11.7
2004	United States of America	Hurricane Frances	11
1991	Japan	Typhoon Mireille	10
1995	United States of America	Major west coast wind storm	10

reported disaster losses at least once between 1970 and 2007, 48% reported disaster losses six or more times and there was an average of nine local loss reports per day.

This geographically dispersed exposure of vulnerable people and economic assets to mainly low or moderate intensity hazard is described as *extensive risk* in this report. Intensive and extensive risk, therefore, refer to the relative concentration or spread of disaster risk in space and time, at whatever scale risk is observed.

1.2 The configuration of disaster risk

Disasters are often viewed as exogenous shocks that destroy and erode development gains. Disaster risk, however, is far from exogenous to development. It is configured over time through a complex interaction between development processes that generate conditions of exposure, vulnerability and hazard.

Globally, disaster risk is increasing for most hazards, although the risk of economic loss is increasing far faster than the risk of mortality. For example, assuming constant hazard it is estimated that global flood mortality risk increased by 13% between 1990 and 2007, while economic loss risk increased by 33%. The main driver of this trend is rapidly increasing exposure. As countries develop, and both economic conditions and governance improve, vulnerability decreases but not sufficiently rapidly to compensate for the increase in exposure, particularly in the case of very rapidly growing low-income and low- to middle-income countries. When economic development stabilizes and slows down, the rate

of increase in exposure may decelerate and be overtaken by reductions in vulnerability, leading to a lowering of risk.

Extensive risk patterns, associated with weather-related hazards, are also expanding rapidly in the sample of low- and middle-income countries in Asia and Latin America examined in this Report. Part of this expansion can be explained by improved disaster reporting. Similarly, climate change is altering hazard patterns. However, the principal risk drivers are locally specific increases in exposure, vulnerability and hazard in the context of broader processes of urbanization, economic and territorial development, and ecosystem decline (see Box 1.1).

Box 1.1: Components of disaster risk

Exposure

People and economic assets become concentrated in areas exposed to severe hazards through processes such as population growth, migration, urbanization and economic development. This process operates over time, and risk in these areas therefore becomes more intensive, as more people and assets are exposed. Many hazard prone areas, such as coastlines, attract economic and urban development or offer significant economic benefits. The rich alluvial soils in the regularly flooded river deltas of South Asia, for example, support intensive agriculture and the livelihoods of millions of rural households.

At the same time as risk becomes more intensive in some areas, it also spreads out extensively as cities expand into their hinterlands and as economic and urban development transform previously sparsely populated areas.

Vulnerability and resilience

The degree to which exposed people or economic assets are actually at risk is a function of their vulnerability. Vulnerability refers to a propensity or susceptibility to suffer loss and is associated with a range of physical, social, political, economic, cultural and institutional characterisitcs. For example, unsafe poorly built housing, schools, hospitals and lifeline infrastructure are characteristics of physical vulnerability. The difficulty faced by poor households without a car in evacuating New Orleans during Hurricane Katrina was a characteristic of both social and institutional vulnerability.

Resilience refers to the capacity of people or economies to absorb loss and recover. Poor households often have low resilience to loss due to a lack of savings, reserves or insurance. However, social factors such as extended families and community networks increase resilience. Vulnerability is sometimes used in a wider sense to encompass the concept of resilience[6]. Vulnerability and resilience also change over time. For example, if due to rapid urban growth an increasing proportion of a city's population lives in unsafe housing, vulnerability will increase; conversely, if more rural families have access to crop insurance, their resilience will increase.

Hazards

Patterns of geological hazard are mainly determined by the location of seismic fault lines, the presence of active volcanoes or tsunami-exposed coastlines and are relatively static. However, environmental change and urbanization are changing the magnitude, spatial distribution and frequency of floods, droughts, tropical cyclones, landslides and other weather-related hazards. The decline in the regulating services provided by many ecosystems has been observed in the 2005 Millennium Ecosystem Assessment[7] as a factor that increases flood and drought hazard. In urban areas flooding is often caused by a combination of more intense run-off during heavy rainfall events due to an increase in the built area; inadequate drainage; the disappearance of wetlands that traditionally absorbed and moderated peak flooding; and the encroachment of housing on floodplains.

On a global scale the Intergovernmental Panel on Climate Change (IPCC) has confirmed that climate change is now altering the predictability, intensity and geographical distribution of many weather-related hazards through increased intensity of the water cycle and other effects such as glacial melt and sea level rise.

1.3 The disaster risk–poverty nexus

The fact that disasters have a disproportionate impact on the poor in developing countries has been highlighted in research for at least 30 years[8]. The 2004 UNDP/Bureau for Crisis Prevention and Recovery (BCPR) report *Reducing Disaster Risk: a Challenge for Development*[9] highlighted the fact that while only 11% of those exposed to hazards live in low human development countries, 53% of disaster mortality is concentrated in those countries. The present Report has assembled a considerable body of empirical evidence that confirms that disaster risk is fundamentally associated with poverty at both the global and local levels.

