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Note

This edition of *Disaster Risk Reduction: 2007 Global Review* is a preliminary version of a final publication which will be published later in 2007. Many reports from regions and countries prepared for the Global Platform for Disaster Risk Reduction, held in Geneva on June 5-7, 2007 were not available at the time this review was prepared and therefore could not be reflected in its analysis, conclusions and recommendations.

The final version will take into account all country and regional reports prepared for the Global Platform. Similarly it will take into account comments received on this preliminary draft. At the same time, it will make recommendations for improving the process of systematic monitoring of progress in the implementation of the *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters* (HFA). Comments, corrections and additional information are all welcomed and can be sent to the ISDR secretariat at isdr@un.org. All comments received by 30 June, 2007 will be considered.

Session documents are available on the Global Platform website
<http://www.preventionweb.net/globalplatform>

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The present Global Review prepared for the Global Platform for Disaster Risk Reduction to be held in Geneva on 5-7 June, 2007 would not have been possible without extensive contributions from ISDR partners from around the world.

Chapter 2 (Global disaster risk: an interpretation of contemporary trends and patterns) builds on previous reports and studies on global disaster risk produced by partners of the ISDR system Global Risk Identification Programme, particularly United Nations Development Programme, United Nations Environment Programme, the World Bank, the Inter-American Development Bank, Centre for Research on the Epidemiology of Disasters and ISDR secretariat¹ as well as recent global reports on climate change.² This chapter was peer reviewed by experts involved in those reports, including Omar Dario Cardona Arboleda, Caroline Clarke, Uwe Deichmann, Maxx Dille, Debarati Guha-Sapir, Kari Juhani Keipi, Allan Lavell, Pascal Peduzzi, Mark Pelling, Carlos Villacis, Ben Wisner as well as by staff of the ISDR secretariat.

Chapter 3 (Progress in disaster risk reduction) builds on reports of progress in implementing the HFA prepared by 70 member states and on a number of recent regional reviews carried out by the ISDR secretariat in cooperation with the World Bank, in Sub-Saharan Africa, Middle East and North Africa and with regional partners in Asia, Latin America and the Caribbean and Europe³. The countries which submitted reports that have been reviewed for this publication are listed in Annex 4⁴: A number of ISDR system thematic platforms also submitted progress reports. All reports are available at the ISDR website at: <http://www.unisdr.org/>

The report was prepared at the ISDR secretariat by Andrew Maskrey, Gabriella Buescher, Pascal Peduzzi, Carolin Schaerpf and designed by Mario Barrantes. Invaluable support was provided by Reid Basher, Terry Jeggle and Helena Molin-Valdes in Geneva and by Mostafa Mohaghegh, Martin Owor, Noroarisoa Rakotondrandria, Seth Vordzorgde, Angelika Planitz, Christel Rose, Haris Sanahuja and Dave Zervaas in ISDR regional outreach units in Cairo, Nairobi, Bangkok and Panama.

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- 1 UNDP, (2004), Reducing Disaster Risk: a Challenge for Development; World Bank, (2005), Natural Disaster Hotspots: a Global Risk Analysis; Inter-American Development Bank, (2005), Indicators of Disaster Risk and Disaster Risk Management; CRED, (2004), Thirty Years of Natural Disasters 1974-2003: the Numbers; UNEP/GRID-Europe, PREVIEW project, <http://www.grid.unep.ch/preview>, Living with Risk: A global review of disaster reduction initiatives (2004) www.unisdr.org.
 - 2 Nicholas Stern, (2006), The Economics of Climate Change, The Stern Review; IPCC 4th Assessment Report, (2007); World Bank, (2007), The Impact of Sea Level Rise on Developing Countries: A Comparative Analysis.
 - 3 UNSIDR/World Bank, (2007), Preliminary Regional Stocktaking of Natural Hazard Risk and Disaster Management Capacity: Middle East and North Africa. Building Partnerships for Disaster Risk Reduction and Natural Hazard Risk Management (Philip Buckle); SOPAC, (2007), Progress Report on the Implementation of the Hyogo Framework for Action for the Pacific Islands Region Pacific Regional Framework for Action - An Investment for Sustainable Development in the Pacific Island Countries - Disaster Risk Reduction and Disaster Management, a Framework for Action 2005 - 2015: Building the Resilience of Nations and Communities to Disasters; UN/ISDR Africa Regional Unit and World Bank (2007), Review of Disaster Risk Reduction in Sub-Saharan Africa Region, Disaster Risk Reduction profile of Sub-Sahara African (SSA) Countries; UN/ISDR, ADPC, ADRC, (2007), Baseline Status of Disaster Risk Reduction (DRR) at the start of the HFA implementation decade; UN/ISDR in collaboration with DKKV, (2007), Strengthening the Network of European National Platforms; UN/ISDR, UN/ISDR Latin America and Caribbean, (2007), Measuring Progress in Disaster Risk Reduction, Americas Regional Overview 2005-2006.
 - 4 The results of country and regional reports received at the ISDR secretariat after 16 May have only been partially reflected in the present version, but will be included in the final publication.

Preface

In January 2005, 168 countries approved the *Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters* (HFA)⁵ as an ambitious programme of action to significantly reduce disaster risk. Since then efforts have been made to strengthen the International Strategy for Disaster Reduction (ISDR)⁶ system as an international mechanism to support the implementation of the HFA.

The strengthened ISDR system is based on the full participation of Governments, regional inter-governmental organizations and the international community, including the programmes, funds and agencies of the United Nations system, the international financial institutions, the Red Cross and Red Crescent movement, non governmental organizations and the scientific and technical community.

The Global Platform for Disaster Risk Reduction⁷, which will meet in Geneva for the first time on 5-7 June 2007, will be the principal global forum of the strengthened ISDR system with functions that include sharing of experience, advocacy, reporting progress, identifying gaps and challenges for the ISDR system. As the strengthening of the ISDR system progresses, regional platforms will fulfil similar functions at regional and sub-regional levels, national platforms will assist in bringing together relevant partners in risk-prone countries, while thematic platforms will compile global knowledge and best practice to ensure effective support to countries and regions.

Since 2005, many countries and organizations are already realigning their policies and strategies to directly respond to the expectations and directions of the Hyogo Framework for Action. For example: HFA focal points have been established by 106 countries and 5 territories; national platforms for disaster reduction have been initiated in 38 countries; ministerial-level regional agreements and strategies have been agreed, or are being developed in several regions and sub-regions, (Africa, Asia, and the Pacific Islands) and specific risk reduction strategies or initiatives have been developed by a number of international agencies, including the United Nations Development Programme, World Bank, International Federation of Red Cross and Red Crescent Societies and World Meteorological Organization, exemplified by the launch of the Global Facility for Disaster Reduction and Recovery⁸ by the World Bank in 2006.

Reporting on progress is an essential feature of the HFA. Responsibility for monitoring and reporting is assigned mainly to states, including for the preparation of national baseline assessments, periodic summaries and reviews of progress, and reports on risk reduction progress in other policy frameworks such as the Millennium Development Goals and the Johannesburg Implementation Plan for Sustainable Development. Reporting responsibilities are also identified for regional organizations and institutions and international organizations.

The HFA calls on the ISDR partners and secretariat to prepare periodic reviews of progress and to identify gaps and challenges in implementation. In this context, the ISDR secretariat will co-ordinate the preparation of a major global assessment report to be launched by the UN Secretary-General in 2009. This report will be a landmark assessment based on a global risk update⁹ and an analysis of achievements and gaps, that will provide a foundation for profiling future priorities and policy on disaster risk reduction, as well as an important advocacy tool at all levels. It is expected that the report will focus world attention on the costs of disaster risk, will galvanize additional political and economic support and commitment to disaster risk reduction and will assist the Global Platform in the setting of appropriate targets and priorities.

5 Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters: <http://www.unisdr.org/hfa>

6 International Strategy for Disaster Reduction (ISDR). The term ISDR system means the various international, regional and national bodies, platforms, programmes and mechanisms expressly established to support the implementation of the ISDR and the HFA. See <http://www.unisdr.org> for more information.

7 Global Platform for Disaster Risk Reduction: <http://www.preventionweb.net/globalplatform/> builds on the achievements of the Inter-agency Task Force for Disaster Reduction.

8 Global Facility for Disaster Reduction and Recovery: <http://www.worldbank.org/hazards/gfdr>

The present draft report, prepared for the 2007 session of the Global Platform by the ISDR secretariat, with the support of the Global Facility for Disaster Reduction and Recovery of the World Bank and the United Nations Development Programme, provides a preview of some of the elements that will be contained in the major global assessment report to be launched in 2009. It begins with an initial characterization of global disaster risk, based on an interpretation of reports already published by partners of the Global Risk Identification Programme. It continues with a review of progress in reducing disaster risk based on an analysis of reports on HFA implementation prepared by a number of countries. The report then highlights a number of key issues and challenges that should be addressed as a priority by the ISDR system.

The report is presented to the Global Platform as a preliminary draft and it will be completed later in 2007 following comments and the receipt of additional reports. The number of countries reporting HFA progress is still limited and systematic regional and thematic reporting by other ISDR system partners has still not been addressed. Improved reporting and analysis by all ISDR system partners over the coming biennium will enable the goal of a full global assessment report in 2009.



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1

Introduction

A series of extraordinary catastrophes, triggered by natural hazards between 2003 and 2005, highlighted and reminded the world the degree to which disaster risk now underlies and threatens development. The Bam earthquake of December 2003 in the Islamic Republic of Iran, the heat-wave that affected Western Europe in 2003, the devastation caused by Hurricanes Ivan and Jeanne in Grenada and other Caribbean countries in September 2004, the Indian Ocean earthquake and tsunami in December 2004, Hurricane Katrina in the United States of America in August 2005 and the Kashmir earthquake of October 2005, accounted for more than 350'000 deaths and USD 194 billion of economic damage between them¹⁰. However, these catastrophes were only the most visible manifestations of the ongoing unfolding of disaster risk.

Changes in disaster risk are driven by underlying processes such as urbanization, economic globalization and poverty. At the same time, evidence continues to mount that global climate change is already modifying patterns of climate hazard such as cyclone, drought and flood, with drastic implications for disaster risk. The report on the economics of climate change produced by Nicholas Stern¹¹ in 2007, recent evidence presented by the International Panel on Climate Change (IPCC)¹², the United Nations Security Council's first-ever debate on impact of climate change on peace and security, together with the increasing number of climate anomalies documented by the media, have converged to focus political interest on the prevention of further

climate change and on the mitigation of its consequences, including increased disaster risk.

The World Conference on Disaster Reduction (WCDR)¹³, held in Kobe, Japan, a few weeks after the Indian Ocean tsunami created further impetus. 168 member states adopted the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA)5. It calls for the pursuit of three strategic goals for the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries within the next 10 years in conformity with the Millennium Development Goals (MDGs)¹⁴.

Since then, measures have been designed to build on existing mechanisms to strengthen the International Strategy for Disaster Reduction (ISDR) as a system of partnerships composed of governments, inter-governmental and non-governmental organizations, international financial institutions, scientific and technical bodies, civil society and the private sector, to implement the HFA. A core element in the proposed strengthened ISDR system is a Global Platform for Disaster Risk Reduction, with the full participation of governments and which will meet biennially, beginning in June 2007.

It is in this context of increasing political commitment to disaster risk reduction that the ISDR secretariat has prepared the Disaster Risk Reduction: 2007 Global

10 EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Centre for Research on the Epidemiology of Disasters, Université Catholique de Louvain - Brussels - Belgium.

11 Nicholas Stern, Op.Cit.

12 Intergovernmental Panel on Climate Change (IPCC), 4th Assessment Report, (2007): <http://www.ipcc.ch/>

13 World Conference on Disaster Reduction: <http://www.unisdr.org/wcdr/>

14 Millennium Development Goals: <http://www.un.org/millenniumgoals/>

Review, as a contribution to the first session of the Global Platform for Disaster Risk Reduction. This short draft report provides an indicative statement on current trends and patterns in global disaster risk and on the progress being made by countries to reduce this risk. The report is meant to provide a bridge between the deliberations of the World Conference on Disaster Reduction in 2005 and the launch of a major global ISDR system assessment report on disaster risk reduction in 2009. The report contains two principal sections.

The first section, presents an interpretation of contemporary patterns, trends and tendencies in global disaster risk through a transversal analysis of data and information culled from recent global and regional reports¹⁵ produced by partners of the Global Risk Identification Programme (GRIP)¹⁶ and from previous reviews and analysis¹⁷. A number of broad risk scenarios are identified and discussed, including:

- the risk of catastrophic disasters in hotspots, where people and economic activities are intensively concentrated in areas exposed to large-scale climatic and geological hazard events and
- the risk of low-intensity asset loss and livelihood disruption over extensive areas, where people and economic activities are exposed to highly localized, principally climatic hazard events.

While recognizing the importance of urbanization, poverty and economic globalization as the key drivers of disaster risk, the section examines some of implications of global climate change on increasing hazard levels, taking advantage of the findings of recent international reports¹⁸.

This interpretation of global disaster risk is indicative rather than comprehensive and focuses only on observable trends and patterns as presented in already published reports. It does not review nor pretend to reflect the large number of risk identification studies and projects, carried out by ISDR system partners at the regional, national and local levels. Neither does it provide guidance on the characteristics of disaster risk

in specific countries, localities or sectors. Its findings are presented as questions and hypotheses that should be examined in depth in the major global assessment report to be launched in 2009.

The second section examines progress being made by countries in reducing disaster risk, identifying trends and analyzing these in the light of global disaster risk patterns. This analysis is based on reports of progress in implementing the HFA prepared by 70 member states and on recent regional reviews carried out by the ISDR secretariat in cooperation with the World Bank and regional partners in the Middle East and North Africa; Africa; Asia; Latin America and the Caribbean .

Disaster risk reduction involves a large number of partners including governments, the private sector, civil society, academic and scientific institutions, amongst others. This report only reflects the progress reported by governments in a number of countries. As such it provides only an indicative and partial statement of the progress being made by all actors in other areas of disaster reduction. The content of national reports to be presented to the Global Platform are the responsibility of the respective governments. The present report is an interpretation of broader global trends and does not evaluate nor judge the progress being made by individual countries. Similarly, while the report notes illustratively the conclusions of reviews of thematic areas such as early warning, El Nino, climate change, fire, recovery and institutional and legislative systems prepared by seven ISDR system partners it does not overview progress in any of these particular disaster reduction theme.

The report ends with a set of conclusions that contrast the global trends in progress identified with the broad risk scenarios mentioned above and that outline key challenges to be addressed in order to achieve the goal and objectives of the HFA. It is expected that these conclusions will inform the formulation of priority actions for the ISDR system by the Global Platform and its partners, while at the same time framing and outlining issues that will be more fully addressed in the major global assessment report to be launched in 2009.

15 UNDP, (2004), Reducing Disaster Risk: a Challenge for Development; World Bank, (2005), Natural Disaster Hotspots: a Global Risk Analysis; Inter-American Development Bank, (2005), Indicators of Disaster Risk and Disaster Risk Management; CRED, (2004), Thirty Years of Natural Disasters 1974-2003: the Numbers; UNEP/GRID-Europe, PREVIEW project, www.grid.unep.ch/preview

16 Global Risk Identification Programme (GRIP): www.grip.net

17 UNDP/BCPR, Disaster Reduction Unit, (2004), Visions of Risk: A Review of International Indicators of Disaster Risk and its Management A Report for the ISDR Inter-Agency Task force on Disaster Reduction Working Group 3: Risk, Vulnerability and Disaster Impact Assessment, Ed. Mark Pelling.

18 Nicholas Stern, Op.Cit.

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19 UN/ISDR Africa Regional Unit; UN/ISDR Latin America and Caribbean; UN/ISDR, ADPC, ADRC; UN/ISDR/DKKV; SOPAC, Op.Cit.

20 See Annex 5.

2

Global disaster risk: an interpretation of contemporary trends and patterns

2.1 Why global disaster risk identification?

Disaster risk unfolds over time through the concentration of people and economic activities in areas exposed to hazards e.g. earthquakes, tropical cyclones, floods, drought²¹ and landslides, through the frequency and magnitude of hazard events and through the vulnerability of communities and economies, understood in terms of their capacity to absorb and recover from hazard impacts.

In disaster prone countries, identifying, locating, measuring and understanding risk is the crucial first step towards the design of policies, strategies and actions for disaster risk reduction, ranging from response preparedness through to addressing risk in development planning. Disaster risk identification and assessment at the national and local levels is therefore a key priority for achieving the HFA.

Identifying and displaying global patterns and trends in disaster risk does not provide the detailed information required by national planners and decision makers. However, an improved understanding of global risk is vital both to increase political and economic commitment to disaster risk reduction as well as to ensure that the policies and strategies of international organizations are effectively focused and prioritized. At the same time, identifying global risk patterns increases understanding of how underlying processes such as climate change,

urbanization and economic development configure disaster risk and vulnerability over time and in space. These processes are fundamentally global in character and to address them requires a coordinated international commitment.

Global risk identification therefore provides key information for the ISDR system. In order to justify investment in risk reduction, accurate information on probable disaster losses and costs is required. To be able to predict likely losses, it is necessary to identify the spatial distribution of disaster risk, its likely magnitude and its evolution over time. To be able to reduce disaster risk effectively the linkages between development processes, such as urbanization and climate change, and risk trends and patterns must be revealed and understood. If the ISDR system is to address disaster risk and not just respond to disasters occurred, then it is essential to identify and understand the nature of risk. Risk identification and analysis can be described as a process of making the invisible more visible as risk has to be visualized before it can be addressed.

This review interprets the results of reports and studies on global disaster risk produced by United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), the World Bank, the Inter-American Development Bank (IDB) and Centre for Research on the Epidemiology of Disasters (CRED)²² in order to profile the key

²¹ Since drought has a strong food insecurity component, in some analysis it is differentiated from other climatic hazards.

²² UNDP, UNEP, World Bank, IDB, CRED, Op.Cit.

contemporary trends and patterns. This interpretation provides a base-line of current knowledge on global disaster risk against which progress in reducing that risk can be examined.

In particular, the review examines the scenarios presented by hotspots of intensive disaster risk, where people and economic activities are concentrated in areas exposed to large-scale hazard events, as well as regions of extensive disaster risk, where people are exposed to highly-localized hazard events and low-intensity asset loss and livelihood disruption over extensive areas. In both cases, the review contrasts the risk associated with both climatic and geological hazards and related to both mortality and economic loss. The concepts and definitions used, based broadly on standard definitions used by the ISDR²³, are explained to make the analysis accessible to the non-specialized reader. In general, more detailed information on definitions, as well as the technical and methodological aspects of the evidence presented, can be consulted in Annex 1.

2.2 Intensive Disaster Risk Hotspots

Patterns of hazard exposure, vulnerability and risk

Between 1975 and 2005, the total number of disaster deaths recorded by the CRED EM-DAT²⁴ database was 2,317,395. However, as Table 1 indicates, 82% of these occurred in only 20 large disasters with over 10,000 deaths each. Of these 553,474 deaths occurred in the 1984 famine in Africa and 138,866 due to tropical cyclone Gorky in Bangladesh in 1991. More recently, of the 89,916 deaths registered in EM-DAT in 2005, 77,320 corresponded to the Pakistan earthquake. Of the 241,400 deaths EM-DAT registered in 2004, 227,460 corresponded to the Indian Ocean tsunami.

Similarly 38.5% of total economic losses are concentrated in 21 disasters that caused more than USD 10 billion of damage.

These tables suggest that disaster risk²⁵ is heavily concentrated in a number of intensive risk hotspots.

Table 1 - Largest disasters 1975 - 2005 (>10000 killed)

Year	Hazard	Countries	Number killed
1975	Earthquake	China	10'000
1976	Earthquake	China	242'000
1976	Earthquake	Guatemala	23'000
1977	Cyclone	India	14'204
1978	Earthquake	Iran	25'000
1981	Drought	Mozambique	100'000
1983	Drought	Ethiopia and Sudan	450'000
1985	Volcano	Colombia	21'800
1985	Cyclone	Bangladesh	10'000
1985	Cyclone	Bangladesh	10'000
1988	Earthquake	Soviet Union	25'000
1990	Earthquake	Iran Islam Rep	40'000
1991	Cyclone	Bangladesh	138'866
1998	Hurricane	Honduras	14'600
1999	Flood	Venezuela	30'000
1999	Earthquake	Turkey	17'127
2001	Earthquake	India	20'005
2003	Earthquake	Iran Islam Rep	26'796
2003	Heat wave	France, Italy	34'947
2004	Tsunami	Indian Ocean	226'408
2005	Earthquake	Pakistan	73'338

Data source: CRED EM-DAT

It is in these intensive risk hotspots that future catastrophic disaster loss will occur. Tables 1 and 2 illustrate very clearly that mortality risk is principally concentrated in hotspots in less- developed regions while economic loss risk is principally concentrated in hotspots in highly-developed regions.