1.3.1 At the global level

This Report confirms that poorer countries have disproportionately higher mortality and economic loss risks, given similar levels of hazard exposure. For example, globally, high-income countries account for 39% of the exposure to tropical cyclones but only 1% of the mortality risk. Low-income countries represent 13% of the exposure but no less than 81% of the mortality risk.

For example, gross domestic product (GDP) per capita in Japan is US$ 31,267 compared to US$ 5,137 in the Philippines, and Japan has a human development index of 0.953 compared to 0.771 in the Philippines[10]. Japan also has about 1.4 times as many people exposed to tropical cyclones than the Philippines. However, if affected by a cyclone of the same magnitude, mortality in the Philippines would be 17 times higher than that in Japan (see Figure 1.2).

Countries with small and vulnerable economies, such as many Small Island Developing States (SIDS) and Land-Locked Developing Countries (LLDCs) not only suffer higher relative levels of economic loss, with respect to the size of their GDPs. They also have a particularly low resilience to loss, meaning that disaster losses can lead to major setbacks in economic development. The countries with the highest economic vulnerability to natural hazards

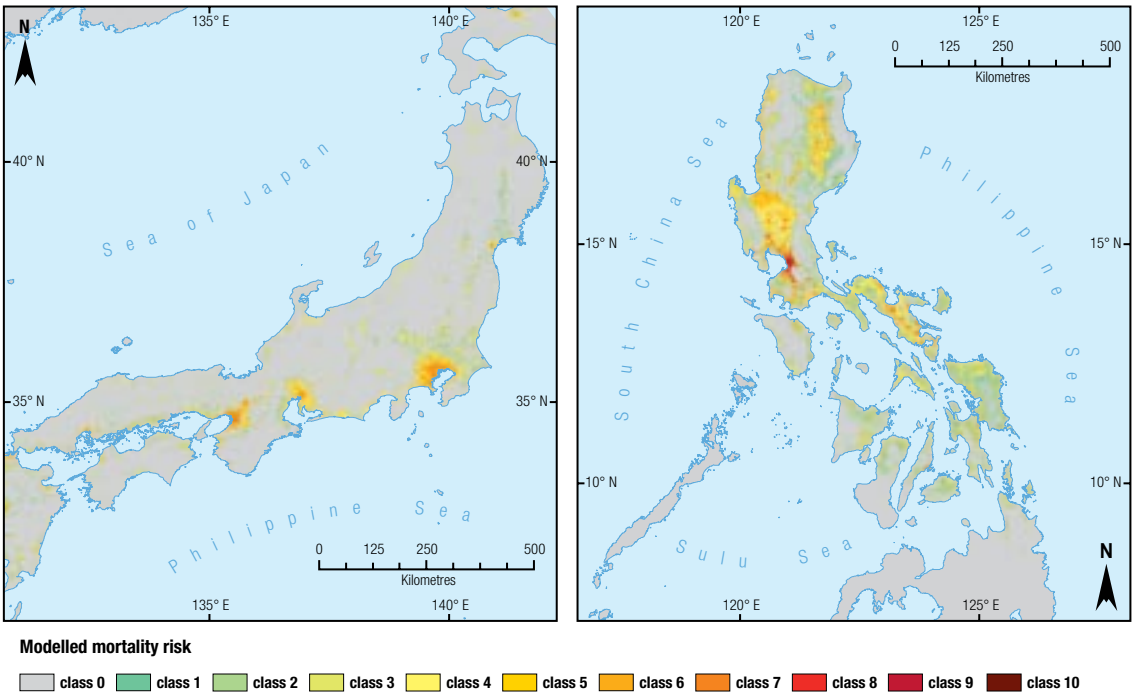


Figure 1.2: Mortality risk for tropical cyclones in two countries with similar exposure: Japan and the Philippines

Note: Classes as defined in Box 2.2, p.21

Source: Cartography and geographic information system (GIS) analysis: UNEP/GRID-Europe 2008

and the lowest resilience are also those with very low participation in world markets and low export diversification.

1.3.2 At the local level

At the local level, there is also empirical evidence to show that poor areas suffer disproportionately high levels of damage in disasters and that this is related to factors such as unsafe housing.

Case study evidence from particular cities also shows that both disaster occurrence and loss are associated with processes that increase the hazard exposure of the poor – for example, the expansion of informal settlements in hazard prone areas.

Considerable empirical evidence from all regions shows that while disaster losses lead to measurable decreases in income, consumption and human development indicators, these effects are far more accentuated in poor households and communities. The evidence points to increases in the depth and breadth of poverty, long-term difficulties in recovery and very negative human development impacts in areas such as education and health, which also have long-term consequences.

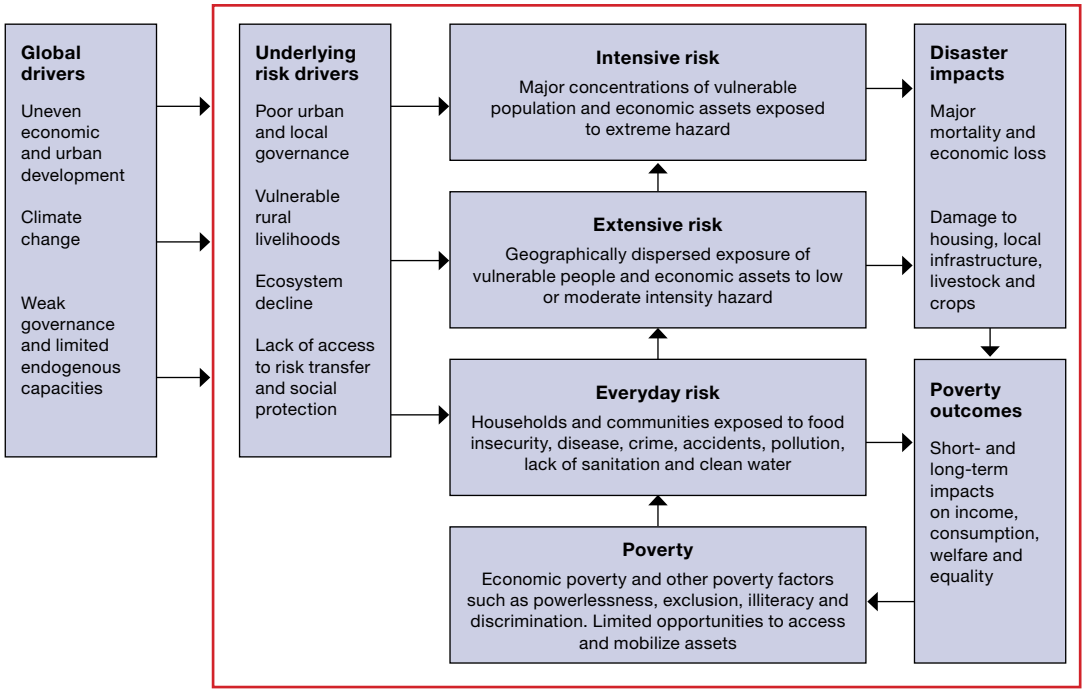
1.4 Interpreting the disaster–risk poverty nexus

At the global level, drivers such as economic development and urbanization, climate change and the strength or weakness of a range of endogenous capacities condition the landscape of both poverty and disaster risk in any given country. Figure 1.3 illustrates schematically some of the key interactions between disaster risk and poverty analysed in this Report.

1.4.1 The translation of poverty into disaster risk

Poverty [11] and associated conditions of everyday risk underpin the configuration of patterns of extensive and intensive risk. In general, both the urban and rural poor face very high levels of everyday risk, associated with traffic and occupational accidents, malaria and health

Figure 1.3: The disaster risk–poverty nexus



hazards associated with a lack of clean water, sanitation or pollution, crime, unemployment and underemployment, and other factors. For example, under-five mortality rates in many developing country cities are typically in a range of 80–160 per thousand live births while in most developed country cities they are under 10 per thousand live births.

A range of underlying risk drivers, such as poor urban governance, vulnerable rural livelihoods and declining ecosystems, contribute to the translation of poverty and every day risk into disaster risk, in a context of broader economic and political processes.

The livelihoods of the urban poor often do not cover the costs of housing, transport, education and health. But at the same time it is the low institutional capacity of city governments to provide land and services to the poor that has led to a model of urban growth characterized by the expansion of informal settlements in hazard prone areas. At least 900 million people now live in informal settlements in developing country cities. Many of these are in hazard prone areas. Urban hazards, such as flooding, are exacerbated by lack of investment in infrastructure. Households live in structurally weak and badly built housing and with deficient infrastructure and services. Unsurprisingly, the urban poor often have high levels of disaster risk.

In poor rural areas, poverty is translated into disaster risk through the vulnerability of rural livelihoods. A constrained access to productive land, technology, credit and other productive assets means that poor rural households are largely dependent on rain-fed agriculture for their livelihoods and subsistence, and thus are highly vulnerable to even small seasonal variations in weather. Difficulties in accessing markets, adverse trade policies and a lack of investment in infrastructure compound this vulnerability. In sub-Saharan Africa alone, 268 million people in rural areas live below a poverty line of US$ 1.25 per day. The absence of safe housing, infrastructure and public services in poor rural areas that could protect households from earthquakes, cyclones and major floods also increases mortality risk.