A key factor behind the existence of these intensive risk *hotspots* is that hazard exposure is not distributed uniformly across the globe but is concentrated in regions, where large numbers of population and economic activities coincide with high levels of single or multiple overlapping hazards e.g. earthquake; tropical cyclone; flood; drought; volcanic eruption and landslide. The concept of hazard exposure²⁶ or physical exposure is used to measure this concentration by combining the level of hazard in a place with the quantity of population, infrastructure and economy exposed. For hazard to generate risk, people, infrastructure or economic activities have to

23 Different academic communities have developed concepts and definitions that vary widely. In particular, terms and concepts are used very differently in each language. The ISDR secretariat has adopted a set of standard definitions that are now widely accepted and which form the basis for the analysis presented here. These definitions were published in *Living in Risk: a Global Review of Disaster Reduction Initiatives* (2004)

24 The EM-DAT database is maintained by CRED a non-governmental organization based at the Catholic University of Louvain in Belgium. EM DAT at present provides the best global assessment of disaster occurrence and loss, available in the public domain, and therefore accessible by the disaster risk management community. For further information on EM-DAT see technical annex: Note 1.

25 See technical annex: Note 2

26 See technical annex: Note 3

Table 2 - Disaster causing more than USD 10 billion economic losses (1975-2006)

Year	Disaster Type	Subset	Name of disaster	Country affected	Total damages
2005	Wind Storm	Hurricane	Katrina	United States	125000000
1995	Earthquake	Earthquake	Kobe Eq	Japan	100000000
1998	Flood	Flood		China P Rep	30000000
2004	Earthquake	Earthquake		Japan	28000000
1992	Wind Storm	Hurricane	Andrew	United States	26500000
1980	Earthquake	Earthquake		Italy	20000000
2004	Wind Storm	Hurricane	Ivan	United States	18000000
1997	Wild Fires	Forest		Indonesia	17000000
1994	Earthquake	Earthquake		United States	16500000
2004	Wind Storm	Hurricane	Charley	United States	16000000
2005	Wind Storm	Hurricane	Rita	United States	16000000
1995	Flood	--		Korea D.P.R.	15000000
2005	Wind Storm	Hurricane	Wilma	United States	14300000
1999	Earthquake	Earthquake		Taiwan (China)	14100000
1988	Earthquake	Earthquake		Soviet Union	14000000
1994	Drought	Drought		China P Rep	13755200
1991	Flood	--		China P Rep	13600000
1996	Flood	Flood		China P Rep	12600000
1993	Flood	Flood		United States	12000000
2002	Flood	Flood		Germany	11700000
2004	Wind Storm	Hurricane	Frances	United States	11000000

Data source: EM-Dat

be exposed. If hazard events occur in uninhabited areas, no-one is at risk.

According to UNEP/Global Resource Information Database (GRID) Europe and UNDP²⁷ 118 million people are exposed annually to earthquake (Magnitude higher than 5.5 on Richter scale), 343.6 millions of people are exposed²⁸ annually to tropical cyclones, 521 millions are exposed annually to floods while 130 millions people globally per year are exposed to meteorological drought. Additional analysis by UNEP/GRID and Norwegian Geotechnical Institute (NGI) has shown that 2.3 million persons are annually exposed to landslides mostly in Asia and the Pacific (1.4 millions) and Latin America and the Caribbean (351.600)²⁹.

Hazard exposure goes a long way to explaining the concentration of disaster risk in these intensive risk hotspots but by itself it is not enough. Disaster risk is also a function of the vulnerability³⁰ of whatever is exposed. Vulnerability can broadly be defined as the

capacity to resist the impact of a hazard event and to recover afterwards and likewise can be sub-divided into physical, economic, social vulnerability etc. Like hazard exposure, development configures patterns of vulnerability in a society and modifies those conditions over time, making different social and economic sectors in a society more or less able to resist and recover from hazard events.

For a given level of hazard exposure countries have very different levels of relative human vulnerability, expressed in terms of the number of expected deaths for a given level of hazard exposure³¹. Mortality is a very crude proxy for human vulnerability, which could be more appropriately measured by other kinds of disaster loss such as injury, loss of livelihood, long term health problems and psycho-social suffering, the partial or total displacement of communities and the deterioration of living conditions, social services and the environment. Unfortunately, mortality is the most robust data variable available in global datasets to measure relative human vulnerability. If measured

27 See technical annex: Note 4

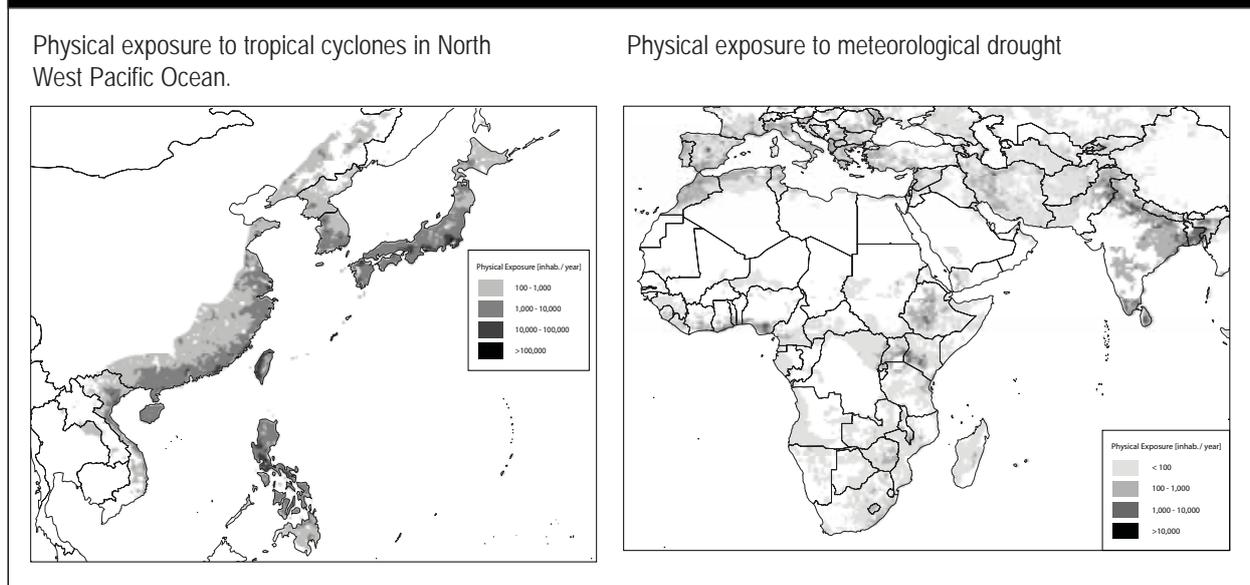
28 UNEP/GRID-Europe, (2007), New estimations based on refined modeling of physical exposure to tropical cyclones.

29 Nadim, F., O. Kjekstad, P. Peduzzi, C. Herold and C. Jaedicke, (2006), Global Landslides and avalanches Hotspots, Landslides.

30 See technical annex: Note 5

31 See technical annex: Note 6

Figure 1
Physical exposure from tropical cyclones (left) and meteorological drought (right)



Sources: P. Peduzzi, UNEP, PREVIEW tropical cyclones, 2005.

Data sources: UNEP, PREVIEW drought, from CRU precipitation dataset.
Source: P. Peduzzi, UNEP, 2005.

using other variables human vulnerability may exhibit different patterns from those highlighted by mortality.

Taking into account this limitation, the relative human vulnerability of a country is influenced by all the physical, social, economic, political and cultural variables that increase or decrease mortality, such as improved disaster preparedness systems and emergency health facilities as well as those factors, such as environmental degradation that may alter the strength, frequency, extension and predictability of hazard events.

Figure 2 shows a distribution of relative human vulnerability for earthquakes over the period 1980-2000. Simply put, if for the same level of exposure the mortality is higher, it means that this country is more vulnerable. Those countries on the top left have the highest relative vulnerability and those on the bottom right the lowest. For example, in the case of earthquakes³², the observed relative human vulnerability of the Islamic Republic of Iran (Disaster Risk Index (DRI) value 1074) is over 1000 times greater than that of the United States of America (DRI value 0.97) and 100 times greater than that of Japan (DRI value 9). That implies very wide variations in mortality for similar levels of hazard exposure. The level of mortality that occurred

in Bam, Iran in December 2003, where 26,796 were killed would never have occurred if a similar earthquake had affected a similar sized city in the United States of America or Japan.

In the case of tropical cyclones (Figure 3), the relative human vulnerability of the United States of America (DRI value 2.49) is more than 15 times greater than that of Cuba (DRI value 0.16). This result was illustrated recently by the very low level of mortality produced by hurricanes affecting Cuba in 2004 and 2005, compared to the 1,833 lives lost when Hurricane Katrina affected New Orleans and Mississippi in 2005. For methodological reasons, drought was not examined in the DRI. However, it is illustrative to note that 98.5% of drought mortality is concentrated in four countries that concentrate only 3.5% of the hazard exposure.

In the same way that mortality only represents a very crude proxy for human vulnerability, economic loss per se is only a crude measure of the economic vulnerability of a country. This depends on many other factors associated with its economic resilience to cope with extreme catastrophic events. A study of the economic resilience of 14 Latin American and Caribbean countries was calculated by IDB.³³

³² Taking into account the methodological limitations of the DRI explained in the technical annex: Note 6.

³³ Cardona, O. D. (2005), Indicators of Disaster Risk and Disaster Risk Management. IDB. For further information see technical annex: Note 8.

This study shows enormous variations between countries. In the case of Figure 4, all values above 1.0 indicate an inability to cope with the likely cost of a 100 year catastrophe³⁴. Six countries would have problems coping, in particular Peru and the Dominican Republic. In contrast, Mexico could cope, even though in absolute terms it has the highest potential loss figure.

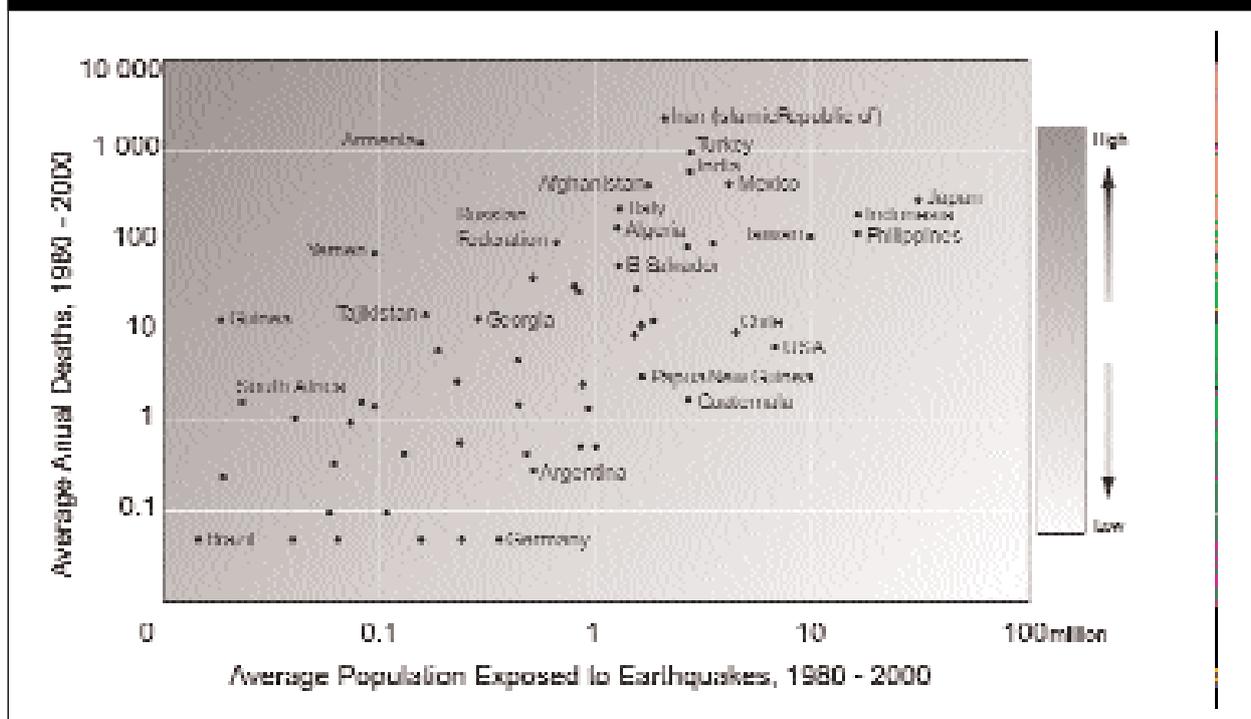
The *hotspots* with most intensive risk, therefore, are those where high relative vulnerability is combined with major concentrations of hazard exposure. Figure 5 shows that, in the case of small-island developing states affected by tropical cyclones, Haiti exemplifies this scenario in all its dimensions.

These *hotspots* are where large-scale catastrophes involving significant mortality, economic loss or both will occur in the future, unless risk levels are drastically reduced. The level of disaster risk has been calculated for earthquake, flood, tropical cyclone, drought and landslide and for multiple hazards, by multiplying hazard exposure with a vulnerability indicator³⁵ enabling the identification of

such hotspots. Disaster risk has been calculated in terms of mortality, total likely economic loss and economic loss as a proportion of Gross domestic product (GDP) density.

Mortality and economic loss hotspots for earthquakes (Figure 6) include the trans-Himalayan and trans-Caucasian regions as well as parts of Japan, Indonesia, the Andean countries and Central America. In terms of economic loss, Japan, Turkey and Iran are at particular risk, as well as parts of south and south-east Europe and Central Asia. Mega-cities such as Tehran represent both mortality and economic loss hotspots where enormous concentrations of vulnerable people and economic activities interface with a high level of hazard. Mega-cities often concentrate a substantial proportion of a country's GDP, implying that the indirect economic loss would be national in character. In the case of some mega-cities, for example Tokyo, the impact would be global. Both economic loss and mortality hotspots are heavily concentrated in rapidly urbanizing middle-income countries.

Figure 2
Relative vulnerability for earthquakes

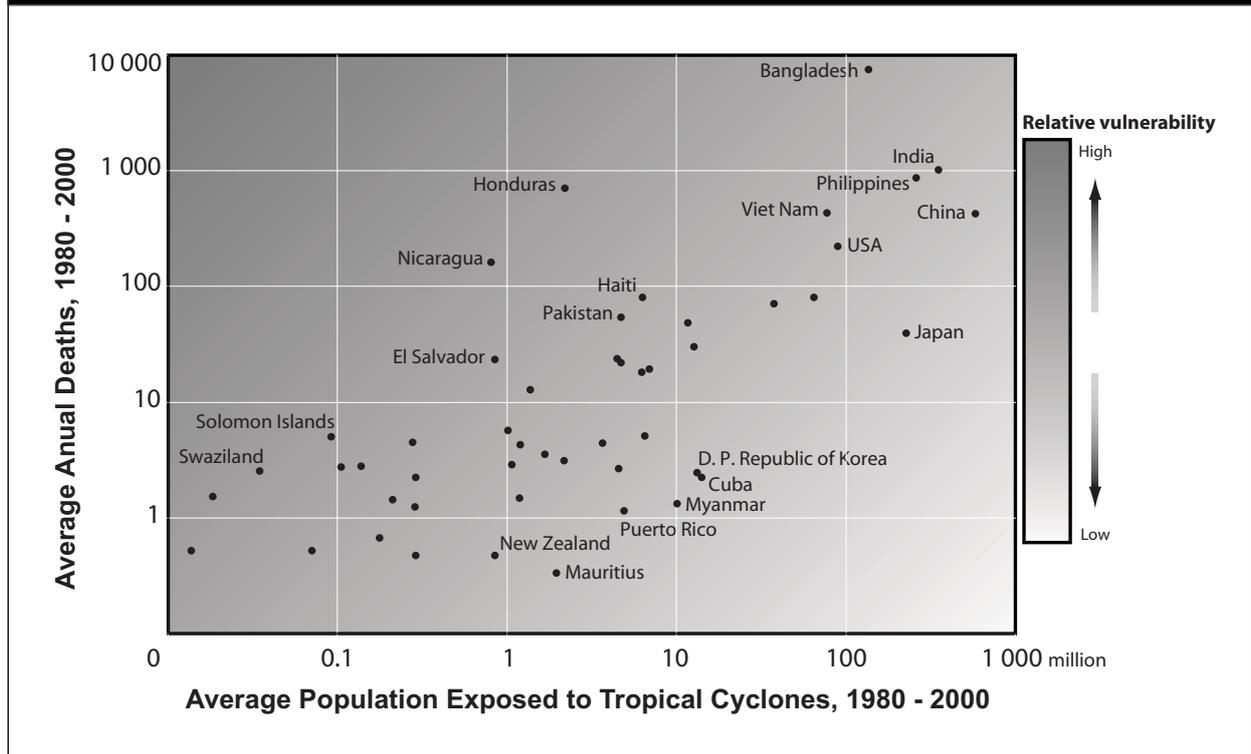


Source: Reducing Disaster Risk, UNDP 2004, data on exposure : UNEP/GRID-Europe, data on mortality, EM-DAT OFDA/CRED International Disaster Database

34 Maximum Considered Event in a 100 year period. 5 per cent probability of occurrence in a 10 year period.

35 See technical annex: Note 7

Figure 3
Relative vulnerability for tropical cyclones



Source: Reducing Disaster Risk, UNDP 2004, data on exposure : UNEP/GRID-Europe, data on mortality, EM-DAT OFDA/CRED International Disaster Database

Figure 4
Disaster Deficit Index for a 100 year catastrophe

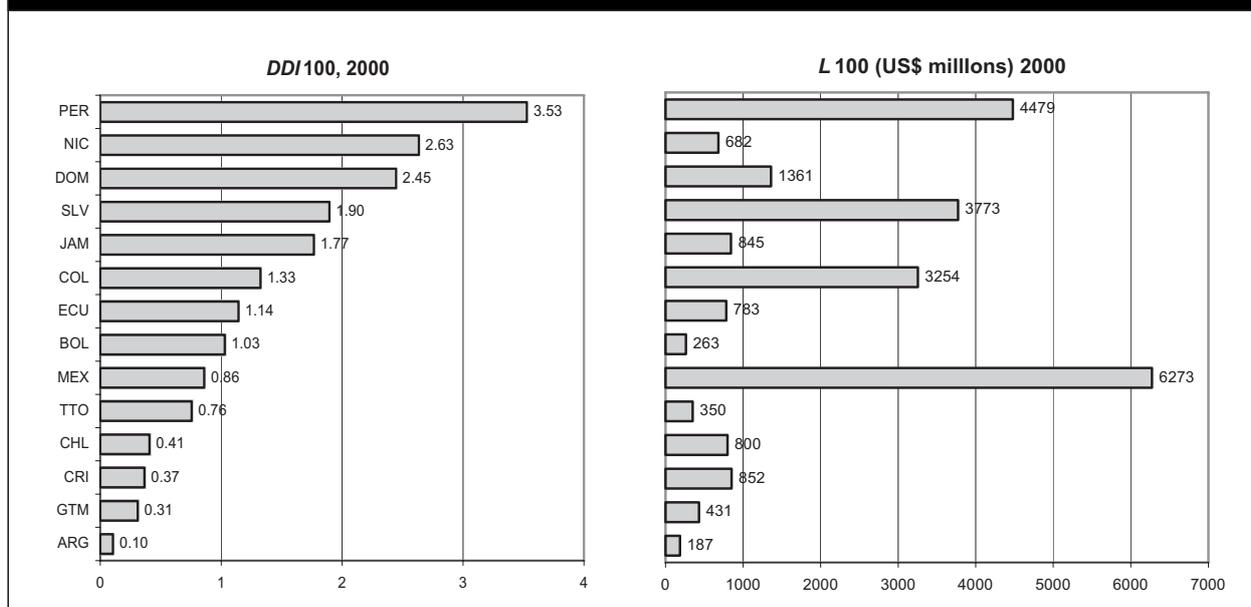
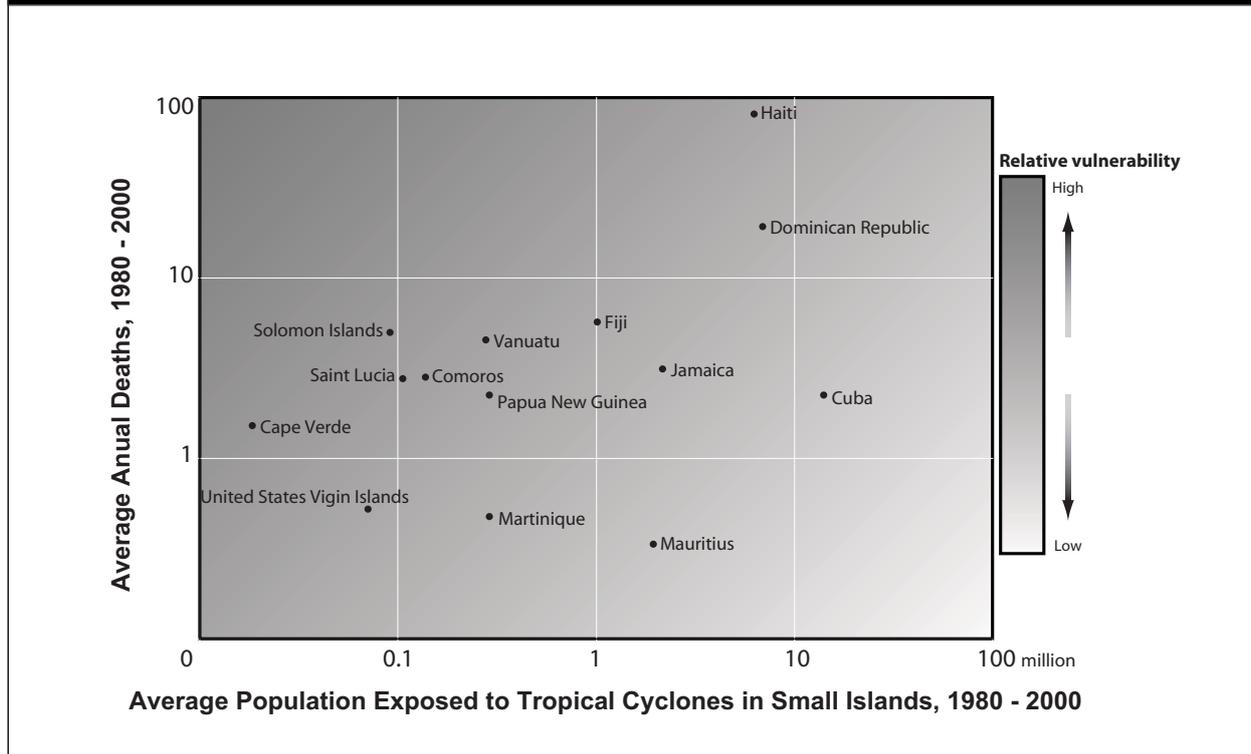