In rural and urban areas, the disaster risk–poverty nexus is further fuelled by environmental degradation. The 2005 Millennium Ecosystem Assessment [12] highlighted significant declines in many key ecosystems. Natural ecosystems such as wetlands, forests, mangroves and watersheds fulfil an essential function in regulating the frequency and intensity of hazards, such as flooding and landslides. They also often provide important additional sources of income for the poor. When ecosystems decline, their capacity to provide these services decreases and both hazard and vulnerability increase. Poor communities in developing countries are usually disproportionately dependent on ecosystem services. According to the last UNEP Atlas over Africa [13], deforestation is one the most significant environmental issues in 35 African countries. In Cameroon alone, for example, 200,000 ha are deforested every year, as shown in Figure 1.4.

1.4.2 From disaster risk to poverty outcomes

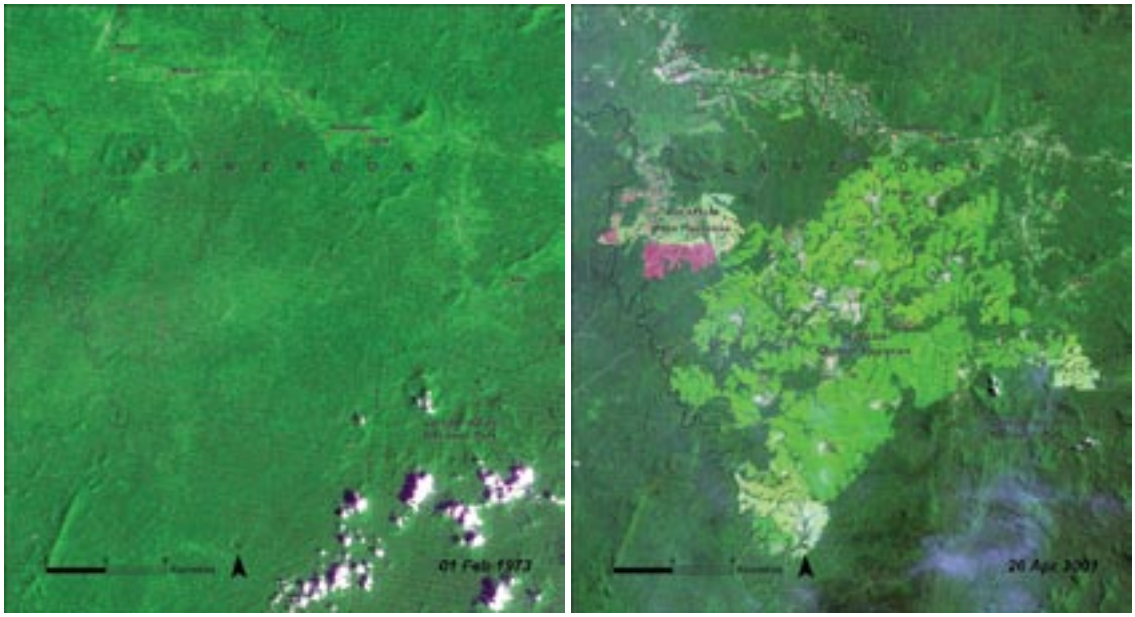
Poor households often have a very limited capacity to access and use assets in order to buffer disaster losses. These losses include both infrequently occurring major mortality, and economic loss from concentrations of intensive risk, as well as the lower intensity patterns of damage associated with the spread of extensive risk.

The low resilience of the poor is further undermined by risk drivers, including weak or absent social protection measures and the low penetration of catastrophe insurance in most developing countries, which contribute to the translation of disaster impacts into poverty outcomes. While the losses associated with intensive risk often overwhelm household, local and even national coping capacities in poor countries, the more frequent and low-intensity losses associated with extensive risk undermine resilience over time. Both kinds of risk, therefore, have a critical influence.

The resulting poverty outcomes include reductions in income and consumption as well as both short- and long-term negative impacts in human development, welfare and equality. As a consequence, following disasters economic

Figure 1.4: Deforestation in Cameroon between 1973 and 2001

Source: UNEP DEWA, 2008



Box 1.2: The impact of the 2001 El Salvador earthquakes on poverty[14]

In El Salvador, the 2001 earthquakes killed more than 1,200 people, affected approximately 300,000 houses (or 32% of the stock) and caused US$ 1.6 billion in direct and indirect damage (12% of GDP in 2000). Between 2000 and 2002, average household income per capita actually increased in El Salvador, while extreme poverty rates fell from 33.8% to 26.6%. In poor rural households affected by the earthquakes, however, average household income per capita was reduced by approximately one third. Those most affected by the earthquakes suffered higher loss of housing, land, livestock, farm machinery and other physical capital, reducing their future earning capacity.

poverty may increase in incidence and depth, while welfare indicators of human development tend to decrease. But disasters do not make everyone poorer; their impact is highly unequal. Poor households tend to be far less resilient to loss than wealthier households, are pushed deeper into poverty, and have more difficulty recovering. Furthermore, disasters have long-term impacts (Box 1.2) on the poor, particularly on vulnerable groups like young children and women. While normally only the short-term impacts of disasters, such as mortality or direct economic loss are highlighted, disaster impacts may impair the long-term health, human development and productivity of the poor, exacerbating chronic poverty.