Figure 5
Relative vulnerability for tropical cyclones in Small Islands

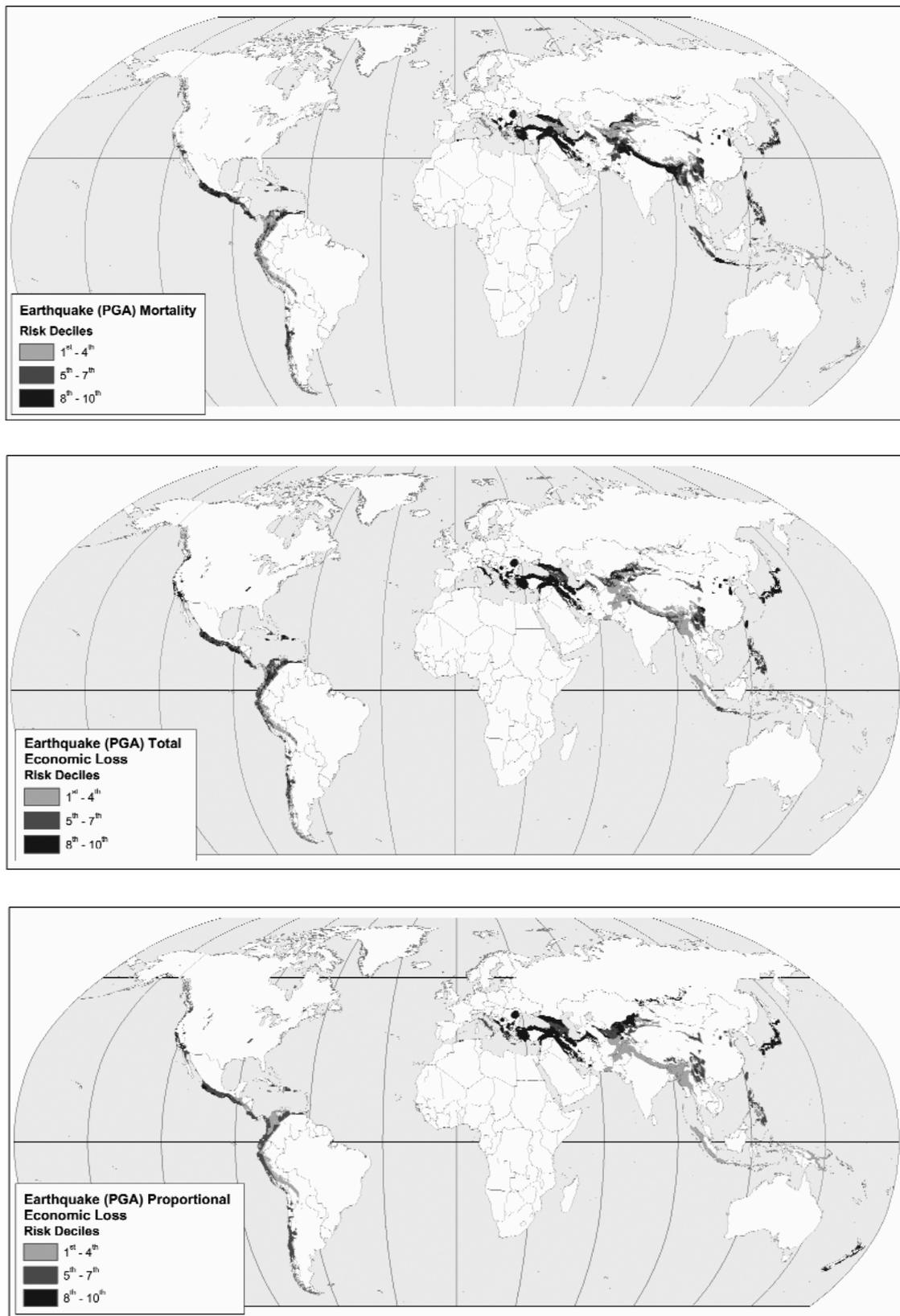


Source: Reducing Disaster Risk, UNDP 2004, data on exposure : UNEP/GRID-Europe, data on mortality, EM-DAT OFDA/CRED International Disaster Database

In the case of cyclones, mortality hotspots include coastal areas in south and east-Asia, Central America and the Caribbean and parts of Madagascar and Mozambique. Economic loss hotspots however include the eastern seaboard of the United States of America, a region with relatively low mortality risk. Flood mortality hotspots are concentrated in major river basins in south and east-Asia as well as in Latin America. As in the case of cyclones, economic loss

hotspots include areas of Europe and the eastern United States of America, with relatively low mortality risk. Drought mortality hotspots (Figure 7) are concentrated exclusively in sub-Saharan Africa. Economic loss hotspots for drought, in contrast, are located in more developed regions, for example in southern Europe and the Middle East, Mexico, north-east Brazil and north-east China.

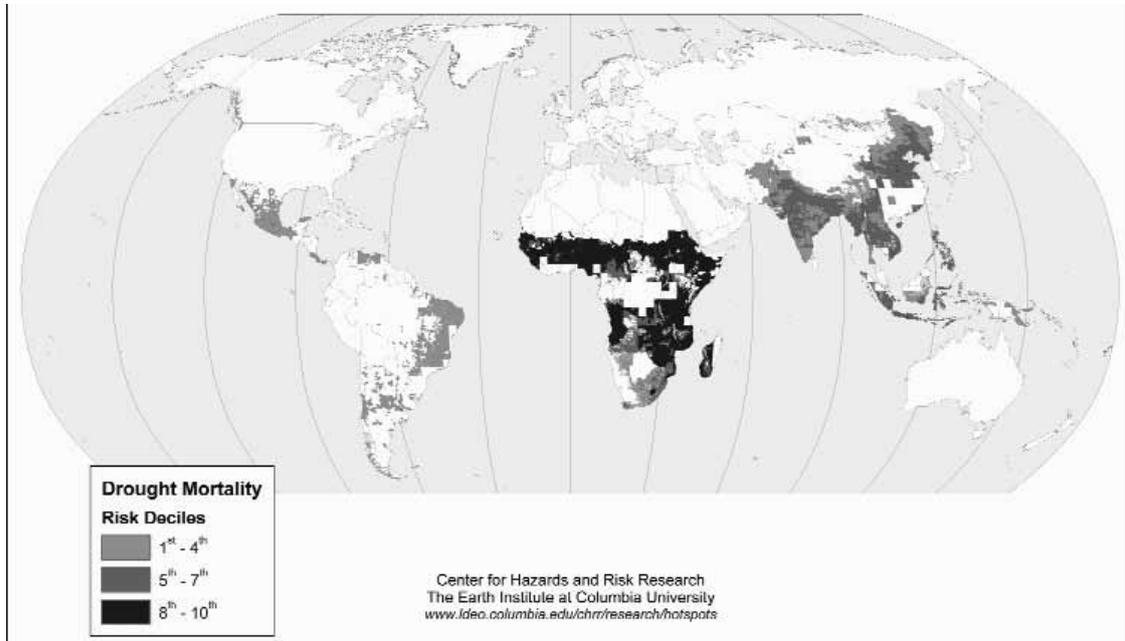
Figure 6
Mortality, economic and proportional economic losses from earthquakes



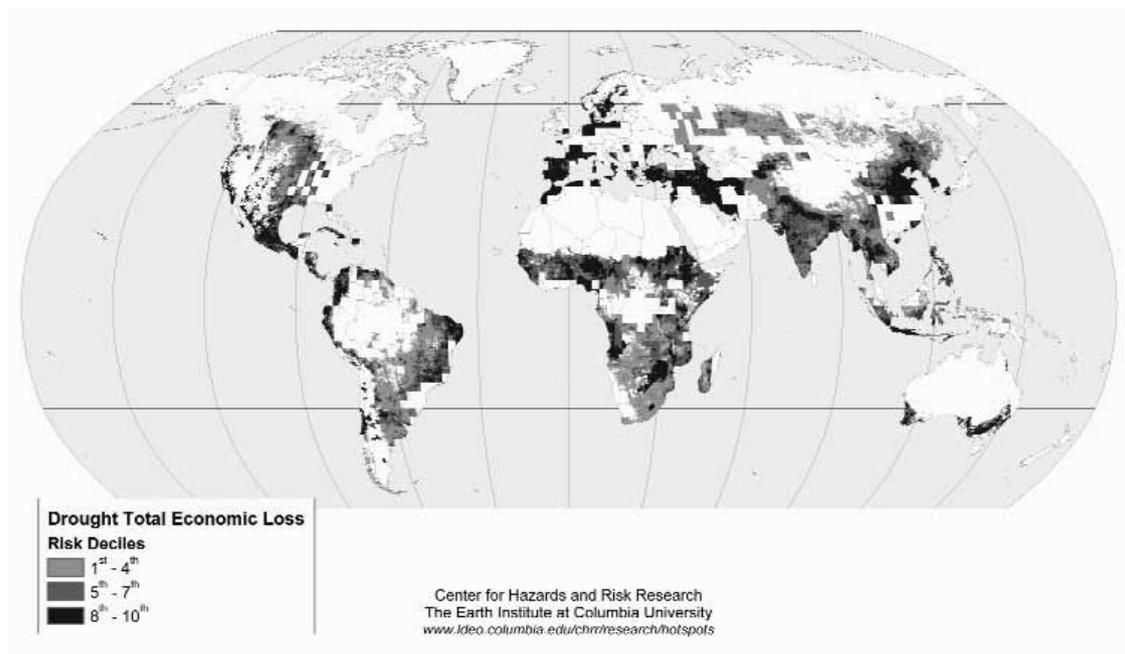
Global distribution of earthquake risk
Sources: Natural Disaster Hotspots: a Global Risk Analysis Synthesis Report

Figure 7
Mortality and economical losses distribution for droughts

Drought mortality losses distribution



Drought economic losses distribution



Trends in Mortality and Economic Loss Risk

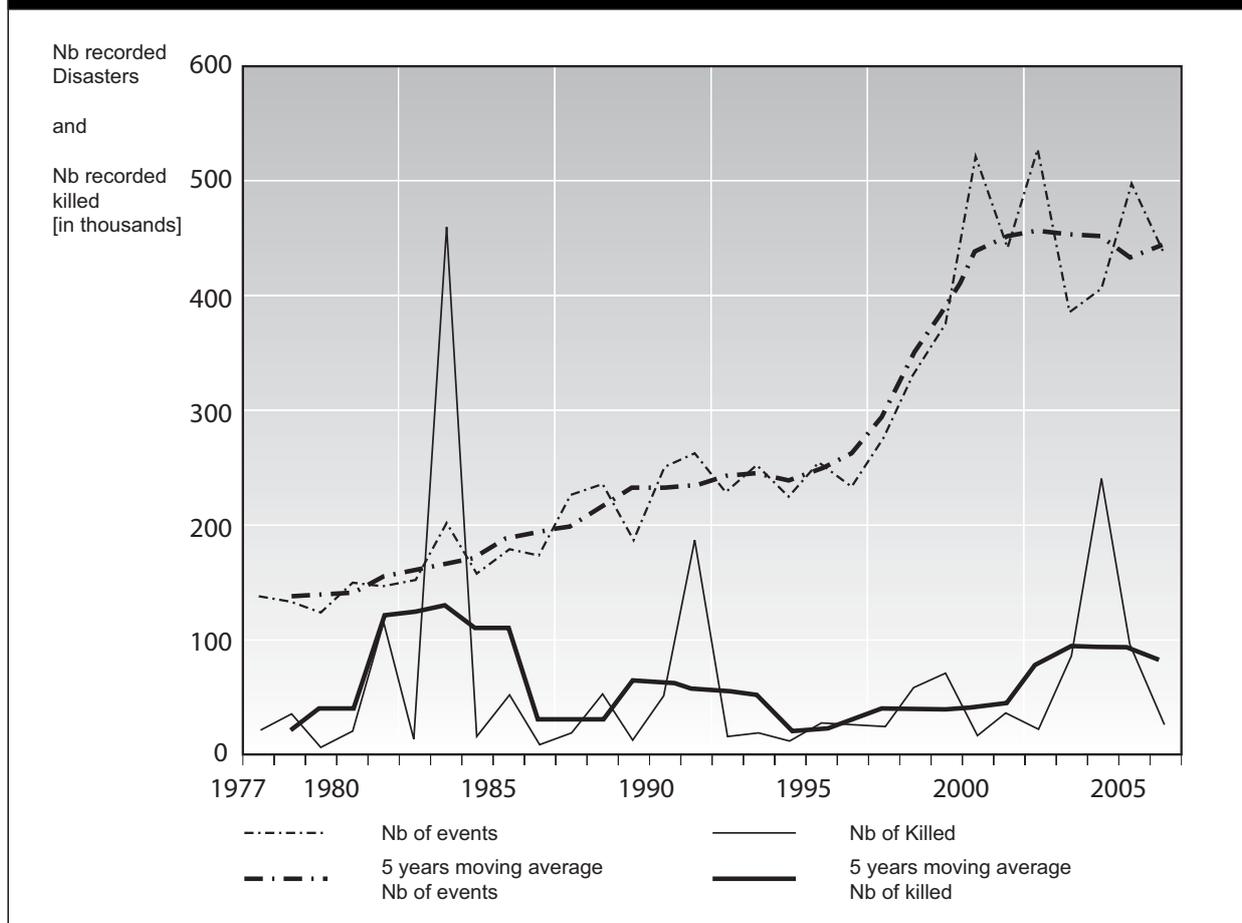
Development configures and modifies both hazard exposure and vulnerability over time and is therefore a key driver of disaster risk. As risk accumulates both disaster occurrence and loss may increase. Figure 8³⁶ indicates that over the last 30 years disaster occurrence is increasing far faster than the number of deaths, which has remained relatively constant.

From a global perspective this could imply that at the same time as hazard exposure is increasing (more people and assets exposed to hazards and therefore more disasters) relative human vulnerability may be decreasing (similar numbers of deaths for more people exposed). However, this apparently optimistic conclusion is challenged, when mortality data is examined for different hazard types and regions. As both Figures 9 and 10 indicate, most of the reduction in mortality is due to the fall in drought mortality

since the major drought disasters of the early 1980s in Africa. In contrast, mortality rates for other climatic disasters and particularly for geological (tectonic) disasters are still rising globally while mortality is also increasing in all regions. Given the concentration of mortality in large-scale disasters, this may mean that mortality is rising faster in geological risk hotspots than in climate risk hotspots, while the increase in disaster occurrence is mainly related to smaller scale climatic disasters with low mortality rates (see Figure 13 below).

This hypothesis is supported by looking at how development conditions both mortality and economic loss risk. Mortality risk would seem to be sensitive to the underlying development processes in geological risk hotspots and climatic risk hotspots in very different ways.

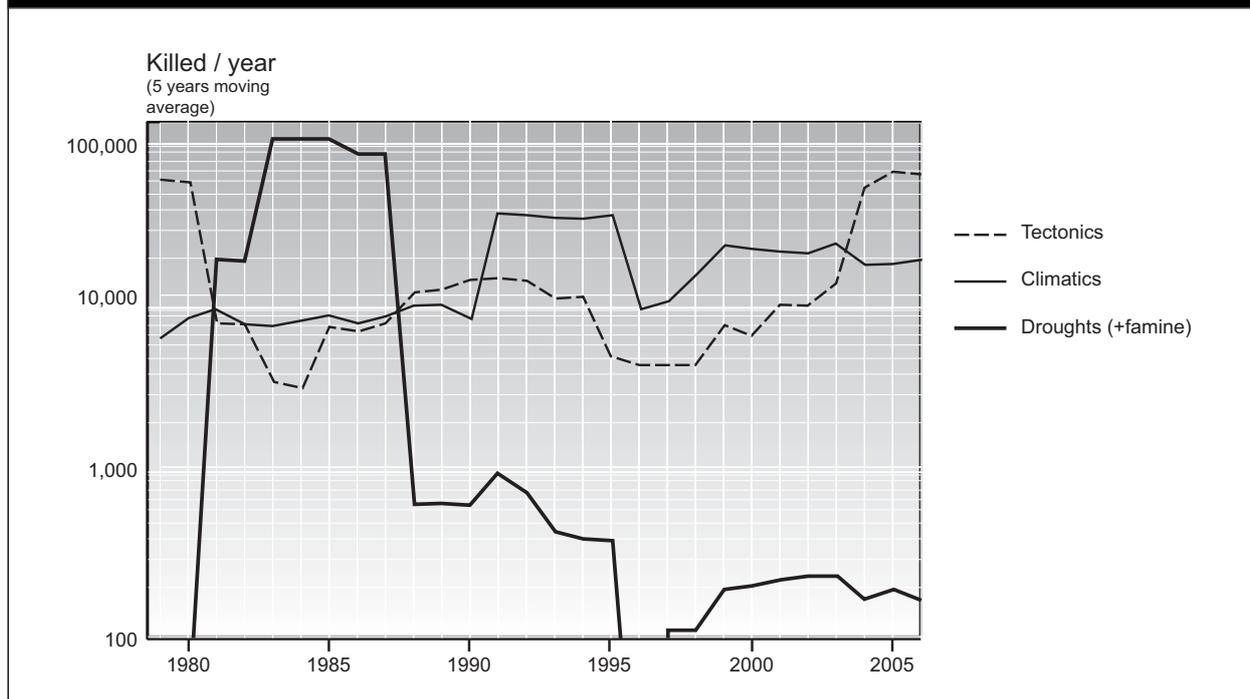
Figure 8
Trends of recorded natural disaster and killed 1977-2006 (CRED)



Data source: EM-Dat, graphic: ISDR, 2007

36 See technical annex: Note 9

Figure 9
Killed per year by type of hazard



Data source: EM-Dat, graphic: ISDR, 2007

In the case of climatic risk hotspots, a correlation of mortality risk³⁷ with a range of social, economic and environmental indicators³⁸ shows that, economic and social development with improved health, sanitation, infrastructure and communications in many rural areas may lead to a reduction in mortality. Improved early warning, disaster preparedness and response may also contribute. As a consequence, mortality in climatic risk hotspots in developed countries, as well as in some developing countries like Cuba, is now relatively low. Mortality risk, however, in climatic risk hotspots in less developed regions remains high³⁹. This conclusion is supported by the spatial distribution of both mortality and economic risk in climatic risk hotspots⁴⁰. In the case of floods, cyclones and drought mortality risk is heavily concentrated in less developed regions, while economic risk is heavily concentrated in more developed regions. Again this indicates that economic and social development, together with factors such as improved disaster preparedness and early warning may lead to a reduction in mortality in the case of climate related hazards.

In the case of geological risk hotspots, in particular earthquakes, mortality behaves very differently. In earthquake hotspots, when economic and social development is characterized by rapid urbanization, this would seem to lead to an increase in mortality⁴¹ risk possibly due to the difficulties in implementing building regulations and planning controls when urban growth is very fast. At the same time, earthquake mortality risk is far less sensitive to reductions through enhancements in early warning and preparedness than climatic mortality risk. High mortality risk is concentrated in rapidly urbanizing middle-income countries such as Iran or Turkey, while lower mortality risk occurs in countries with slower rates of urbanization at both ends of the development spectrum. In the case of highly developed countries such as the United States of America, this may be linked to seismic resistant building standards and norms. In the case of some lesser developed regions, it is possible that urbanization has yet to reach the speed where it increases mortality risk.

37 The existence of a correlation does not imply a causal relation. However it does poses hypothesis which regarding possible causalities.

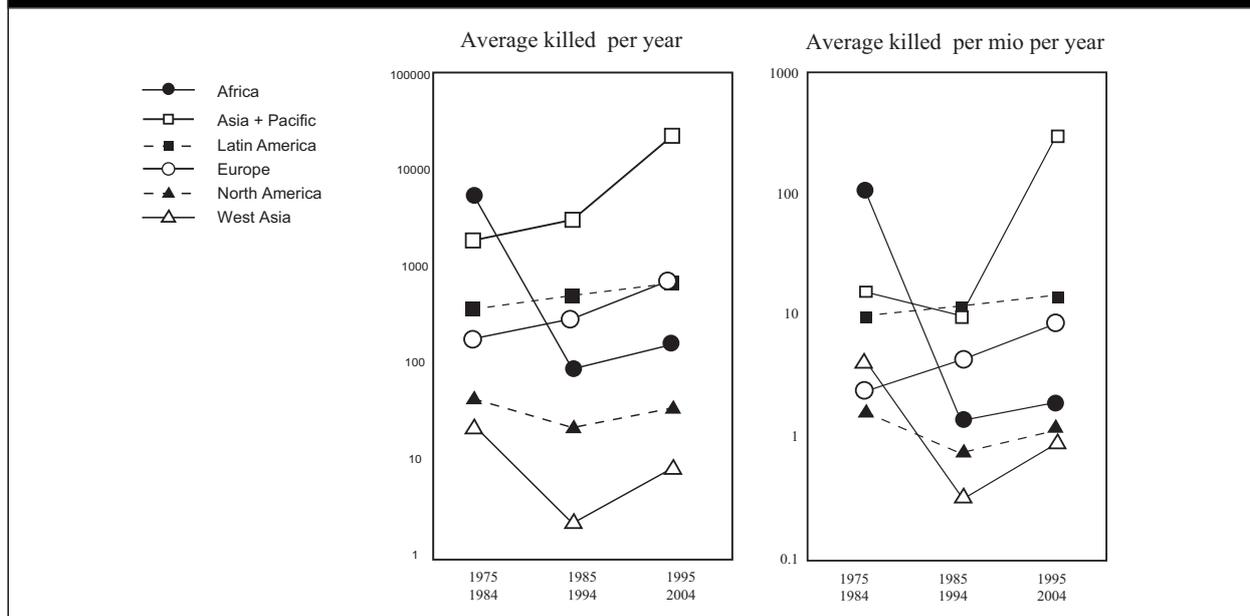
38 UNDP Op.Cit

39 See technical annex: Note 10

40 World Bank Op. Cit

41 See technical annex: Note 10

Figure 10
Trend in killed by region by decades



Source: Peduzzi, P., (2006), Risk from environmental degradation, presentation at the ProVention Forum Session 1 "Evidence of Changing Patterns of Risk and New Perspectives on Disaster Vulnerability". Bangkok. http://www.proventionconsortium.org/themes/default/pdfs/Forum06/Forum06_WS1_peduzzi.pdf

In the case of economic loss risk, Figure 12 shows a total economic loss of USD 1,700 billion, insured losses of USD 340 billion and a very clear upward growth trend over the last 50 years in large-scale disasters. In contrast to mortality risk, it is likely that economic loss risk is driven by development in similar ways in both geological as well as climatic risk *hotspots*⁴². In general, higher levels of economic development are consistent with more economic assets at risk for both kinds of *hotspot*. In the case of climatic risk hotspots, while measures such as enhanced early warning, disaster preparedness and response can save lives, they do not reduce the loss and destruction of economic assets, except when applied to agricultural planning. Thus even countries like Cuba that have achieved a very low level of relative human vulnerability to tropical cyclones, can suffer significant economic losses with every major event. Figure 12 shows that large scale climatic disasters account for 71% of the disasters recorded, 69% of the total economic loss but only 45% of disaster mortality. Given that economic loss in climatic risk hotspots is concentrated in the developed world it is possible that economic loss risk will become increasingly associated with major

climate related hazard events affecting more developed regions. For example, while Hurricane Katrina was responsible for 1,833 deaths it caused more than USD 125 billion in economic losses.⁴³

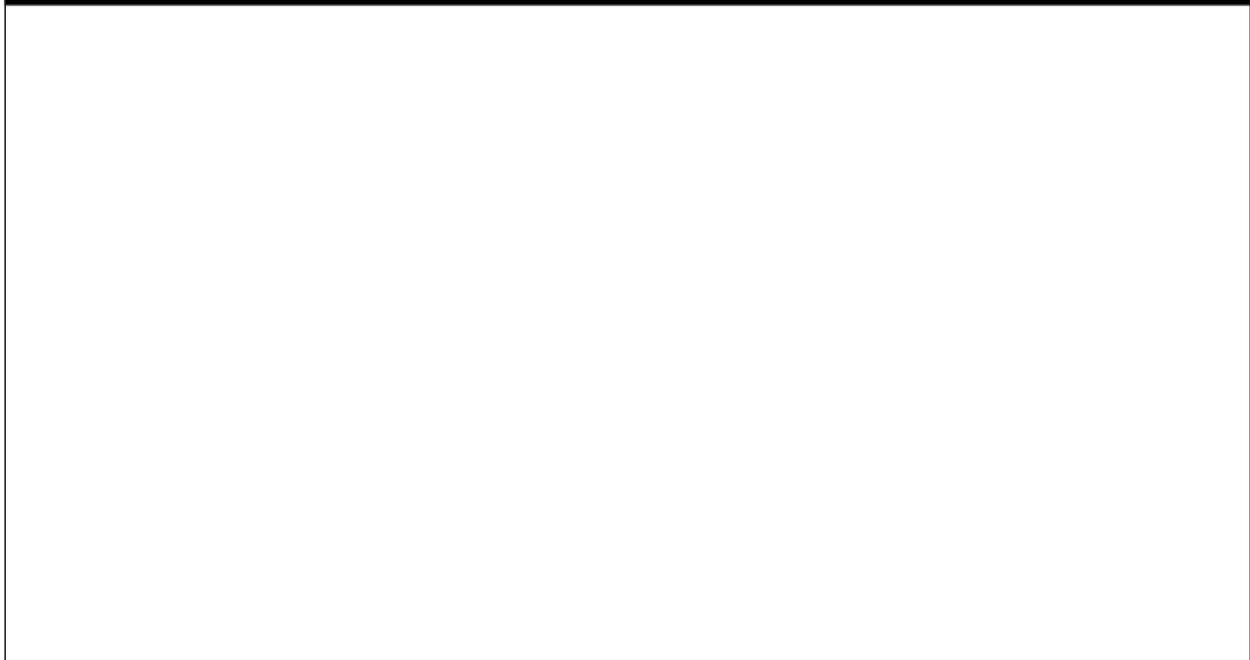
In contrast, it is likely that mortality risk will become more concentrated in geological risk hotspots in rapidly urbanizing regions. By 2010 more than 50% of global population will be living in cities. More than 30% of urban population is living in slums⁴⁴ which may have specific characteristics of vulnerability and risk. As so much of this risk is already committed, for example in large mega-cities without a history of recent major earthquakes, a significant part of this future mortality is unfortunately inevitable. In the case of climatic hotspots, even in less-developed regions, there is evidence to suggest that mortality risk can be reduced. However, the experience of the 2003 European heat-wave and of Hurricane Katrina in the United States of America in 2005 shows that even highly-developed countries can experience serious rates of mortality, when preparedness and response capacities are unable to cope with exceptional events. And as will be discussed below, climate change may drastically modify current assumptions about risk levels.

42 See technical annex: Note 11

43 Sources: EM-Dat, 2007

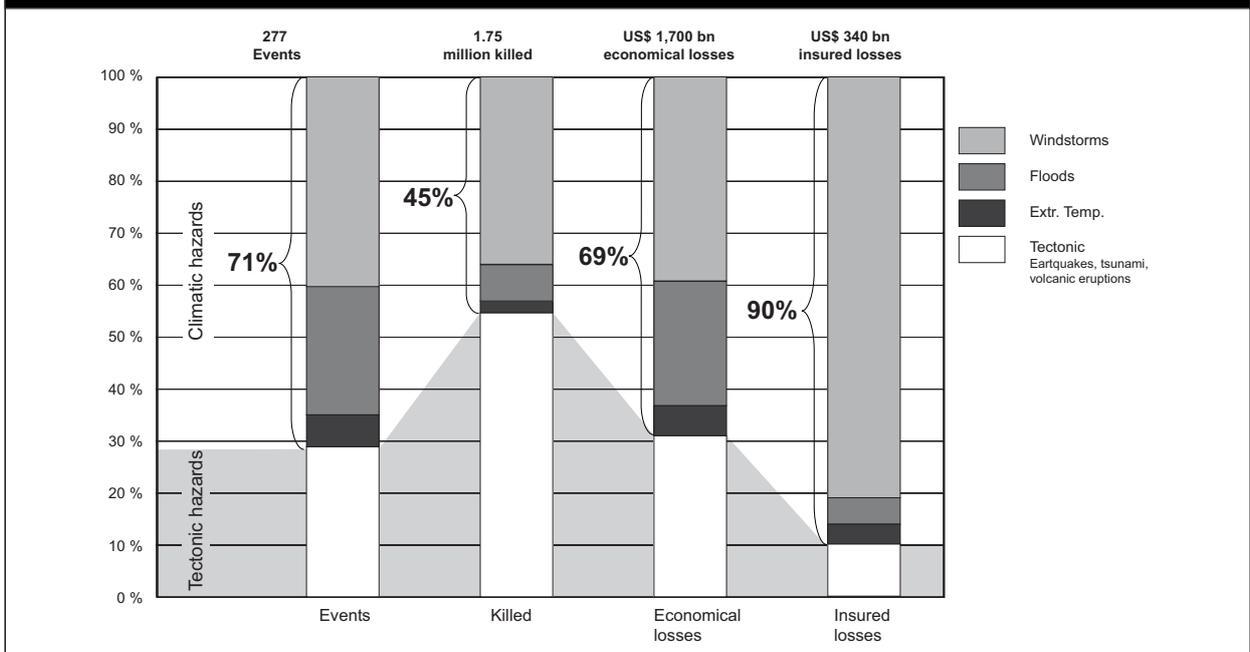
44 UN-Habitat, (2003), Water and Sanitation in the World's Cities: Local Action for Global Goals. Waking Up to Realities of Water and Sanitation Problems of Urban Poor.

Figure 11
Great natural catastrophes 1950-2005. Overall losses and insured losses.



Source: Münchner Rückversicherungs-Gesellschaft, Geo Risks research, NatCatService

Figure 12
Economic losses in large-scale disasters



Data sources: Münchner Rückversicherungs-Gesellschaft, Geo Risks research, NatCatService, Graphic: ISDR 2007

2.3 Extensive disaster risk

The attention of the humanitarian community, the private sector and the media is focused on the effects of large-scale catastrophes, in intensive risk hotspots. As described above, these disasters feature the vast majority of mortality cases.

Discounting these large-scale events, annual global disaster mortality was only 11,000 for the decade 1975-1984, 14,500 for 1985-1994 and 7,021 for 1995-2004, figures that are extraordinarily flat if one considers population growth over the same period. The global population reached 6.54 billion in 2006⁴⁵ and continues to grow at a rate of 80 millions per year (the equivalent of a country like Germany or Viet Nam).

EM-DAT shows (Figure 13) that the number of climate related disasters is increasing far faster than the number of geological disasters, particularly since the late 1970's and that the number of small and medium scale disasters is growing much faster than large-scale disasters⁴⁶. This result is consistent with the fact that (Figure 14), excluding the mortality in large-scale disasters, mortality in climatic disasters is

Table 3
Mortality trends excluding large-scale catastrophes

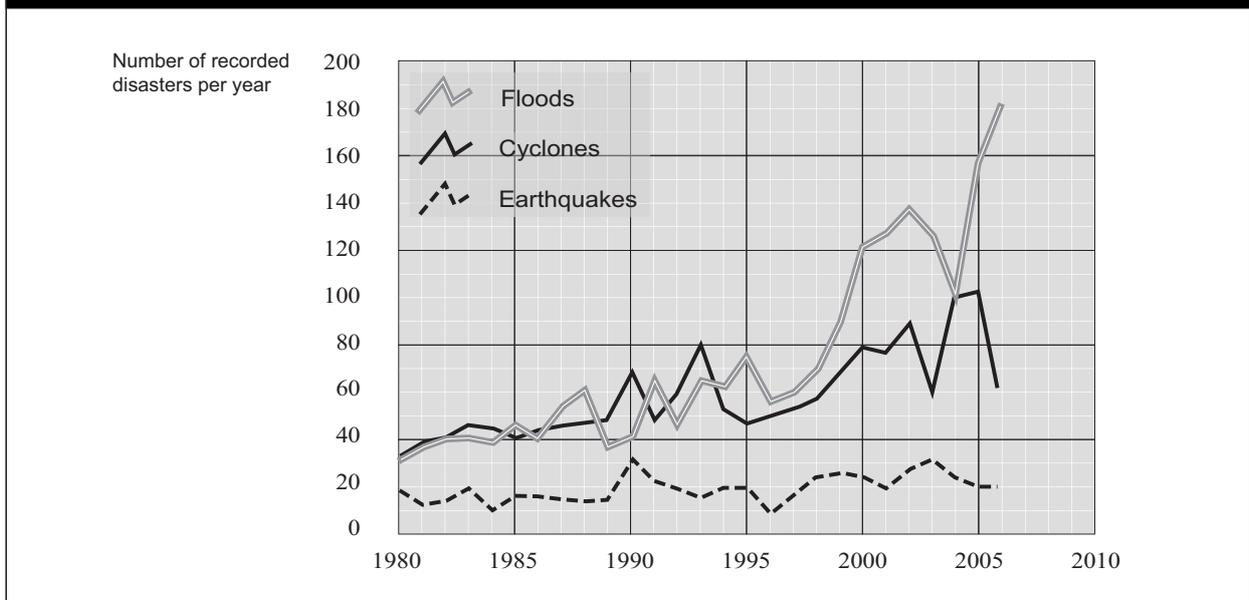
Decade	Mortality in disasters that killed over 10,000	Other mortality	Total annual mortality	Total annual mortality excluding disasters with over 10,000 killed
1975-1984	864'204	112596	97680	11260
1985-1994	235'666	145864	38153	14586
1995-2004	360'971	70211	43118	7021
Total killed	1'460'841	328'671		

Data source: EM-DAT

rising far faster than in geological disasters albeit from a low base-line.

These results indicate that in parallel with intensive risk hotspots, extensive risk scenarios are also unfolding, characterized by large-numbers of highly localized mainly climatic hazard events spread over extensive areas and affecting relatively low concentrations of people and economic assets. Many

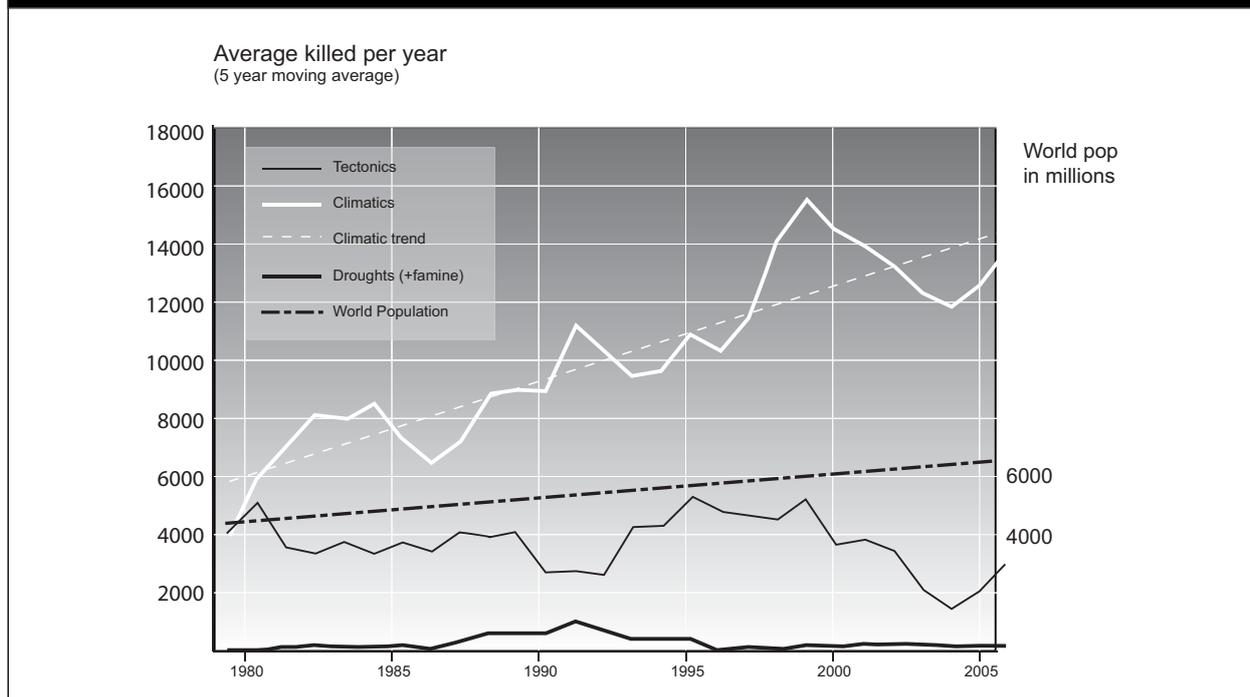
Figure 13
Trends in events versus killed by hazard types



Data source: EM-Dat, graphic: ISDR, 2007

45 World Population Prospects: The 2006 Revision Population Database: <http://esa.un.org/unpp/>
 46 Defined as over 50 deaths or 150,000 affected people or USD 200 million in economic losses.

Figure 14
Average killed per hazard per year without "mega events"



Data source: EM-Dat, graphic: ISDR, 2007

climate related hazards such as landslides, flash-floods, localized storms and coastal flooding etc. in contrast to the effects of earthquakes, result in highly localized disaster impacts and thus an increase in small and medium scale disasters. The rapid growth in the number of small-scale climatic disasters and of mortality in these events tends to indicate that extensive risk is increasing rapidly, although it has been studied far less systematically than the intensive risk hotspots.