1.5 Global climate change

Climate change is perhaps the greatest global outcome of environmental inequity, since it is driven by the emissions that have brought benefits to affluent individuals and societies yet most of the burdens fall on poorer individuals and societies, with developing countries and their poorest citizens being the most vulnerable[15].

The IPCC Fourth Assessment Report has emphasized that if the planet's surface temperature increases by 2°C above pre-industrial levels, then a catastrophic collapse of ecosystems becomes possible with unforeseen, non-linear impacts on poverty and disaster risk[16]. The IPCC has also confirmed that the geographic

distribution, frequency and intensity of these hazards are already being altered significantly by climate change [17]. Changes are occurring in the amount, intensity, frequency and type of precipitation. This is associated with increases in the extent of the areas affected by drought, in the numbers of heavy daily precipitation events that lead to flooding, and increases in the intensity and duration of certain kinds of tropical storms.

As outlined above, the concentration of disaster risk in poor communities in developing countries and the translation of disaster impacts into poverty outcomes are configured by drivers such as vulnerable rural livelihoods, poor urban governance, declining ecosystems and an absence of social protection. Unless those drivers are addressed the poor will continue to suffer disproportionately from disaster loss whether the climate changes or not. For example, it is estimated that the global population living in urban informal settlements, many of which are in hazard prone locations, is increasing by 25 million per year. This increase in itself is a key driver of disaster risk.

However, climate change magnifies the interactions between disaster risk and poverty. On the one hand it magnifies weather-related and climatic hazards. On the other hand, it will decrease the resilience of many poor households and communities to absorb the impact and recover from disaster loss, due to factors such as decreases in agricultural productivity, increases in disease vectors and shortages of water and energy in many disaster prone regions. Climate change, therefore, is now a key global driver of disaster risk.

Globally, disaster risk is increasing for weather-related hazards such as floods and tropical cyclones, even if hazard levels remain constant. Locally, the rapid expansion of weather-related extensive risk documented in this report is particularly dramatic. Even small increases in hazard levels due to climate change will have an enormous magnifying effect on disaster risk.

Critically, these increases will magnify even further the uneven distribution of risk between wealthier and poorer countries and between the wealthy and the poor in those countries. For example, if mortality levels relative to hazard exposure to tropical cyclones are currently 200 times greater in low-income countries than in Organization for Economic Cooperation and Development (OECD) countries, then the consequences of increasing cyclone severity due to climate change will also be unequally distributed. Climate change, therefore, will turbo-charge the disaster risk–poverty nexus, drastically increasing disaster impacts on the poor and resulting poverty outcomes.

1.6 Interlocked global risks

Disaster risk is now widely recognized as an integral part of a wider constellation of risks related to food and energy insecurity, financial and economic instability, global climate change, environmental degradation, disease and epidemics, conflict and extreme poverty.

Recent global reports by the United Nations Centre for Human Settlements (UN HABITAT) [18] and UNEP [19] have stressed the threat posed by disaster risk in the urban and environmental sectors. Other reports by the United Nations Department for Social and Economic Affairs (UNDESA) [20] and by the World Economic Forum [21] have argued that different kinds of risk now form an interlocked system, implying that impacts in one sphere spill over into other areas, and that actions to reduce one risk may imply trade-offs in reducing others. The IPCC Fourth Assessment Report [22] in 2007 dispelled any remaining doubt that climate change is a catastrophic threat on a global scale.

These interlinkages are becoming increasingly visible. In 2008, successive global crises hit the headlines as the prices of grain and energy sources fluctuated wildly and the global financial system threatened to collapse,

all in the context of ongoing concerns about global climate change, conflict, security and extreme poverty. These systemic risks now pose a very serious threat to global security and sustainability. Ongoing disaster losses undermine resilience to other kinds of threats, while major impacts in mega-disasters can trigger reactions in other risk spheres.

The way disaster risk is magnified by other kinds of global risk, and in turn feeds back into them, can be illustrated by a hypothetical but plausible example. If global climate change magnifies the severity of drought in a key grain producing region causing harvest failure, this could feed back into speculative increases in food prices. The most affected will not only be those living in the region but poor households in other parts of the world who spend a large proportion of their income on food. Faced with chronic food insecurity and with their resilience undermined by other hazards such as poor health or conflict, poor rural households may then migrate to urban areas. In many towns and cities across developing countries migration from rural areas is absorbed through the growth of informal settlements in areas prone to hazards such as floods. Flood risk in turn may also be further magnified by climate change.

Other examples of the interlocked nature of risk include the increase of oil prices when hurricanes threaten the Gulf of Mexico at the same time as conflict threatens oil production in Nigeria. As the credit crisis in developed countries is pushing economies into recession, the construction boom in the Persian Gulf is faltering, leading to a decrease in remittances from migrant workers to relatives in the Indian sub-continent. This in turn may lead to decreasing economic resilience in poor households in that region, increased rural–urban migration and subsequent increases in the population exposed to weather-related hazards in cities.

The linkages between disaster risk, poverty and climate change, described above, form a particularly tightly interlocked group of global challenges, in which impacts in any one sphere spill over into the other two and which have to be addressed in a way that recognizes their inter-connectedness.

1.7 Reducing disaster risk and poverty in a context of global climate change

Globally, efforts to address climate change through reductions in greenhouse gas emissions and energy consumption are of critical importance if potentially catastrophic increases in weather-related and climatic hazard are to be avoided in the future. In the meantime, existing hazard levels and increases that are taking place due to already committed climate change are essentially locked in to the disaster risk equation. Major concentrations of both people and economic assets exposed to hazard are similarly difficult to address given the economic advantages offered by many hazardous locations such as coastlines and fertile floodplains.

Wealthier countries have lower risk levels than poorer countries. Economic growth may reduce poverty. But economic growth per se does not lead to reduced disaster risk: as economies grow, exposure tends to increase at a faster rate than vulnerability can decrease, particularly in economically dynamic low- and low-to-middle income countries. The principal opportunities, therefore, for reducing disaster risk are to be found in addressing the different factors that characterize a country's vulnerability and lack of resilience.

This Report shows that by addressing the underlying risk drivers that translate poverty into disaster risk, such as poor urban governance, vulnerable rural livelihoods and ecosystem decline, it is possible to develop in a way that does not lead to increased risk. Similarly, by addressing

the underlying risk drivers that translate disaster impacts into poverty outcomes, such as the lack of access to social protection and risk transfer, it is possible to ensure that continuing disaster losses do not feed back into worsening poverty. If these drivers are addressed then it is possible for even poor countries to reduce their vulnerability in a way that outweighs increases in exposure and hazard.

Addressing these drivers, therefore, would not only contribute to reducing disaster risk – it would also contribute to poverty reduction. Importantly, it also offers the best opportunity to adapt to climate change. If disaster risk can be reduced, then the magnifying effect of climate change on risk will also diminish. In contrast, if these drivers are not addressed, disaster risk will continue to grow due to increasing hazard and exposure. If disaster risk continues to increase, it will seriously compromise efforts to reduce global poverty and countries with increasing disaster risk and poverty will be progressively less adapted to climate change.

1.7.1 Progress in disaster risk reduction

In 2005, 168 member states of the United Nations agreed the Hyogo Framework for Action (HFA) that called for building the resilience of nations and communities to disasters with the objective of reducing disaster risk by 2015. As Box 1.3 indicates the HFA forms part of a growing number of international declarations, frameworks and agreements, which indicate both a recognition of the links between disaster risk reduction, poverty reduction and climate change, and a growing political commitment to address these issues.

Interim national reports were completed by 62 countries in 2008, describing progress in achieving the strategic goals of the HFA. These indicate that many countries are making very good progress in developing institutional systems, legislation, policy and plans to improve disaster preparedness, and response and early warning. Due to such efforts, many low-income countries have dramatically reduced their mortality risk to hazards such as tropical cyclones and floods.

Box 1.3: International commitments to addressing the disaster risk–poverty nexus

In 1994, at the first World Conference on Disaster Reduction, the Yokohama Declaration and Plan of Action for a Safe World provided guidelines for national and international action on natural disaster prevention, preparedness and mitigation. Ten years later, in 2005, the HFA called for building the resilience of nations and communities to disasters. Other international declarations on poverty, social and sustainable development have also recognized the disaster risk–development linkages.

At the World Summit on Sustainable Development in Johannesburg in 2002 the Johannesburg Plan of Implementation[23] stated: *"An integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the twenty-first century."*

The formulation and adoption of the Millennium Development Goals (MDGs) was a watershed in mobilizing international commitment to poverty reduction. While there was no specific MDG addressing disaster risk, many of the MDGs refer to actions that will address the underlying risk factors[24]. Subsequently, developing countries have reaffirmed their commitment to reducing poverty through the achievement of the MDGs.

The United Nations Framework Convention on Climate Change was signed in 1992. While originally focused on mitigating climate change through agreements to reduce greenhouse gas emissions, momentum has gathered to support the efforts of developing countries to adapt to climate change. The IPCC Fourth Assessment stressed that climate change will erode nations' capacities to achieve the MDGs, measured in terms of reduced poverty, particularly in Africa and parts of Asia[25]. Subsequently, the Bali Action Plan[26] reaffirms that economic and social development and poverty eradication are global priorities.