It is likely that these emerging patterns of extensive risk are being driven by concurrent processes of urbanization, environmental degradation and the productive transformation of new territories. The combined effects of this processes generates an increase in the extent, frequency and magnitude of localized flooding, flash-flood, landslide and wildfire events, creates new climate related hazards in previously hazard free areas due to environmental change and increases the population and economic activities exposed as well as their vulnerability. For

example, globally forests are currently losing 130'000 km² per year⁴⁷ while increases in landslide frequency in deforested areas are likely, as highlighted by a United Nations (UN)/International Union for the Conservation of Nature and Natural Resources (IUCN) study for north Pakistan.⁴⁸

A closer look at extensive risk is provided by the data available in national disaster databases. Accurate global data on small scale disasters below the EM-DAT reporting threshold⁴⁹ does not exist. However, a number of countries in Asia and Latin America have made significant progress in developing disaster databases using the DesInventar⁵⁰ methodology with a national level of observation and a local scale of resolution⁵¹. These databases show that, while globally it is unlikely that extensive risk makes a significant contribution to disaster mortality, in countries not exposed to large scale hazard events, the small-scale disasters that characterize extensive risk may make up a very significant part of total mortality⁵². For example, in the case of Panama, Chile and Jamaica, they

47 UNEP, billion tree campaign: www.unep.org/billiontreecampaign

48 UNEP-IUCN-University of Lausanne (study not yet published).

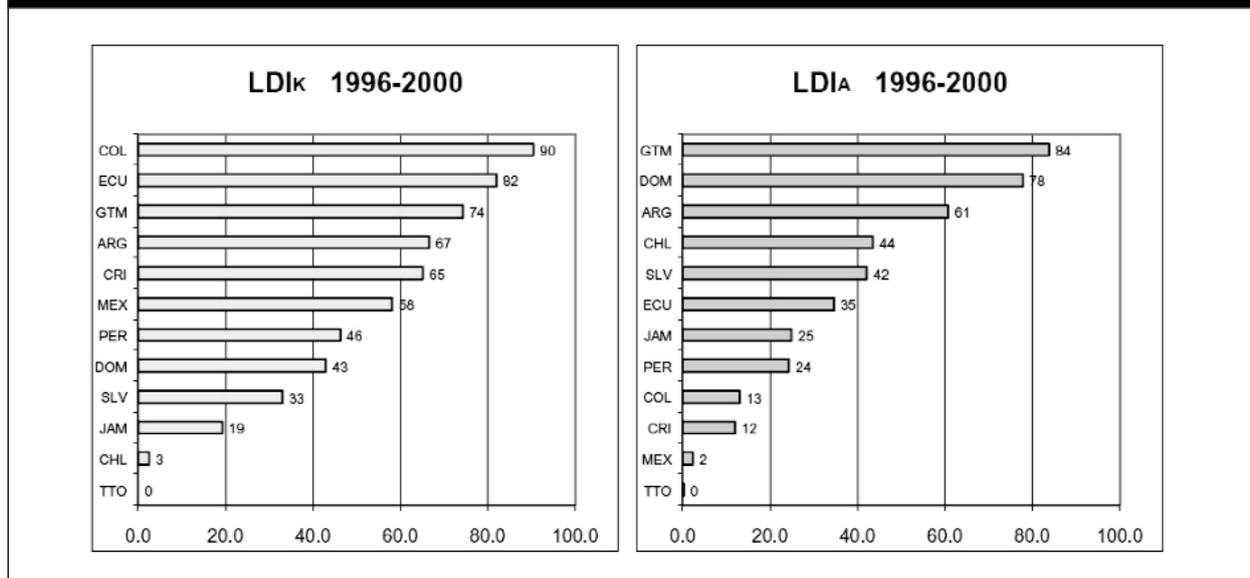
49 The EM-DAT database records all disaster events with more than 10 deaths, 100 affected or where a call for international assistance was made.

50 See technical annex note 12.

51 National databases, containing usually 30 years of disaster data currently exist for 14 Latin American and Caribbean countries as well as for Sri Lanka, Nepal and a number of States in India. Databases in Indonesia, Thailand, Maldives and the Islamic Republic of Iran are in various stages of completion.

52 See technical annex note 13.

Figure 15
Local Disaster Index for people killed and affected



Source: Cardona, O. D, (2005), Indicators for Disaster Risk and Risk Management. Program for Latin America and the Caribbean

represented 74%, 53 % and 43 % of the total mortality registered in the national databases. In the case of Colombia, in contrast, that figure was only 4%. In other words, the relative importance of extensive risk is greater outside of countries like Colombia which are intensive risk *hotspots*.

While the absolute mortality in areas of extensive risk may be very low, levels of damage to housing, infrastructure and agriculture may be far more significant. According to the national database of Chile, while small scale disasters in Chile accounted for less than 1000 deaths over a 30 year period, an average of only 33 deaths per year, 5,564 houses were destroyed, 22,060 houses were damaged and 601,457 hectares of crops were affected in the same events.

These figures again highlight a significant underreporting of economic loss, probably affecting marginal rural and urban communities.

Unfortunately, no systematic measurement of economic loss in small-scale disasters has been attempted. In the national databases the panorama is nebulous, because very little reliable economic data is reported. Nevertheless, the example of the El Salvador earthquake in 2001 demonstrates clearly that small scale disasters often have huge impact on livelihood of many families which are living under the poverty line⁵³.

The extensive nature of disaster risk associated with these small-scale events can also be examined by looking at the spatial distribution of disaster loss across local administration areas in a country. If losses are more evenly spread across a large number of local administration areas, then this will reflect a greater extensiveness of risk⁵⁴. Examining the distribution of mortality (LDIk), which represents the most robust variable in the source data, countries like Colombia, Ecuador and Guatemala showed a large distribution across the national territory in contrast to Chile which showed a very low level of uniformity. The processes that are driving extensive, localized weather-related disaster risk play out in very different ways from country to country depending on geography, ecology and patterns of urbanization and economic activities.

It is possible that as more and more risk becomes committed over extensive areas, through urbanization, environmental change and the productive incorporation of new territories, new risk hotspots will gradually unfold. This can happen, for example, when hazard exposure grows in areas that were previously sparsely populated but which are seismically active. For example, Hurricane Mitch in Central America in 1998 revealed a complex pattern of extensive risk that was manifested simultaneously through a major hazard event and appeared as an intensive risk hotspot.

⁵³ www.desenredando.org.

⁵⁴ The Local Disaster Index calculated in a study commissioned by IDB, illustrates the relative distribution of deaths, affected people and direct physical damage for 12 Latin American and Caribbean countries for the period 1996-2000.

2.4 How will climate change affect global risk patterns?

The scenarios of intensive risk hotspots and extensive disaster risk outlined above are being driven by global processes including urbanization, economic globalization, poverty and environmental change. While global climate change is only one of these processes, it is highlighted in this review because it is already having a crucial impact and because in recent months major reports have laid out with a far greater degree of confidence than was previously possible both the likely magnitude of global climate change as well as its likely impact on water resources, ecosystems, food production, coastal systems, industry, settlement and society and health.

Climate change will reconfigure patterns of climatic hazard as well as physical, social and economic vulnerability in many regions. The combination of increasing climatic hazard, together with declining resilience may conspire against the effectiveness of measures for social development and enhanced preparedness and early warning, which have achieved a reduction in mortality rates in climatic disasters in developed countries. The 30,000 deaths attributed to

the 2003 heat-wave in Western Europe, occurring in countries with first-class national health systems, is an indication of how mortality rates associated with climatic hazards can easily be reversed.

At the same time, other processes that configure disaster risk, such as urbanization will also increase exposure and vulnerability to climate change, for example by increasing the concentration of population and economic activities in flood and cyclone-prone coastal areas.

The potential linkages between evolving disaster risk trends and patterns and the likely impacts of global climate change are non-linear and complex and have only been partially explored in the reports mentioned. In the scope of this review it is only possible to provide an indicative description of some of these linkages.

Climate change will alter risk patterns in several ways:

- Increase in the frequency and intensity of extreme climatic events, such as temperature extremes, storms, floods and droughts;

Table 4 - Impacts of sea level rise: Global level

	1m	2m	3m	4m	5m
Area (Total = 63,332,530 sq. km)					
Impacted area	194'309	305'036	449'428	608'239	768'804
% of total area	0.31	0.48	0.71	0.96	1.21
Population (Total = 4,414,030,000)					
Impacted population (in million)	56,3	89,6	133,1	183,5	245,9
% of total population	1.28%	2.03%	3.01%	4.16%	5.57%
GDP (Total = 16,890,948 million USD)					
Impacted GDP (in million USD)	219'181	357'401	541'744	789'569	1'022'349
% of total GDP	1.30%	2.12%	3.21%	4.67%	6.05%
Urban extent (Total = 1,434,712 sq. km)					
Impacted urban area	14'646	23'497	35'794	50'742	67'140
% impacted urban area	1.02%	1.64%	2.49%	3.54%	4.68%
Agricultural extent (Total = 17,975,807 sq. km)					
Impacted agric. Area	70'671	124'247	196'834	285'172	377'930
% total agric. Area	0.39%	0.69%	1.09%	1.59%	2.10%
Wetlands area (Total = 4744149 sq. km)					
Impacted area	88'224	140'365	205'597	283'009	347'400
% of total wetlands area	1.86%	2.96%	4.33%	5.97%	7.32%

Sources: Adapted from Dasgupta et. al., (under publication 2007)

- Hazard impact in areas that do not have experience with such hazards;
- Increase in vulnerability as underlying risk factors are compounded by climate-change-specific hazards, such as sea-level rise and glacier melt.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), released in 2007, confirms that the hardest hit by climate change include the Arctic, sub Saharan Africa, small islands developing states, and Asian megadeltas, as well as coastal zones, water resources and human health. It is the poorest who will suffer the most as they have the least means to adapt. As the water cycle becomes more intense through climate change many climate-related hazards will become more severe, including floods, droughts, heat-waves, wild-fires and storms, which will affect the economies of many human settlements.

Drought

Drought is of particular concern in Africa, given its high exposure and insufficient capacity to adapt to climate change. According to the IPCC, the areas suitable for agriculture, the length of growing seasons and yield potential, particularly along the margins of semi-arid and arid areas are expected to decrease. By 2020, between 75 and 250 million people are projected to be exposed to an increase of water stress due to climate change in the region. Agriculture production, including access to food, in many African countries and regions is projected to be severely compromised by climate variability and change."

Flood

The IPCC found that it is very likely that heavy precipitation events will become more frequent. Small island developing states face flooding, storm surge, erosion and other coastal hazards, which threatens infrastructure, livelihoods and settlements. Heavily populated megadeltas in South, East and Southeast Asia will be at greatest risk of flooding from sea-level rise and in some megadeltas from flooding of rivers. Europe will face greater risk of inland flash floods, as well as more frequent coastal flooding and increased erosion. In Africa sea-level rise will affect low-lying coastal areas with large populations.

Tropical cyclone

Higher sea temperatures will lead to more intense tropical and extra-tropical cyclones. This will directly increase hazard exposure in existing cyclone hotspots particularly if combined with an increase in the concentration of population and economic activities in these areas.

At the same time, higher sea temperatures may also alter cyclone tracks meaning that hazard exposure could increase in regions that historically have not suffered cyclones, configuring new hotspots. The Catarina hurricane, the first ever in the South Atlantic, hit the coast of Santa Catarina, Brazil, in 2004, causing severe damage, for example. In such regions, vulnerability will be higher than in regions that historically suffer cyclones, given that the development of settlement, buildings and social systems would not have taken into account cyclone hazard.

Table 5 - Change in the number and percentage of hurricanes in categories 4 and 5 for the 15-year periods 1975-1989 and 1990-2004 for the different ocean basins

Basin	1975 - 1989		1990 - 2004	
	Number	Percentage	Number	Percentage
East Pacific Ocean	36	25%	49	35%
West Pacific Ocean	85	25%	116	41%
North Atlantic	16	20%	25	25%
South western Pacific	10	12%	22	28%
North Indian	1	8%	7	25%
South Indian	23	18%	50	34%

Sources: P. J. Webster, G. J. Holland, J. A. Curry, H.-R. Chang, (2005). Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment, Science, 16 September 2005: Vol. 309.

The year 2005 was the warmest year in northern hemisphere and it had the highest number of tropical cyclones (26). 14 became tropical cyclones and 7 super-cyclones. The previous record was 21 tropical cyclones in 1933. 2005 saw the highest economical losses from climatic events: 200 billions USD losses, mostly as a result of Katrina (125 billions USD). It recorded the strongest winds: Wilma wind gusts reached 330 km/h and the lowest central pressure 882 hPa ever recorded (previous record 888 hPa - Gilbert in 1988)⁵⁵. An increase in this trend seems to be very likely.

Glacier melt: Flood and drought hazard

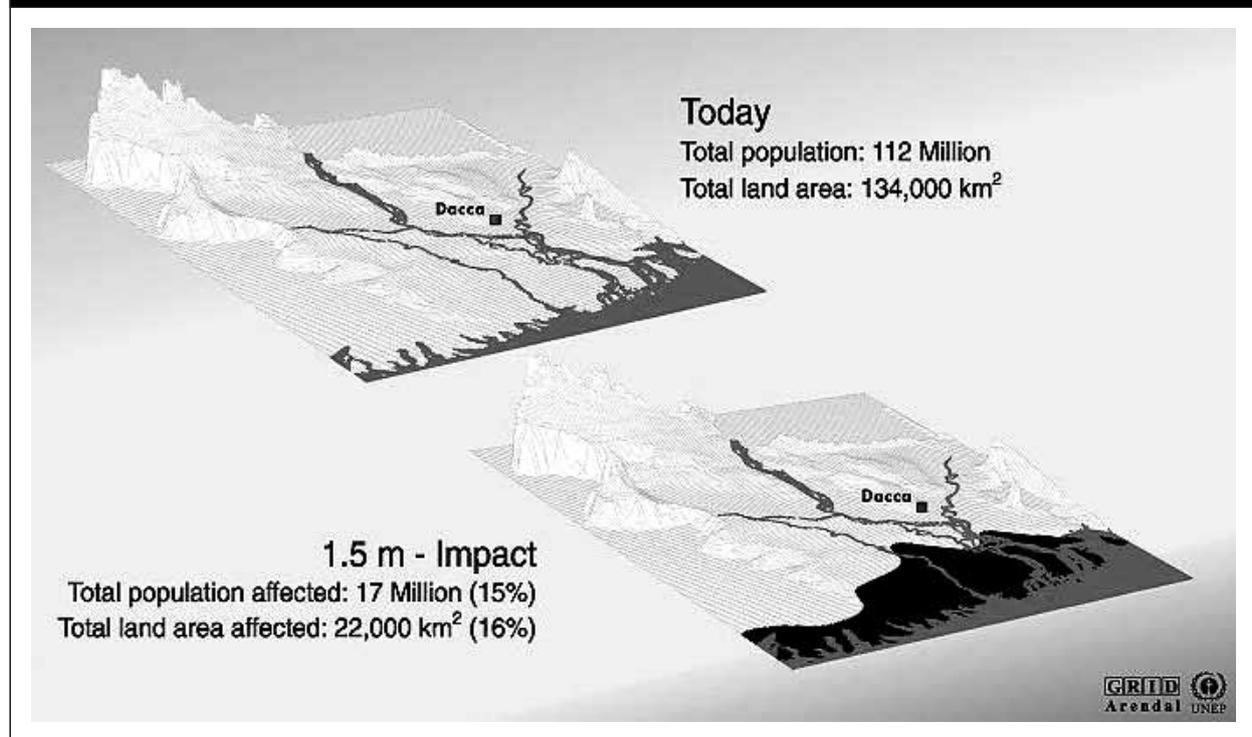
Increased glacier melt in the Himalayas, for instance, will lead to the formation of larger glacier lakes. This phenomenon is likely to lead to increased flooding in many river systems, including potentially catastrophic glacial lake outburst floods, rock avalanches from destabilized slopes, overflow floods and natural damn rupture. For example, the surface of Lake Safuna Alta in the Cordillera Blanca, Peru, increased spectacularly between 1975 (7.4 ha) and 2000 (37.8 ha)⁵⁶.

These changes will directly increase hazard exposure, associated first to flood and landslide and eventually to drought in large areas around the Andes and Himalayas. As water stresses increase for agriculture, power generation, industry and human consumption, glacier melt will also increase human vulnerability as well as that of many economic activities, with a consequent impact on disaster risk patterns.

Sea-level rise

Different scenarios of sea-level rise have been presented, ranging from serious (0.2-0.6 m) to catastrophic (4-6 m) by the end of this century. In terms of direct impact, this is very likely to lead to a rapid increase in hazard exposure due to increased coastal flooding, wave and storm surges and erosion, particularly if population and economic activities continue to concentrate in coastal areas. Many areas concentrating population and economic activities may become uninhabitable or non-productive for agriculture in the future if catastrophic sea-level rise occurs, as agricultural lands are lost to the sea and coastal soils become saline. The potential

Figure 16
Potential impact of sea-level rise on Bangladesh



Sources: Cartography UNEP/GRID-Arendal (2000), data sources: UNEP/GRID Geneva; University of Dacca; JRO Munich; The World Bank; World Resources Institute, Washington D.C. http://maps.grida.no/go/graphic/potential_impact_of_sea_level_rise_on_bangladesh

⁵⁵ NASA earth observatory: <http://earthobservatory.nasa.gov/Newsroom/NasaNews/2006/2006021321735.html>

⁵⁶ Silverio, Jaquet, (2002), Land cover changes in Cordillera Blanca (Peru) : Glacial retreat, avalanches and mining development. In "Atlas of Global Change", UNEP GRID - Sioux Falls (USA). www.grid.unep.ch/proser/remotesens/cordillera_blanca.php

large-scale displacement of people, infrastructure and economic activities would lead to a drastic and non-linear realignment of disaster risk patterns, which cannot be addressed here.

Increased vulnerability from multiple stressors

The degradation of ecosystems, including livelihood supporting coastal ecosystems, will increase the fragility of many rural livelihoods and thus intensify human vulnerability. In Africa, food insecurity will increase and access to safe water will diminish. In

Asia, increased vulnerability will be characterized by water stress, declining agricultural productivity and an erosion of coastal livelihoods. In Latin America, a very significant proportion of agricultural lands will be subjected to desertification and salinization while there will be a loss of biodiversity in tropical forests and an increase in savannah type vegetation. The increased prevalence of disease vectors will also contribute to greater human vulnerability, concatenating the above causes.

3

Progress in reducing disaster risk

Disaster risk reduction can involve a wide range of measures to reduce or manage disaster risk. It may include measures to reduce risk, for example ensuring through effective land-use planning and building regulation that the growth of cities in hazard prone regions does not increase disaster risk. It may also include measures to address already existing risk, such as early warning and disaster preparedness, the strengthening of existing buildings or physical measures to reduce hazard. Additionally, the post-disaster recovery period often provides a good opportunity to ensure that reconstruction leads to a real reduction in disaster risk. The HFA provides guidance on the full potential range of disaster reduction measures that a country may have to implement, grouped under five priorities for action, in order to address the outcome of the substantial reduction of disaster losses in lives and in the social, economic and environmental assets of communities and countries.

Disaster risk reduction requires concerted action by a wide range of stakeholders including national and local governments, civil society and non-governmental organizations, scientific, technical and academic organizations and the private sector. National stakeholders may require regional and global support from, amongst others, regional inter-governmental organizations, agencies, programmes, agencies and funds of the United Nations system, international financial institutions, scientific and technical networks and platforms and non-profit foundations.

The source material for this review of progress in disaster risk reduction is a set of 70 reports prepared by national governments that reflect the progress that each country believes it is making towards achieving the outcome and strategic goals of the HFA complemented by a set of regional reviews commissioned by the ISDR secretariat⁵⁷. Systematic reporting by the private sector, non-governmental organizations, regional and international organizations on the progress they are making towards the achievement of the HFA is not yet available, with a number of exceptions. Nor are there complete sets of governmental reports in any one disaster prone region.

For these reasons, this review is necessarily limited in scope to an identification and illustration of broad global trends in governmental action to reduce disaster risk, illustrated by examples from the countries and regions that have prepared reports. It makes no attempt to judge or evaluate the progress being made in individual countries or regions. Nor does it reflect the progress being made by the full range of stakeholders and ISDR partners at either the country, regional or global levels or in specific thematic areas.

It is also important to take into account that, while current knowledge permits a broad characterization of global risk, in many regions and countries disaster risk information is still heterogeneous in quality and incomplete in coverage. While the HFA provides overall guidance on the possible range of measures that a country could implement to reduce its disaster

⁵⁷ See Annex 5 for a list of countries, thematic platforms, and regional reports which provided input to this report.

risk, in each particular country the actual measures required will depend on its specific risk profile and development situation. Ultimately, progress in achieving the HFA in a country can only be measured with respect to its disaster risk. Without identifying and understanding the risk, any judgement on the relevance or effectiveness of disaster risk reduction would be premature. Countries are moving towards the achievement of the HFA from very different starting points. Some have been strengthening their capacities to reduce disaster risk for thirty years or more, others have recently been motivated to begin by the political impetus provided by the World Conference on Disaster Reduction in 2005 and the obligations under the Hyogo Framework for Action.

While noting these limitations, the report nevertheless provides valuable insight into the nature of Governments' commitments to the HFA and their understanding and visualisation of the challenge of disaster risk reduction, and hence a useful starting point to the formulation of work plans and other activities by the ISDR system as a whole to support the implementation of the HFA." The review identifies a number of global trends with respect to each of the five Priorities for Action 2005-2015 of the Hyogo Framework of Action and provides illustrations of these trends from some of the regional and country supports submitted.

3.1 HFA Priority 1: Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

As mentioned in the introduction to this report, several factors have combined to create a growing global momentum in favour of disaster risk reduction, in particular the series of extraordinary disasters that occurred in the two year period between late 2003 and late 2005, the political commitment manifest in adoption of the HFA at the World Conference on Disaster Reduction in January 2005 and the growing evidence that climate change is radically altering patterns of disaster risk.

Countries in some regions, such as Latin America and the Caribbean and parts of Asia and Pacific, have been addressing disaster risk for several decades, in particular those that have experienced large-scale catastrophes. In some regions, such as Central America and the Caribbean, regional mechanisms like Centro de Coordinación para la

Regional frameworks Central America

Established in 1988, CEPREDENAC (<http://www.cepredenac.org>) is the specialized institution of the Central American Integration System (SICA) for natural disaster prevention, mitigation and response. The Governments of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama are active members, while Belize and the Dominican Republic are in the process of becoming members. CEPREDENAC's inter-sectoral agenda is harmonized with other specialized regional entities in such areas as hydrological resources, agriculture, nutrition and food security.

The Regional Disaster Reduction Plan aims at contributing to disaster reduction as an integral part of the sustainability of Central American societies. The strategic objectives of the PRRD are: a) promoting the incorporation of disaster risk reduction in legislation, policies, plans and investment projects for sustainable development in the region; 2) enhancing and developing greater resilience of the population to disaster risk; and 3) promoting the incorporation of disaster risk analysis in the design and implementation of prevention, mitigation, response, recovery and reconstruction in the countries of the region (PRRD 2006-2015).

One of the most challenging processes undertaken by CEPREDENAC in the last two years has been the review of the Regional Strategy for Disaster Reduction 2006-2015. The PRRD 2006-2015 is based on the Presidential Mandates and the Hyogo Framework for Action 2005-2015 and the proposal has been the result of a wide participative consultation process that took place in each country of the region through workshops and collective interviews. The whole process has revitalized the National Commissions of CEPREDENAC, allowing for the incorporation and ownership of more stakeholders in the multi-sectoral composition of these commissions.

Prevenció de los Desastres Naturales en América Central (CEPREDENAC) and Caribbean Disaster Emergency Response Agency (CDERA) are also well developed, with mature regional planning processes and strong linkages to national planning institutional frameworks. But in other countries, particularly outside of the intensive risk hotspots, there was little urgency prior to 2005 to include disaster risk reduction on governmental development agendas and with few large-scale disasters little exposure to international humanitarian concern.

The Caribbean

The Caribbean Disaster Emergency Response Agency (CDERA) is the main specialized body in disaster risk management in the Caribbean, with 16 participating states and headquartered in Barbados. CDERA focuses on capacity building and formulation of policy in disaster risk reduction and it is the implementing agency for the Comprehensive Disaster Management Project. The Caribbean Community (CARICOM) adopted a Strategy and Results Framework in 2001 with the goal of linking the Comprehensive Disaster Management Project to national development decision-making and planning. In light of the outcomes of the World Conference on Disaster Reduction and the priorities identified by the HFA, and against the background of experiences in the region, CARICOM focuses its programming around the critical actions needed to advance implementation of the five Intermediate Results of the 2001 Comprehensive Disaster Management Strategy and Framework⁵⁸.

In light of the outcomes of the World Conference on Disaster Reduction and the priorities identified by the Hyogo Framework for Action, and against the background of experiences in the region, CARICOM focuses its programming around the critical actions needed to advance implementation of the five Intermediate Results of the 2001 Comprehensive Disaster Management Strategy and Framework, which itself was also explicitly connected to the Bridgetown Programme of Action. Following review and participatory discussion the following thematic areas were selected for priority attention within CARICOM over the 2005-2015 period.

The Enhanced Comprehensive Disaster Management Framework which proposes four priority outcomes is based on three underpinning pillars: The Review and Assessment of the 2001 Comprehensive Disaster Management Strategy and Framework; the global and regional disaster management agenda including the Hyogo Framework for Action 2005-2015; and the CARICOM Regional Programming Framework. The Intermediate Results of the 2001 Framework have been incorporated in the relevant places so as to ensure continuity and deepening of the Comprehensive Disaster Management process which began in 2001. The enhanced Framework is designed toward achieving the overarching goal of sustainable development in the Caribbean.

That situation is now changing radically. In regions such as central and western Africa and in parts of north Africa and the Middle East, as well as in some individual countries in Asia, Latin America and the Caribbean, where there was previously little interest in disaster risk reduction, there is now a growing political commitment to addressing disaster risk and interest to develop institutions, legislative frameworks, policies and strategies. For example, in 2004 the African Union (AU) and New Partnership for Africa's Development (NEPAD)⁵⁹ approved an African Regional Strategy for Disaster Reduction. While a number of regional economic commissions such as Intergovernmental Authority on Development (IGAD) and Southern Africa Development Community (SADC) already had in place strategies and policies for disaster management, the Africa Regional Strategy has served as an impetus for others such as Economic Community of West African States (ECOWAS) and Economic Community of Central Africa States (ECCAS) as well as their member states to engage in disaster risk reduction. In South Eastern Europe, interest in addressing disaster risk reduction issues has grown since the adoption of the HFA, evolving from a purely preparedness and response approach. A number of legislative initiatives on disaster risk reduction are being developed; in Bosnia and Herzegovina, for instance, a Law on the Protection and Rescue of People and Property in Natural and other Disasters is under development with a component related to disaster risk reduction. The same is true for the Arab League as well as individual countries in other regions, such as Bhutan.

In other regions, where significant experience already existed at the national level, regional co-operation is also increasing. In South Asia, the creation of the South Asian Association for Regional Cooperation (SAARC) Disaster Management Centre in 2006 builds on progress already being made at the national level and will provide additional support to and cross-fertilization between national efforts. The Andean region is making similar efforts through CAPRADE (Andean Committee for Disaster Prevention and Attention) and regional projects such as PREDECAN (Prevention and Mitigation in the Andean Community).

⁵⁸ Unless otherwise specified, all information in boxes comes from national reports.

⁵⁹ With the support of UN/ISDR and UNDP.

Evolution of disaster risk reduction in Africa

Disaster risk reduction has been gaining momentum in Africa at a significantly fast pace over the past few years. In 2003, a baseline study of disaster reduction potential in Africa was conducted by NEPAD, AU and UN/ISDR Africa. This was followed by the establishment of an "Africa Working Group (AWG) for Disaster Risk Reduction" under the joint leadership of the Commission of the AU and the NEPAD Secretariat. In 2004, an "Africa Regional Strategy for Disaster Risk Reduction" and "Guidelines for Mainstreaming Disaster Risk Assessment into Development" were developed. 2005 began with the establishment of an "Africa Advisory Group on disaster risk reduction" and ended with the successful organization of the "First Africa Ministerial Conference on disaster risk reduction" which adopted an "Africa Program of Action on Disaster Risk Reduction".

In May 2006 at Brazzaville, the African Ministerial Conference on Environment (AMCEN) mainstreamed the Africa disaster risk reduction strategy into its next five-year programme.

At the sub-regional level, the Inter-Governmental Authority on Development (IGAD) has developed a sub-regional strategy for disaster reduction. On 19 January 2007, ECOWAS approved a sub-regional Common Policy and mechanisms for disaster risk reduction. SADC has revised its sub-regional strategy, factoring in disaster risk reduction. ECCAS has established in Congo Republic a sub-regional Centre for disaster risk reduction and is developing a sub-regional strategy.

At the national level, 25 African countries have established national platforms for disaster risk reduction and are making progress in making it a development priority by mainstreaming it into sectoral programmes, establishing early warning systems and reporting on progress in the implementation of the HFA. A number of countries such as Uganda, Ghana, Senegal and Madagascar have revised their Poverty Reduction Strategy Papers integrating disaster risk reduction as a cross cutting issue and are moving further to introduce disaster risk reduction into annual work plans and budgets.

The first Africa Disaster Risk Reduction Platform meeting took place 26-27 April in Nairobi and it will be followed by the first Sub Regional Platform meeting to take place in Abidjan for West Africa 17-18 May 2007.

These positive developments have been underpinned by growing cooperation between UN/ISDR and the AU and Regional Economic Commissions, resulting in UN/ISDR providing technical assistance staff to enhance the capacity of the AU to implement the Africa Strategy.

Establishment of new national platforms and strengthening of existing ones to enhance reporting on implementation of HFA is the focus and priority for the coming years. Also of equal significance is the promotion of academic, scientific, media, private-public and non-governmental organization (NGO) networks in the implementation of HFA and documentation of good practice and reporting.

The use of thematic platforms and regional collaborative centres such as AMCEN and IGAD Climate Prediction and Application Centre (ICPAC), respectively to enhance prediction and early warning to national platforms and communities, and, to strengthen their capacity for managing drought and climate change adaptation, will equally be prioritized.

Finally, awareness campaigns through all media on education and safe schools, and on health and safe hospitals will also get considerable focus in the implementation of HFA.

In general, the occurrence of large-scale catastrophes has always acted as a strong catalyst for increased commitment and investment in disaster risk reduction at the national level. Following a major disaster, most countries review their existing legislation and institutional systems in order to identify deficiencies and opportunities for improvement. The impact of the Armero volcanic

explosion in Colombia in 1985 and the combined impact of the Latur earthquake, the Orissa super-cyclone and the Gujarat earthquake in India are both examples of a disaster occurrence leading to a redesign of national legislative and institutional arrangements. In some cases, it may be a fundamental political change, such as the end of apartheid in South Africa, which provides the catalyst

The Andean Region strategic plan

The Andean Committee for Disaster Prevention and Relief (CAPRADE) is the specialized body for disaster reduction in the countries belonging to the Andean Community (CAN) and was created in 2002. CAPRADE's objective is to contribute to the reduction of risk and the impact of natural and man-made disasters in the territories of the Andean sub-region through: political coordination and lobbying; strategy and planning; the promotion of disaster prevention; mitigation, preparedness relief and reconstruction; as well as facilitating cooperation, mutual assistance and exchange of experience in this area. Bolivia, Colombia, Ecuador, Peru and Venezuela are active members of this sub-regional body.

The Andean Strategy for Disaster Prevention and Relief, approved in June 2004, in Quito, is the main policy instrument for disaster reduction in the sub-region, and it has been the result of an intense work that gathered 280 entities and more than 450 national practitioners and experts in round tables and workshops, conducted in every member country. The Andean Development Community (CAF), UNDP and UN/ISDR have supported CAPRADE during this process. The Andean Strategy has provided the context for the development of the Andean Strategic Plan 2005-2010; among the key guidelines for this plan is the promotion and strengthening of national platforms / National Systems for disaster risk reduction, highlighting the importance of the multi-sectoral and multi-stakeholder nature of these mechanisms. Another strategic action is the design and application of a new monitoring and evaluation system that will include the elaboration of a structured group of indicators and protocols for data gathering and compilation. For further information see: http://www.caprade.org/plan_trab.htm

to address disaster risk. This trend shows no sign of changing. Following the Bam earthquake in 2003, Iran has begun putting in place a comprehensive system of working groups and task forces to address the different risks present in the country.

Algeria and Morocco in North Africa, which were affected by earthquakes and floods between 2002 and 2004 are similarly making major efforts to improve their legislative and institutional systems and to develop planning frameworks. Algeria, for example, has put in place a new risk management law, and is updating codes on building and urbanization and is creating a new institutional framework. Following a period of political instability, Nepal is also engaged in the development of a new National Strategy for Disaster Risk Management.

In Latin America and the Caribbean, Honduras has been working throughout 2006 on a new law for the establishment of a disaster risk reduction national system that harmonizes the sub-national and national levels, and designates specific responsibilities for prevention, mitigation, preparedness, response, early recovery and reconstruction to different entities. El Salvador has adopted a new law for Civil Defense, Prevention and Disaster Mitigation as well as the Civil Defense, Prevention and Disaster Mitigation Fund. In addition, the National Land Use Survey has developed a set of governmental indicators for monitoring disaster risk reduction. In Haiti, a draft decree for a new legal disaster risk reduction framework has been submitted while Saint Lucia has

updated its Disaster Management policy. Many of the countries in Asia affected by the 2004 tsunami and the 2005 Kashmir earthquake are also enhancing their legislative and institutional arrangements. The case of Sri Lanka (see box) is particularly interesting because it illustrates how a major disaster can provide the missing impetus to approve and implement legislation that had already been prepared but that was lacking the necessary urgency.

Similarly, following the 2005 earthquake, Pakistan has established a National Disaster Management Commission and National Disaster Management Authority which will act as the implementing, coordinating and monitoring body for disaster risk reduction, response and recovery at the National, Provincial and District level. The initiative aims at preparing the National Plan which is approved by National Disaster Management Commission and lays down guidelines for preparing disaster management plans by different Ministries of Departments and the Provincial Authorities.

Indonesia and Pakistan's new legislative frameworks and National Platforms are also totally aligned with the HFA. Indonesia has moved from a responsive approach to a more preventive one and is working to incorporate disaster risk reduction into government plans and legislation. Pakistan has been focusing on institutional and legal arrangements for disaster risk reduction: it has established Provincial and Regional DM Commissions and Authorities, as well as 50

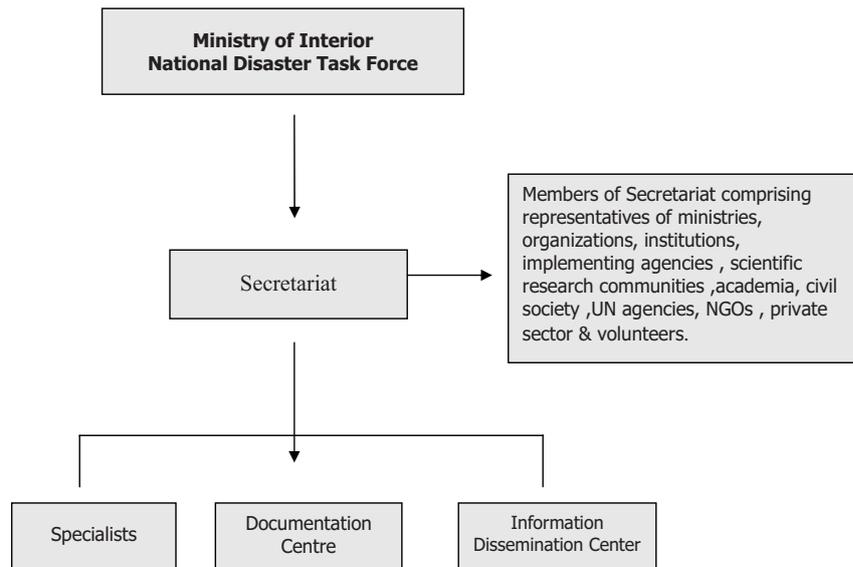
Institutional investment in disaster risk reduction

The Islamic Republic of Iran has made a considerable investment in its institutions and its national platform on disaster risk reduction. Following are its major areas of focus.

Establishment of Executive Secretariat of HFA

The Executive Secretariat of Hyogo Framework for Action was set up under the overall supervision of the Natural Disaster Task Force of the Ministry of Interior.

The structure of this secretariat is as follows:



1. Strengthening 23 Preparedness Working Groups
Iran has strengthened activities and enhanced the role of 23 working groups which were established in 2003 within the framework of the National Relief and Rescue Comprehensive Plan, approved by the cabinet, and based on article 44 of third national development programme. Preparedness activities include data collection, research, planning, establishing management structure, training, and securing resources.

The preparedness working groups are at 3 levels: Local, national and provincial; there are 3 categories of sub-groups on operations, prevention and training which support the preparedness working groups.
2. Creating a National Working Committee in 2005
The members of this committee consist of the Ministry of Interior, Iranian Red Crescent, NGOs, Municipality of Tehran, President Office, Social Committee of the Parliament, NDRII, National Iranian Broadcasting Organization, Disciplinary Forces, Ministry of Energy, Basij Organization, Housing Foundation, Meteorological Organization, IIEES, TDMMO, Environmental Organization, Ministry of Housing and some other organizations. The committee has prepared a "National Policy on Natural Disaster Prevention and Risk Reduction".
3. Establishing a national platform on disaster risk reduction, consisting of more than 30 members including line ministries, academic and research institutions, implementing agencies, and NGOs.
4. Creation of a High - Level Council on Disaster Management
The chair of the council is the President and the council is responsible for risk reduction issues at the time of disaster response, recovery, and construction.
5. Establishment of nine specialized working groups within the Ministry of Interior on different aspects of disaster risk reduction, in 2005: including Earthquake and landslide, Rangeland revival and coping with droughts; Flood prevention; reducing air pollution; Storm and hurricane hazards; Rescue and relief; Loss compensation and Health care.
6. Preparation of a ten - year plan for implementation of the HFA for reducing disaster risk reduction.

Roadmap for disaster risk management - towards a safer Sri Lanka

Following the Indian Ocean tsunami, Sri Lanka passed a new Disaster Management Act and created a National Council for Disaster Management was established as the leading body for disaster risk management in Sri Lanka with the Disaster Management Centre as the executing agency. The Council is represented by Cabinet Ministers in charge of 20 subject areas.

Following the enactment of the Sri Lanka Disaster Management Act, it was decided to complement the ongoing policy efforts with strengthened National and local level institutions, while also focusing on Community-based Disaster Risk Management (CBDRM). In acknowledging these needs, the Ministry proposed to develop a 'Road Map' towards building a 'Safer Sri Lanka' in the next 10 years, identifying specific priority projects in coordination with multiple stakeholders through a holistic strategy. The Roadmap is a 10-year plan comprising specific project proposals covering seven thematic areas consistent with ongoing and past efforts in the field of disaster risk management and development planning in Sri Lanka. The thematic areas are Policy; Institutional Mandates and Institutional Development; Hazard, Vulnerability and Risk Assessment; Tsunami and Multi-hazard Early Warning Systems; Preparedness and Response Plans; Mitigation and Integration of Disaster Risk Reduction into Development Planning; Community-based Disaster Risk Management; Public Awareness, Education and Training.

The Roadmap was prepared with UNDP support and technical support from ADPC. A total of 109 projects within the 7 thematic areas were identified at a cost totalling approximately USD 609 million. Funding has already been allocated for some projects by the treasury for the year 2007. Parts of some activities have been commenced or completed with funding from government, UNDP and donors.

district/municipal ones; it has also developed appropriate building codes for hazard resilient construction, as well as land use plans for cities and districts at risk.

While highlighting this trend, however, it is also necessary to avoid generalization. Evidence from other countries would seem to indicate that the ability to build on disaster impact as a catalyst for strengthening capacities, depends on minimum conditions of political and economic stability, governance and peace. It is unclear, for example, whether the impact of the volcanic disaster in Goma in the Democratic Republic of Congo in 2003 led to significant upgrading of national institutional capacities to address disaster risk, although at the local level significant progress was made. In other countries, while progress may have been made in one period, capacities may actually decline in another as political interest moves to another area. Exactly what political, social and economic conditions enable countries to take advantage of the momentum produced by a major disaster and what conditions impede that catalysis have still to be systematically documented.

While the number of countries involved in disaster risk reduction is growing rapidly, it appears from the governmental reporting that disaster risk reduction in most countries is still essentially focused on addressing mortality risk. Most of the progress

described by countries, relates to improvements in disaster response, preparedness, early warning and education. In fact, it could be inferred that most countries understand disaster risk reduction in terms of strengthening capacities to avoid loss of life. Possibly this is due to the traditional institutional location of responsibilities for disaster risk reduction within governments, since most of the governmental institutions reporting and responsible for developing institutional and legislative frameworks and for developing policy and strategy either are or were, in their origins, response-focused organizations, focused on saving lives. The progress being made often reflects these organizational mandates, philosophy and perspectives.

There is a notable tendency to move from single institution civil protection or civil defence organizations towards more complex institutional systems that coordinate actions by a range of sector departments and ministries and at different territorial levels. However, the reporting indicates that the development of institutional systems often consists of an expansion of a preparedness focus outwards from the response organizations to a wider range of governmental actors. Similarly, the co-ordination of most of the systems still rests with the organization responsible for disaster response and disaster risk reduction, and is being approached from a disaster preparedness life-saving perspective in most of the countries reporting.

Legislative arrangements, Algeria

Algeria has adopted a series of laws on the prevention of disaster risk reduction. It has adopted "Law 04-20" (25 December 2004) regarding the prevention and management of risks within the area of sustainable development, which envisions the creation of a commission on disaster risk reduction within the Prime Minister's Office. The commission would be charged with several advisory, evaluation and coordination tasks; it would also focus on efforts to reduce the impact of disaster risk reduction on the country's economy and the safety and security of its citizens.