Bilateral agencies, such as the UK's Department for International Development (DFID)[27] and Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation) (GTZ)[28], have recently produced policy statements that specifically address the disaster risk–poverty nexus. The World Bank has recently also made climate change an important part of its policy agenda, by adopting a Strategic Framework for Development and Climate Change in October 2008. Major attention is given to climate risk management and adaptation, which is a top climate-related priority in most developing countries[29].

However, reported progress in addressing other underlying risk drivers is less encouraging. Many of the institutional and legislative systems created for disaster risk reduction have had little influence on development sectors, due to a lack of political authority and technical capacity, particularly in countries where much development is unregulated and occurs in the informal sector. Progress in addressing issues of social equity and gender through disaster risk reduction has been similarly elusive. Few countries have mechanisms in place to protect the most vulnerable social groups from the long term impacts of disaster on poverty and human development.

Many Poverty Reduction Strategy Papers (PRSPs) acknowledge the impact of disaster loss on poverty and a significant number include a section on disaster risk reduction. PRSPs and other poverty reduction instruments clearly have enormous potential to address the underlying risk drivers highlighted above. However, there is little evidence of real synergy between policies and strategies on poverty and disaster reduction, which may undermine the effectiveness of PRSPs as disaster risk reduction instruments.

With respect to climate change adaptation, in some countries planning tools such as National Adaptation Programmes of Action (NAPAs) have facilitated integration between disaster risk reduction and climate change adaptation. NAPAs focus on *urgent and immediate* adaptation needs, and disaster risk reduction provides a good entry point to immediately address climate-related risks. In general, however, the institutional frameworks for adaptation are also still largely divorced from those for disaster risk reduction, and are more focused on specific measures such as climate proofing infrastructure than on addressing the underlying risk drivers. Planning instruments, such as NAPAs, and funding mechanisms for adaptation have been created which offer tremendous potential. However, at present, the funding and implementation mechanisms necessary to unlock that potential have yet to fully unfold.

1.7.2 Addressing the underlying risk drivers

Fortunately, considerable progress in addressing the underlying risk drivers is already being made in specific sectors and localities. Many of the tools and approaches required to address these drivers are already being successfully applied in many developing countries both at the local and sectoral levels.

Successful cases abound of strengthened livelihoods reducing vulnerability, poverty and disaster risk in rural areas. Many cities have applied innovative methods to provide access to secure land tenure, infrastructure and services for the urban poor. Improvements in environmental management are demonstrating ways to simultaneously regulate hazard and support livelihoods. Examples of innovative financial mechanisms, such as index-based crop insurance, catastrophe pools and applications of microfinance and microinsurance are gaining momentum. In practice, many local initiatives to adapt to climate change also address the underlying risk drivers. Many of the above approaches build on community and local-level participation in a way that reduces costs, builds social capital and enhances the relevance and sustainability of investments.

1.7.3 The missing link

To summarize, there is a growing international commitment to addressing disaster risk, poverty and climate change. At the national level good progress is being made in strengthening some disaster reduction capacities, particularly those associated with disaster preparedness, response and early warning. The fact that many low-income countries, from Bangladesh to Cuba, have been able to achieve quite dramatic reductions in mortality risk to some hazards is proof that progress is being made.

Similarly, progress is being made in addressing the underlying risk drivers in many localities and sectors in developing countries, highlighting the effective approaches and tools that exist and are already being applied.

There is, however, a gap between the international frameworks and commitments on the one hand, and local and sectoral good practice on the other. At both the international and national levels, the policy and strategy frameworks for disaster risk reduction, poverty reduction and climate change adaptation are not effectively integrated, are not focused on addressing the underlying risk drivers and are insufficiently articulated to and supportive of effective local and sectoral actions. This is the missing link that is holding back progress in addressing the disaster risk–poverty nexus in the context of climate change.

1.8 The way forward

Given the urgency posed by climate change, a business as usual approach to disaster risk reduction, poverty reduction and climate change adaptation will not lead to the achievement of the HFA or the MDGs. On the contrary both disaster risk and poverty may be pushed to new, more extreme levels. This Report concludes that more drastic measures are required.

Given the strong interlinkages between disaster risk, poverty and climate change, the principal recommendation of the Report is that countries need to adopt overarching policy and strategy frameworks for risk reduction, focused on addressing the underlying risk drivers described above, and supported by both resources and political authority. In risk prone countries, the implementation of such frameworks must be the key development priority of the state as a whole, rather than of a particular department or ministry.

In practical terms, the adoption of an overarching policy framework for risk reduction should provide a vehicle for a closer integration of existing policy and strategy instruments such as PRSPs, NAPAs and action plans to implement the HFA, thus improving coherence and gaining synergy. In turn this will be facilitated if the plethora of planning, reporting and funding mechanisms at the international level is streamlined.

It should also facilitate a more inclusive approach to addressing the underlying risk drivers that is supportive of the many local and sectoral initiatives already underway and that builds on innovative partnerships with civil society. This Report stresses that such partnerships are essential to ensure that risk reduction measures are appropriate, cost effective and sustainable.