Law 04-05 (14 August 2004) improves on a previous legislative arrangement (Law 90-29 from 1990) that deals with urban planning and introduces stricter building codes and permit requirements. Other legislative changes include one on insurance against disasters (26 August 2003) and another which deals specifically with earthquake preparedness and response.

Clearly there are regional variations in this trend. In Asia there are indications that legislative frameworks and institutional mechanisms may be starting to adopt a stronger focus on reducing risks and on linking disaster reduction to broader concerns on social, economic and environmental development. In west and central Africa, national legislation and institutions were weak and even non-existent before the impulse provided by the Africa Regional Strategy. Many countries in these two sub-regions are now reporting the development of new institutions and legislation, often civil protection offices with a focus on response and preparedness. Although a number of these organizations refer to prevention or to risk management in their institutional profiles or titles, a closer look at their responsibilities and implementation plans reveals that these terms are used to refer to disaster preparedness and not to proactive measures to reduce disaster risks. A similar situation exists in many countries in the Middle East and North Africa where disaster risk reduction is a relatively new topic of concern and existing legislation and institutional arrangements are dominated by traditional civil protection structures focusing primarily on response and preparedness.

In the Pacific, a number of countries are in the process of developing new institutional and legislative frameworks, notably in Vanuatu, Tonga and Samoa. Nonetheless, in the region as a whole, disaster risk

management has been generally regarded as either an environmental or humanitarian issue and this is reflected in the character of the institutional and legislative arrangements. Disaster risk reduction has been largely considered in terms of response and recovery from disasters, without considerations of risk reduction opportunities in a holistic manner and as an integral element of development planning. Similarly, there is a lack of government policy, organizational structures and legislative framework to underpin disaster risk reduction in a holistic, coordinated and programmatic manner.

Another trend highlighted from governmental reporting is that while political momentum may exist to create new institutional systems and legislation, the lack of dedicated resources from national budgets and of trained human resources, may inhibit the implementation and operation of these systems. Many countries have gone through time-consuming processes to create or up-date legislation, policies and plans, sometimes with active support and participation of highly positioned political figures. The implementation of laws and plans is still an ongoing task in many countries, affected by waning political support and engagement or, as indicated above, interrupted by conflict and political instability. Similarly, while many countries report the formulation of national policies and plans, these are not necessarily followed up by assigning specific responsibilities and resources and developing plans for implementation at the local level or in each sector.

Many countries, particularly in Africa, highlight the lack of resources as one of the key constraints in implementation of the HFA. In Africa, there is little or no evidence of nationally based financial mechanisms to support disaster risk reduction or of budgetary allocations from governments. In the Pacific region this is reported as being inadequate. A significant part of the disaster risk reduction progress described in the reporting is dependent on resources and assistance provided through international technical channels. However, in contrast, a number of middle-income countries, such as India and Iran are now allocating lines from national budgets to their disaster risk reduction efforts. Many countries report the setting up of national emergency or relief funds. As their name implies the function of most of these mechanisms is to fund relief and to a lesser extent rehabilitation and recovery activities following disasters. Asia for example, mentions the use of 'social safety net' funds for recovery purposes. It is not clear from the reporting how many really provide

resources for disaster risk reduction purposes.

In Africa, a number of countries, particularly in east and southern Africa had already developed disaster management legislation and institutions in the 1990s. Ethiopia, Lesotho, Malawi and Nigeria are all examples of countries that have had disaster management legislation in place for a number of years. Many of these institutional and legislative frameworks took the form of national disaster management offices, with a focus on emergency response preparedness and civil protection. Some of these countries are now moving to realign their legislation and institutions to adopt an approach for reducing and managing disaster risk, which goes beyond traditional preparedness and response approaches. Mozambique, Kenya and Zambia are all in the process of reviewing and realigning their legislation, which in some countries such as Tanzania includes the incorporation of disaster risk concerns into national poverty reduction and development strategies and plans.

However, many of these countries report difficulties, for example the lack of buy-in and understanding of the sector ministries and departments, into whose work disaster risk considerations are supposed to be mainstreamed and particularly problems related to a lack of adequate financial and human resources. In countries, where the office that coordinates disaster risk reduction is overseen at the highest level of political power, there would seem to be a better chance of influencing line ministries and ensuring coherence. In general, there is little evidence of achievements in terms of enforcement or accountability; however, this might be a deficiency in the reporting itself or a reflection of the fact that many of these mainstreaming initiatives are in their beginning.

Yet another issue highlighted in Africa refers to the fact that much of the disaster reduction legislation developed is scattered in different pieces of law in different sectors and does not provide for clear responsibilities, entitlements, sanctions and remedies. In Cameroon, for example, over 13 statutes and decrees are in place with relevance to disaster risk reduction.

A large number of countries report efforts to develop institutional structures and strategies at the local level, ranging from villages and communities to large local government areas. In general, these strategies seem to work well in countries with significant levels

Pacific Islands: Vanuatu: the Vanuatu disaster risk management National Action Plan

As part of governance programs in the Pacific Region, an interesting example is the Vanuatu National Action Plan; in the Vanuatu situation analysis for the National Action Plan development, it was found that there is a need to develop appropriate institutional structures with relevant policies and legislation. It is possible that a new structure could either continue to be located with the Police under the Ministry of Internal Affairs or be located under a different Ministry. The aim is to strengthen national policy, legislation, organizational and decision making arrangements for a coordinated and effective disaster risk management. Main activities include: Define and adopt organizational, decision-making, monitoring, reporting and accountability arrangements for disaster risk management; Review the Disaster Management Act of 2000 to give effect to disaster risk management principles and strategies contained in this National Action Plan; Formulate and implement national legislation and policies for rationalizing monitoring and reporting of all natural hazards (geo-hazard, hydrological and meteorological).

of decentralization of political authority and fiscal resources. However, as some countries such as Lesotho, report, these strategies may be difficult to sustain when the necessary conditions for supporting local engagement are not present.

Other countries, particularly in Europe, report efforts to fully incorporate disaster reduction into their international development and humanitarian assistance programmes. In the United Kingdom, for example, different studies were commissioned by UK Department for International Development (DFID) targeting the need for the integration of disaster reduction in European Union development policies. At the same time, DFID earmarked a part of its humanitarian aid budget for disaster reduction activities. The Swedish International Development Cooperation Agency (SIDA) and Danish International Development Agency (DANIDA) are also discussing how to integrate disaster reduction into their aid programmes. During the German EU presidency, the Federal Foreign Office lead a discussion on the integration of disaster reduction into the humanitarian assistance provided by the European Commission and member states. The Swiss Development Cooperation (SDC) is preparing a strategy for integration of disaster reduction into the country's development assistance.

3.2 HFA Priority 2: Identify, assess and monitor disaster risks and enhance early warning

As has been mentioned in an earlier section of this report, risk identification at an appropriate scale provides key base-line information for the development of all disaster risk reduction measures, from response to development-led interventions to address future risks. Many countries are now making progress in this area.

Sri Lanka has completed the development of a national disaster database, providing for the first time a comprehensive picture of disaster occurrence and loss. While Latin America pioneered this approach, other Asian countries, such as India, Thailand, Indonesia, Maldives and Iran are now also involved in developing similar disaster databases that will allow a vision of risk in both intensive hotspots and over extensive areas at a high resolution.

Other countries report efforts to develop hazard maps and atlases. In Asia, India was one of the first countries in the region to develop a vulnerability atlas that has already been used to prioritize interventions, for example in local level disaster risk reduction. Pakistan also plans to produce a composite risk atlas and both Pakistan and Sri Lanka report activities related to identifying and analyzing specific risks to hazards, such as floods and landslides. Similarly, Morocco and Algeria have undertaken hazard mapping at the national level and are now focusing on specific risk reduction studies and plans in high-risk areas. In sub-Saharan Africa, a number of countries have a long experience in developing vulnerability and capacity assessments to address food security concerns.

However, only a few countries report the completion of comprehensive risk assessments and even fewer report the use of risk information in the development of disaster risk reduction policies, strategies and plans. El Salvador has made progress in data compilation and analysis for the construction of a number of risk indexes using a methodology developed for the Inter-American Development Bank. In the Pacific, it is reported that decision-making processes at the national, sectoral, provincial and community levels do not reflect explicit considerations of disaster risk assessments. This information even when it exists is not always available to decision makers. In Africa, only Tanzania reports a comprehensive national risk assessment. Other countries, such as Ethiopia, Eritrea and Nigeria

Achievements and status on the Indian Ocean tsunami early warning system

Considerable progress has been made by countries bordering the Indian Ocean to develop tsunami early warning systems for the region, linked to existing warning services and disaster management organisations. Activities have included the development or enhancement of detection networks and communications, definition of comprehensive national plans for each country participating in the process, and targeted training activities involving more than 150 national officials and researchers. Much needed public awareness and educational materials has been generated and translated into the many different languages of the region. Today, the Indian Ocean Tsunami Early Warning System includes seismological and oceanic observation networks, regional analysis and advisory centres, and national tsunami warning centres linked to national risk assessment and preparedness activities. Twenty-five nations (out of a possible twenty-eight) have established official Tsunami Warning Focal Points capable of receiving and disseminating tsunami advisories around the clock. Nevertheless, in a March 2006 survey, 20 of the 28 countries participating in the Indian Ocean warning system, lacked national plans for a tsunami early warning and response system. Eleven countries have since developed action plans to overcome this gap in developing national capacity. A consortium of seven UN/ISDR system partners is assisting with advisory and implementation support, which provides an example of an integrated apparatus for the support of the implementation of the Hyogo Framework for Action. Source: 2007 Report of Indian Ocean Consortium partners to the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTEWS): <http://ioc3.unesco.org/icg/> and [http://www.unisdr.org/ppew/iewp/pdf/IEWP\(I\)-3.pdf](http://www.unisdr.org/ppew/iewp/pdf/IEWP(I)-3.pdf)

report partial assessments. As in other areas, many African countries have identified risk assessment as priority but are unable to move forward due to a lack of the necessary technical, financial and human resources.

Many countries report good progress in developing early warning systems. National meteorological and hydrological services in 191 countries systematically monitor, and provide forecasts and warnings of, potentially hazardous hydro-meteorological events such as heavy rain, drought, snow and hail storms, floods, avalanches, heat waves and cold waves, tornadoes, lightning, smoke haze and volcanic ash

plumes. Many also monitor and advise on climate change and variability. In addition, some of the national services monitor and give warnings on geological and technological hazards, including earthquakes and tsunamis, volcanic eruptions, landslides, wild land fires, hazardous-material spills and explosions, etc. Innovations in monitoring such as through radars and satellites and in computer based prediction have steadily improved warning capabilities over recent decades. The exchange of data and warnings, international coordination and capacity building are organized under the World Meteorological Organization (WMO). After the devastating cyclone in the Bay of Bengal in 1970, WMO created a tropical cyclone programme not only to improve data sharing and forecasting of approaching storms but also to improve strategies to manage floods and to reduce risk in the region. Currently, five regions are covered by such committees, two of which are also supported by UN/ESCAP. ISDR contributes to these initiatives by promoting interactions with disaster management sectors. A tsunami warning system has long existed in the Pacific Ocean, overseen by UNESCO/IOC. The 2004 Indian Ocean tsunami has triggered the establishment of similar systems in other oceans and seas, most notably the Indian Ocean, but also in the northern Atlantic Ocean, Caribbean Sea, and Mediterranean and Black Seas

Bangladesh was a regional pioneer in developing an effective early warning system through its cyclone preparedness programme and has demonstrated in practice how this can contribute to a major reduction in loss of life. In Central America, Guatemala has significant experience in the development of flood early warning systems in its river basins and has been able to achieve a measurable reduction in loss of life in those cases where the systems were operational when a disaster occurred. In the same region, Costa Rica and St. Lucia also report important progress in this area while the Cayman Islands is linking early warning to an estimation of storm surge impact modelling. In Africa, Kenya, for example, reports multi-sectoral drought contingency plans for 22 arid and semi-arid districts, which link early warning and timely response as well as the establishment of community based drought early warning system in 28 arid and semi-arid districts, providing timely and credible early warning information for response.

The development of early warning systems received an enormous boost from the efforts following the 2004 tsunami to promote comprehensive early

Multi-hazard global early warning system

In 2005, at the request of the United Nations Secretary-General, a global survey of early warning systems was undertaken with a view to advancing the development of a global early warning system for all natural hazards. The survey report concluded that while some warning systems are well advanced, there are numerous gaps and shortcomings, especially in developing countries and in terms of effectively reaching and serving the needs of those at risk. The report recommended the establishment of a globally comprehensive early warning system, rooted in existing early warning systems and capacities. It also recommended a set of specific actions toward building national people-centred early warning systems, filling in the main gaps in global early warning capacities, strengthening the scientific and data foundations for early warning, and developing the institutional foundations for a global early warning system. The Third International Early Warning Conference, Bonn, 27-29 March 2006, and the WMO Symposium on Multi-Hazard Early Warning Systems for Integrated Disaster Risk Management, 23-24 May 2006 further developed these ideas. Source:

<http://www.unisdr.org/ppew/info-resources/ewc3/Global-Survey-of-Early-Warning-Systems.pdf>, www.ewc3.org, and http://www.wmo.int/pages/prog/dpm/latestNews.html#ews_symposium

warning systems in the Indian Ocean countries, focused not only on future tsunamis but on regularly occurring events such as cyclones and floods as well. For example, both Pakistan and Sri Lanka report activities related to improving their early warning capacities, the Disaster and Emergency Warning Network in Sri Lanka and the National Plan on Strengthening National Capacities for Multi-Hazard Early Warning and Response System, both in an early phase of implementation. Other countries such as Mauritius and Thailand also report significant progress.

At the same time, reporting from countries shows that many obstacles remain. In a number of countries, in Africa in particular, the acquisition and maintenance of the necessary equipment for hazard monitoring and for communicating warnings remains a major barrier to implementation. In others, there is still a gap between the development of regional and national hazard warning capacities and the development of effective local capacities to be able to receive and use early warning to save lives. In the

Pacific, for example, it is reported that engagement with communities at risk, private sector, women's groups and other stakeholders, in developing disaster risk reduction actions and projects is minimal. There is an absence of sufficient information systems available for each key hazard that could enable permanent monitoring and the issuing of early warnings to communities at risk. In many countries, the National Meteorological and/or Hydrological Service is only weakly integrated into the organizational framework existing for disaster risk managing, meaning a very poor articulation between hazard monitoring and warning, risk identification and analysis and disaster preparedness and response. These findings would appear to be largely validated by a recent survey carried out by WMO. Most important of all, risk-prone communities themselves often lack capacities in disaster preparedness and response that can be triggered when a warning is issued.

3.3 HFA Priority 3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels

An area in which very considerable progress would appear to have been made is in increasing public awareness, particularly through including disaster risk reduction in school curricula and through the production and dissemination of public information materials.

A very large number of countries report very encouraging progress in developing school based programmes. In Panama, for example, the program "Rain is the source of life" consists of the placement of ten rain gauges in schools affected by floods. The activity aims to develop a more holistic understanding for boys and girls of fifth and sixth grades of their environment, and to appreciate the interconnectedness between them and the natural world around them. Chile has developed a new cooperation framework between the Metropolitan University of Educational Sciences and the Disaster Management Office, to form a strategic alliance aiming at the development of a culture of the prevention. A new collaborative effort between the UN/ISDR, and the University for Peace, located in Costa Rica, includes the incorporation of a new course focused on disaster risk reduction into the University for Peace ongoing Masters programmes in environment, peace and security.

Pakistan educational and curriculum change

Pakistan has a programme to integrate disaster risk reduction into educational curricula and to support awareness-raising in educational institutions. The initiative is to develop curricula for schools, colleges and universities on disaster risk management, particularly in hazard prone areas. The objectives are to raise the awareness of students and to promote overall preparedness in educational institutions through such activities as conducting drills and reducing institutional vulnerability. In addition, orientation programmes will be run to raise awareness of educational authorities and teachers. The National Disaster Management Authority has engaged the Ministry of Education to include elements of disaster risk reduction in the education system, and has noted the need to mobilize all stakeholders, including government, communities and the private sector, to ensure that disaster risk reduction is fully integrated into educational curricula in Pakistan. Emphasis is also placed on the need to build seismically safe school buildings or retrofit them to withstand natural hazards. Curriculum resources (audio and video) prepared by various countries have been incorporated in school curricula and a set of guidelines on disaster risk reduction in the educational system have been developed.

Haiti launched in 2005 an awareness campaign for the Hurricane Season, which includes the use of radio spots and posters; and the Cayman Islands organized its first Earthquake Awareness Day on the anniversary of the December 2004 earthquake. All countries in South Asia report efforts to introduce disaster risk reduction into school curriculum and to launch school education programmes at different levels. Similarly, a wide range of training initiatives are reported. Nepal for example reports an earthquake safety programme for schools being implemented in 20 schools within Kathmandu valley.

At the same time, the content of such programmes may often mirror the overall focus on disaster preparedness and response which characterizes the governmental systems that promote them. It is not clear from the reporting to what extent public awareness and education programmes focus on the causal processes of disaster risk or what their influence is on disaster risk reduction planning and decision making.

A significant number of the countries reporting are also developing information portals or management

Education Platform

Knowledge, education and public awareness are three essential pillars of disaster risk reduction. They are key factors in empowering society on risk management. Education provides the knowledge and fosters the attitudes and behaviours needed to combat natural hazards.

Despite some encouraging progress, a gap still exists between the growing recognition of the importance of teaching on disaster risk reduction and actually doing it in a meaningful way and challenges include the fact that explicit programmes of risk reduction education remain the exception rather than the norm in most countries. Moreover, most programs remain "pilot" projects conducted on a small scale; and institutionalization requires a long-term commitment. The work of the ISDR thematic cluster/platform on knowledge and education includes representatives of member states, civil societies, international and non governmental organisations among them: Bangladesh, Spain, France, UNESCO, UNICEF, WMO, Council of Europe, IFRC, ADRC and many others (for an exhaustive list please see website: www.un.isdr.org). An Interim Organising Committee of the cluster/platform has been established to coordinate the cluster/platform efforts and is formed by: UNESCO, Council of Europe, Action Aid, UNICEF, IFRC, ProVention Consortium, and ADRC.

The platform has engaged in the collection of educational tools in the field of disaster risk reduction from Member States. More than 50 countries from Africa, Arab States, Asia and the Pacific, Europe and North America and Latin America and the Caribbean region have so far contributed. Most materials have been developed within the past 5 years, evidence of growing commitment to forging the links between knowledge and action. This multilingual collection is a compilation of hard documents and electronic resources (books, brochures, manuals, books for children, toys, games, toolkits, posters, DVDs, and CDroms), and useful websites covering disaster risk reduction materials for both formal education and informal education. The physical libraries at UNESCO and UN/ISDR headquarters are providing resource materials for a substantial database prepared in conjunction with the Coalition for Global School Safety, and Risk RED. An overview of existing tools and options was published in 2006 in the publication *Let the Children Teach Us*

systems to ensure that information on all aspects of disaster reduction is widely available; for example, the Department of Disaster Management and Emergencies of the Turk and Caicos Islands is currently testing its website, which is intended to make information on disaster management accessible to all sectors throughout the islands and outside of Turks and Caicos.

3.4 HFA Priority 4: Reduce the underlying risk factors

Progress reported towards reducing the underlying risk factors is more limited, with a smaller number of the countries reporting on this priority.

A number of countries report actions to address existing risk through either physical mitigation measures, through retrofitting existing buildings and facilities or through strengthening building and planning regulations and codes.

Efforts reported by Iran to reduce flood risk by retrofitting a large number of houses and also to strengthen key buildings and facilities subject to earthquake risk, are examples of this kind of action.

Other countries, such as Algeria, are involved in efforts to improve their building codes and planning laws to reduce future risk. Jordan and Syria are also reviewing their arrangements to manage earthquake risk. Yet others, such as Tanzania and Nepal, report efforts to include disaster reduction concerns in national development and poverty reduction strategies. Pakistan reports progress in rebuilding housing with earthquake resistant structures in the area affected by the 2005 earthquake and plans to retrofit risk-prone schools. Sri Lanka plans to develop new building guidelines, to protect coastlines through natural vegetation barriers, to reduce drought vulnerability through introducing rainwater harvesting and to reduce flood risk by de-silting watercourses in flood prone regions. The Cayman Islands is upgrading its building codes following Hurricanes Ivan and Jeanne in 2004, while both Colombia and El Salvador provide examples of applying land-use planning to disaster reduction. Jamaica is incorporating hazard information into the development approval process and the national and local levels.