A further challenge is to incorporate innovations into the governance arrangements for disaster risk reduction that ensure that risk reduction considerations are factored into all investments to address the underlying risk factors. Illustrative good practices exist. Many governments have put in place striking innovations, for example, incorporating disaster risk reduction into national development plans and budgets; using cost–benefit analysis to factor disaster risk reduction into public investment systems; creating harmonized platforms for hazard and risk information to support decision-making; or addressing the issue of accountability and enforcement. Enhancing policy and governance in this way can defuse the disaster–risk poverty nexus and facilitate climate change adaptation. At the same time it can be cost effective.

Since the early 1980s, the World Bank alone has provided 528 loans for disaster recovery and reconstruction purposes for a total disbursement of more than US$40 billion[30]. Disbursement on humanitarian aid in 2007 was more than US$ 120 billion[31]. Other estimates indicate that international assistance for recovery and reconstruction only covers 10% of the real costs. These amounts are high and becoming unsustainable, diverting resources that could have been used for poverty reduction and development.

Data put together for the Millennium Project[32] provides an indicative estimate of some of the costs required to address the

underlying factors that underpin disaster risk. Some of these costs can be drastically reduced by adopting participatory approaches to project and programme implementation but there is no getting round the fact that several hundred billion dollars are required. Incorporating risk reduction measures into such investments is usually seen as an additional cost. However, many investments in disaster risk reduction produce benefits in terms of reduced future losses and avoided reconstruction that considerably outweigh the costs, even without accounting for indirect benefits to health, human development and productivity. Innovative ways of financing risk reduction, through mechanisms such as catastrophe pools and payment for ecosystem services, can reduce the costs and enhance the benefits further still.

In other words, it costs far less to avoid the configuration of risk in the first place than to correct it once it exists, or to compensate for it once it is realized. For example, it is generally cheaper and easier to correct newly arising extensive risk than major historical concentrations of intensive risk. The emphasis of policy therefore should be on factoring disaster risk reduction considerations into new development and during periodic renewal or upgrading of building stock and infrastructure, which provides opportunities to reduce risks. Similar opportunities arise in recovery and reconstruction after old concentrations of risk have been swept away in a disaster. Seen in this way investment in disaster risk reduction is actually a way of dramatically reducing the cost of achieving the MDGs and of adapting to climate change.

Resources are also required to build the capacities necessary to put in place the policy and governance frameworks that can allow the investment described above to be organized, coordinated and sustained. As described above this is essential if future growth is not to lead to increasing risk. However, the major investment required now is political rather than financial. It is hoped that the evidence presented in this Report contributes to building that political capital.

Endnotes

1 EMDAT: The OFDA/CRED International Disaster Database: www.emdat.net
2 EMDAT: The OFDA/CRED International Disaster Database: www.emdat.net
3 EMDAT does not register reports of small-scale disasters below its threshold of 10 deaths, 100 affected people, or a call for international assistance.
4 EMDAT, 2008; Analysis by ISDR (data as of September 2008)
5 Argentina, Bolivia, Colombia, Costa Rica, Ecuador, India (States of Orissa and Tamil Nadu), Iran, Mexico, Nepal, Peru, Sri Lanka and Venezuela
6 The interpretation of the term vulnerability varies widely between different academic disciplines, including within the disaster risk reduction community.
7 Millennium Ecosystem Assessment, 2005
8 Wisner, et al., 1976
9 UNDP/BCPR, 2004
10 UNDP, 2007
11 In general terms an individual, household or community is said to be poor when it falls, in absolute or relative terms, short of a minimum level of welfare, often referred to as the poverty line. However, economic poverty (where a lack of assets, income, endowments and capital means that people are unable to make the minimum expenditures required for food, housing, health, education, energy and transport etc.) only partially describes the experience of poverty. It is usually accompanied by lack of access to health, education and other services, powerlessness and isolation, gender discrimination, social exclusion, illiteracy, poor sanitation, livelihood vulnerability and others.
12 Millennium Ecosystem Assessment, 2005
13 UNEP DEWA, 2008
14 Baez and Santos, 2008
15 IPCC, 2007a
16 IPCC, 2007a
17 IPCC, 2007b
18 UN-HABITAT, 2008
19 UNEP, 2007
20 UNDESA, 2008
21 World Economic Forum, 2008
22 IPCC, 2007a
23 UNDESA Division for Sustainable Development, 2002
24 UNDP/BCPR, 2004, Chapters 1 and 4.
25 Parry, et al., 2007
26 UNFCCC, 2007a
27 DFID, 2006
28 Schmidt et al., 2005
29 World Bank, 2008a
30 Cummins and Mahul, 2009
31 Data from OECD Development Assistance Committee (DAC) Query Wizard for International Development Statistics: http://stats.oecd.org/qwids/OFDA/CRED
32 Sachs and UN Millennium Project, 2005