Many of these measures are in the planning stage and it is too early to assess their impact on disaster risk levels. There is little mention in the reporting of

Managing vulnerability through strategic planning, Maldives

It became painfully clear after the December 2004 tsunami how vulnerable the Maldives are, facing risks that include low elevation above sea level, perennial beach erosion, and dispersal of population across very small islands, remoteness and inaccessibility of islands, concentration of economic activities on tourism and a high dependence on imports. Climate change and associated risks add to the growing exposure of the Maldives. The impact of the tsunami on Maldives reinforced the urgency of enhancing mitigation and redevelopment activities, and the development of the Safe Islands Program. The program focuses on the development of the larger islands with better economic opportunities, high environmental resilience, and incentives for voluntary migration to these islands. To mitigate future risk from disasters, land use plans have been developed incorporating features of high resilience: with a wider environmental protection zone, elevated areas for vertical evacuation in case of floods, establishment of alternative modes of communication and energy and detailed disaster management plans. Currently five islands have been identified for the program and development plans prepared in consultation with local populations. Challenges for the program includes geographical population dispersion, access and logistical difficulties, a high unit cost of delivery of construction material, inadequate human resources to manage projects and above all unpredictable weather and rough seas. But the Maldives are working to reduce the underlying risk and vulnerability factors that at the moment make them among the most 'at risk' countries in the world.

efforts to retrofit risk prone schools or hospitals, except in Latin America, nor lifeline infrastructure such as water and electricity networks. Nor is there much evidence of the allocation of national budget lines to efforts of this kind. Only a few countries such as Maldives report the application of strategic national planning efforts to reduce their disaster risks.

Experience has shown that improving building codes and planning laws may have little impact in countries where a large percentage of housing and urban development occurs in the informal sector. However, very few countries report efforts to train informal sector builders, for example, in safe building techniques. Similarly, there is little or no evidence in the reporting from countries on the effectiveness of enforcement of building codes and regulations.

In the same way, many countries have incorporated disaster risk reduction into national development or poverty reduction plans or strategies, or in the case of Guatemala into the national public pre-investment system. However, it is unclear from the reporting as to what extent the plans or strategies are actually implemented and enforced or whether resources have been allocated against them. Much more may be happening at the national level that is either not reported or else not highlighted in governmental reporting, partly because the reports are focused principally on disaster preparedness efforts.

The involvement of other governmental sectors, financial institutions and the private sector in disaster risk reduction activities is reported only sporadically in the governmental reporting. On the one hand, this may indicate that development actors are not yet factoring disaster risk into their plans and investment decisions. It is more likely, however, that there is a substantial amount of activity underway involving utility companies, environment and planning ministries, the insurance and banking sectors, the transportation sector, large corporations, the tourist industry and others that is simply not being captured in governmental reporting. If national institutional systems are principally oriented towards preparedness, then it is possible that other developmental interventions may be largely invisible to the organizations responsible for disaster risk reduction.

Another trend that is highlighted from the reporting is that only a few countries report on efforts to address climate change, through the development of National Adaptation Plans of Action (NAPAs) in the case of low income countries or through other means. Again, this does not imply that countries are not addressing adaptation concerns as part of their national development plans, but rather that these efforts are not being explicitly considered as part of their efforts to address disaster risk, and thus are not reported against the HFA. This reflects the separation in many countries between the institutional and legislative systems developed to address disaster risk and those developed to address climate change. In Africa, for example, where both climate related hazard and vulnerability levels are likely to be drastically affected by global climate change, only one country reports an intention to connect its strategies and policies on disaster risk reduction to those on adaptation to climate change. In Europe, in contrast, the issue of adaptation to climate change is starting to shape the disaster risk reduction agenda. In a

number of countries, in Scandinavia, Switzerland, France and Germany, for example, national platforms for disaster reduction and HFA Focal Points are heavily involved in the development of national strategies to adapt to the negative effects of climate change. France, for example, now has an early warning system for heat waves in place.

Finally, there is still little reflection in the governmental reporting of efforts by the private sector and by international financial institutions to increase access to risk transfer measures such as insurance, although some countries, such as the Cayman Islands, credit the effectiveness of risk transfer for their rapid recovery from a major hurricane disaster. One of the exceptions is Costa Rica, which reports that a study has been undertaken to insure public infrastructure and investment in close collaboration with the National Insurance Institute. Given that a number of key regional initiatives are now underway to strengthen risk transfer as a disaster risk reduction measure, for example the World Bank Caribbean Catastrophe Risk Insurance Facility or efforts to insure farmers against crop losses due to climate variability in Africa, it would seem that there is again a problem of under-reporting or of a lack of explicit consideration of these efforts within disaster risk reduction strategies.

3.5 HFA Priority 5: Strengthen disaster preparedness for effective response at all levels

Effective early warning depends on effective disaster preparedness and that to be relevant, disaster preparedness has to take root at the local level. A number of countries, such as Cuba, Bangladesh and Vietnam have already shown that when a comprehensive improvement of disaster preparedness at the local level is linked with national capacities to monitor and warn of impending hazard events, loss of life can be drastically reduced. In Cuba, in particular, loss of life in major hurricane events has been almost eliminated due to effective early warning and preparedness.

A significant number of countries in all regions are now taking action to strengthen local capacities for disaster preparedness. India, in particular, has been implementing since 2001 a local level disaster preparedness programme that covers all the most hazard prone districts in the country with a total population of approximately 600 million people. Many other countries report pilot projects in a

Philippines - multi strategy approach to disaster risk reduction

In the Philippines the Implementation of the National Disaster Coordinating Council' s Four-Point Plan of Action for Disaster Preparedness is dealing with disaster risk reduction in a variety of complementary ways, including:

- Upgrading the forecasting capability of the Philippine Atmospheric, Geophysical and Astronomical Services Administration and the Philippine Institute of Volcanology and Seismology through improvement of equipment, staff development, establishing links with foreign forecasting institutions covering the Pacific Rim and South China Sea and the installation of rainfall and water level gauges;
- Promoting an integrated and coherent strategic public information campaign on disaster preparedness through nationwide drills on synchronized Building Emergency Evacuation Plan, tsunami, and earthquake warning; airing of "Safe Ka Ba?" Disaster Management School-on-Air; and production and distribution of posters and flyers on natural hazards;
- Enhancing capabilities of Local Chief Executives and their respective Disaster Coordinating Councils in identified vulnerable areas through the conduct of disaster management related trainings; and
- Strengthening mechanisms for government and private sector partnership in relief and rehabilitation through the organization of the Private Sector Disaster Management Network, developing ongoing arrangements with various entities on operational preparedness and capabilities including communications, technical skills and expertise, health, availability of heavy equipment for search and rescue operations, rehabilitation of internally displaced persons and communities, implementation of disease/trauma management, provision of houses in the communities ravaged by typhoons and harmonization of hazard mapping.

number of local administrative areas. The Indian programme demonstrates the potential for up-scaling local level disaster risk reduction to the national scale and achieving a broad-based advance in preparedness and response capabilities. At the international level, OCHA has led a group of agencies and NGOs also engaged in the Inter-Agency Standing Committee to develop indicators for preparedness and common principles.

Few countries report on local level disaster risk reduction activities that go beyond building capacities for early warning preparedness and response. One of the exceptions is in Costa Rica where municipalities are actively engaged in the identification of disaster risk in the development of land-use plans and regulations. These were then subject to inspections to validate the risk information. Risk evaluations were also carried out of locations suffering recurrent disasters and where land-use plans had to be adjusted. However, there is clearly a substantial area of activity with local governments, NGOs and community organizations involved in a wide range of activities to mitigate hazard and reduce risk. It is likely that these activities are heavily under-reported in the governmental reporting to date.

Norway: Municipal level disaster risk reduction

In Norway, it is the 431 municipalities that are the local focus of national disaster risk reduction efforts. The municipalities are responsible for the functioning of key public services and the coordination of these during emergencies (e.g. local infrastructure, health services, care for the elderly and other vulnerable populations, and information to the public). In accordance with the principles of responsibility and of proximity, the main responsibility for preventive planning and disaster management within their territorial borders lies with the municipalities. Risk- and vulnerability analysis, physical planning, emergency plans and exercises are the cornerstones of disaster risk reduction at the local level. All municipalities are required to have an operational fire- and rescue service. The municipalities are furthermore required by law to undertake civil emergency preparation within the health sector but there is today no trans-sectoral judicial obligation regulating a cross-sectoral preparedness and disaster risk reduction at the local level.

Within this context of local level responsibility, civil society and non-governmental organisations (NGOs) are active partners in reducing the risk of disasters, and in handling emergencies and disasters. This public-private partnership is fundamental for a well-functioning preparedness system and an effective disaster response.

4

Conclusion and recommendations

This concluding chapter summarizes each of the broad disaster risk scenarios identified and characterized in Chapter 2 and then outlines whether and how the progress in disaster reduction reported by countries, and discussed in Chapter 3, addresses the different patterns and trends in risk identified. On the basis of these conclusions, the section then proposes a number of cross-cutting substantive challenges for the ISDR system and its Global Platform for Risk Reduction.

Chapter 2 revealed important differences in the risk patterns and trends emerging in intensive risk hotspots characterized by geological or tectonic hazards (earthquakes, volcanic eruptions and tsunamis), in those characterized by climatic hazards (cyclones, floods, droughts) and in areas of extensive disaster risk, mainly characterized by large-numbers of highly localized climatic hazards (flash floods, landslides, mudslides, fires etc.). This concluding analysis looks at how the trends in disaster risk reduction identified from the reporting will address both mortality and economic risk in the case of three specific risk scenarios: earthquake risk hotspots; climatic risk hotspots and regions of extensive risk.

This categorization of risk scenarios is far too broad to be useful for analytical purposes at the country and regional level. For example, the causes and consequences of risk are completely different in drought prone countries in the Sahel and in Asian mega-cities prone to cyclone, even though both could be broadly classified as climatic risk hotspots. Similarly, earthquake risk is very different in a mega-city such as Tehran compared to a densely populated rural area such as Kashmir. However, the analysis

here is limited to a broad comparison of global trends in risk and in disaster risk reduction. From that perspective the three scenarios examined do provide a useful starting point.

4.1 Earthquake risk hotspots

It is likely that a substantial and growing proportion of future large-scale disaster mortality will occur in earthquake risk hotspots. Both hazard exposure and relative human vulnerability are increasing in countries that experience rapid urban growth and that are located in highly seismic regions. Many rapidly expanding large cities and mega-cities in middle-income countries have become earthquake risk hotspots. These cities often concentrate a substantial proportion of national gross domestic product and may play important roles in both the regional and even the global economy. Thus there is also a likelihood that significant direct and indirect economic loss of up to global significance may occur, exceeding the financial capacity of a country to absorb the loss and recover. Other earthquake risk hotspots coincide with densely populated rural areas in low-income countries, where the direct economic loss may be less but where both the mortality as well as the relative loss of infrastructure, housing and livelihood assets can be enormous.

In general, mortality risk is far lower in highly developed countries due to the application of seismic resistant building and planning standards. Economic loss risk is lower in less developed countries because there are fewer assets exposed. In middle-income countries, however, both mortality and economic loss

risk can be very high, given the concentration of people and economic assets in cities with high levels of physical vulnerability that have not necessarily been addressed through building and planning standards.

In contrast to weather and climate related hazards, early warning for specific earthquakes is not possible. Furthermore, the relative infrequency of major earthquakes in many countries conspires against public awareness, political commitment and effective disaster preparedness. In the case of earthquake hotspots, improvements in disaster preparedness and response can reduce mortality rates to a certain degree. However, given that so much earthquake mortality is directly related to structural failure, even when disaster preparedness and response is highly developed there is often a significant proportion of mortality risk that cannot be reduced in this way. In other words, and in contrast to climatic risk hotspots, earthquake mortality risk is less sensitive to reduction by enhancements in warning, preparedness and response.

From this perspective, the progress on disaster risk reduction reported by countries with earthquake risk hotspots is probably insufficient to have more than a marginal impact on likely increases in mortality and economic loss risk. A number of countries do report important progress in terms of enhancing building codes and planning regulations and in the retrofitting of important buildings, and these efforts should certainly be highlighted. A few countries report efforts to reduce economic loss risk through risk transfer or contingency financing facilities. However, country reporting on broader efforts to reduce risk through addressing the underlying urban processes that generate earthquake vulnerability in the first place is scarce. The progress being reported by many countries continues to be broadly centred on public awareness, disaster preparedness and response. As mentioned above, important as these efforts are, they will have only a limited effectiveness in reducing mortality in earthquake risk hotspots. Nor do they address economic loss risk. In other words, if current trends continue, both mortality and economic loss risk will increase rather than decrease.

However, given the limitations in reporting, as described in Chapter 3, there may be far more

progress at the country level than has been described here. For example, considerable progress has been made in the identification of earthquake risk in many hotspots, with support from international initiatives⁶⁰. However, country reporting gives few indications that this risk information has been mainstreamed into urban planning and management and there is even less evidence of effective implementation.

Given this scenario, major reductions in both mortality and economic loss risk will only be possible through addressing a different range of challenges. Rapid urbanization per se does not have to lead to an increased earthquake risk and, on the contrary, can bring substantial economic and social benefits to a country. However, if urban growth is to be other than a fast-track to accelerated earthquake risk, new urban development must be guided through planning, regulation and incentives towards increased resistance and resilience. One challenge therefore is to achieve an increased application of risk sensitive planning of land-use and infrastructure development and an effective application of appropriate building standards, through improving codes and norms. However, a substantial proportion of the population of both large and mega-cities in earthquake hotspots, as well as in rural areas, live in unregulated, informal settlements or in non-engineered villages and structures, where the impact of conventional planning and building regulation is often limited. The challenge, therefore, more often consists of finding innovative approaches to planning and building, such as through strengthening the capacities of informal sector builders and participative settlement planning. More challenging still is to turn around the urban processes that lead to the generation of physical vulnerability in the first place, as this may require addressing deep-rooted urban issues such as land tenure, access to transport and infrastructure and urban poverty.

Earthquake risk hotspots already have very high levels of existing risk, accumulated over decades. Even in high income countries, it is physically and economically impossible to retrofit entire large and mega-cities. However, existing risk can be reduced by retrofitting and strengthening key facilities such as schools and hospitals, life-line infrastructure such as water, sanitation and electricity networks and

60 See for example: the International Decade for Natural Disaster Reduction (IDNDR) project: RADIUS - Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters at: www.geohaz.org/contents/projects/radius.html; Geohazards International, a nonprofit organisation working toward global earthquake safety see: <http://www.geohaz.org/contents/news/media.html>, Japan International Cooperation Agency (JICA) at: <http://www.jica.go.jp/english/index.html>; Earthquake and Megacities Initiative at: www.earthquakesandmegacities.org

transport hubs such as railway stations and airports. Urban redevelopment similarly provides opportunities for risk reduction, assuming that appropriate standards and norms are in place to guide new development. Such measures can lead to a reduction in mortality risk and can complement existing efforts to strengthen preparedness and response capacities, including local search and rescue capabilities. Again, in many contexts, technical measures of this kind need to be accompanied by legal and financial mechanisms, addressing issues such as property rights, rent laws and financial incentives, in order to be effective. Similarly, economic loss risk can be significantly reduced by a wider application of risk transfer measures such as insurance and the development of contingent financial facilities for both governments and the private sector.

4.2 Climatic risk hotspots

In the case of climatic risk hotspots, mortality rates in poor predominantly rural countries, with low levels of human development are still high and may increase further if vulnerability is not addressed. However, mortality rates in climatic risk hotspots in developed countries have decreased due to improved development conditions, in areas such as health, sanitation, infrastructure and communications, as well as through enhanced early warning, disaster preparedness and response. A number of less-developed countries have also achieved substantial, measurable reductions in mortality risk through improvements in early warning, disaster preparedness and response.

In contrast, economic loss risk is already higher and would appear to be increasing faster in climatic risk hotspots than in earthquake risk hotspots. Enhanced early warning and preparedness can substantially reduce mortality, through evacuation of people to safe places, and can also contribute to reduced loss and destruction of economic and livelihood assets through interim protection or removal of transportable assets to safe places, or in the case of drought through decisions in agriculture, for example, when to plant. However, considerable volumes of assets cannot be defended in these ways, leading to high potential loss. Economic risk is greater in hotspots in more developed areas, due to a greater exposure of economic assets. However, in hotspots in poor rural areas, while the absolute

economic value of asset loss may be low, the disruption of livelihood assets can be devastating.

The fact that mortality risk has declined in a number of countries demonstrates that climatic risk is far more sensitive to a reduction by improved early warning and preparedness than earthquake risk. Major further reductions in climatic risk are therefore possible through a more generalized application of preparedness and early warning. At the same time, economic loss risk in the agriculture sector can also be reduced by the application of early warning information.

However, global climate change will lead to an increase in hazard levels in both existing and new areas. If increased hazard due to climate change is combined with increased exposure and vulnerability, due to the other processes that are generating climatic risk such as urbanization of coastal areas and rural poverty, then overall risk levels may increase dramatically, slowing and even reversing the progress that has been made in reducing mortality. While the reduction in drought mortality, in particular, has been impressive over recent decades, due to improved early-warning, preparedness and response, this tendency may not be sustainable if the vulnerability of poor rural populations increases, particularly in sub-Saharan Africa. And as the impact of the 2003 heat-wave in western-Europe demonstrated, climate change may reverse the pattern of very low mortality risk in climatic hotspots in developed countries by exposing existing vulnerabilities and weaknesses in warning, preparedness and response systems that have not yet adapted to changing climate patterns.

Economic and asset loss will also continue to rapidly increase owing to the increased exposure to hazards as well as due to increases in severity or frequency of cyclones, floods and droughts. The impact of climate change in some hotspots will be particularly drastic. The hazardous nature of some coastal areas, small-island developing states, semi-arid areas and areas that depend on glacier melt for their water supply may become particularly serious, leading to unsustainable levels of risk.

Faced with this risk scenario, many countries with climatic risk hotspots are reporting improvements in the development of institutional and legislative arrangements for enhancing early warning, preparedness and response capacities and for strengthening public awareness and education. In

contrast to earthquake risk hotspots these measures can potentially lead to a significant reduction of climate mortality risk in a large number of countries and should be highlighted. A number of countries also report efforts to reduce climatic hazard exposure, through measures that include rainwater harvesting, coastline protection and the maintenance of drainage systems, which can contribute to a reduction not only of mortality but also of economic loss.

However, and analogous to the situation in earthquake hotspots, little progress is reported in addressing climatic risks through measures such as improvements in land-use planning and building or the introduction of drought resistant agriculture, which can reduce vulnerability. Only a number of countries report efforts to reduce economic loss risk through risk transfer or contingency financing facilities. Very few countries report broader efforts to reduce risk through addressing underlying processes such as urbanization, land use, rural poverty and patterns of agricultural production. Only a handful of countries report linkages between efforts to adapt to climate change to efforts to reduce disaster risks.

Given the limitations in reporting, there may be far more progress at the country level than has been described here. But from the evidence examined here economic losses will continue to increase in climatic risk hotspots, while due to climate change future potential reductions in mortality will be challenged. As in the case of earthquake risk hotspots, if these findings are correct, there is a need to revise and reorient approaches to disaster risk reduction, for which a number of broad parameters can be outlined. Improved scientific knowledge has enabled increasingly accurate modelling of patterns of weather and climate variability, such as tropical cyclones and the El Nino Southern Oscillation, and on the likely consequences of global climatic change on existing climate variability in different regions. However, progress in translating these models into hazard scenarios at the country level has been slower. Even less progress has been made in identifying the specific risks associated with these hazard scenarios in a way that can usefully inform development planning and investment decisions. A first step, therefore, is to prioritize improvements in climatic risk identification in hotspots, in order to clearly profile existing risk patterns and trends as well as potential effects of increases in hazard due to global climate change.

Improved risk information can make ongoing investments in early-warning, disaster preparedness

and response more effective and could lead to a greater reduction in mortality risk. Current progress in this area should be encouraged and maintained, in particular by enhancing the articulation between warning providers, such as the meteorological services and disaster risk management agencies and by ensuring effective links between the national and the local and community levels.

Many of the mechanisms for addressing urban risks, mentioned above under earthquake risk hotspots are equally relevant in the case of climatic risk. However, it is also necessary to consider other mechanisms such as improved water and river management, the promotion of sustainable agriculture and livelihood diversification in rural areas that can reduce vulnerability as well as mechanisms to address climate hazard exposure, such as conserving and extending natural coastline protection, reforestation and recharging groundwater reserves. As in the case of earthquake hotspots measures that rely on formal regulation and standards, may have limited applicability in rural areas and informal unregulated settlements, meaning that more innovative approaches will be required. And again similarly, to be effective, the underlying causes of vulnerability will have to be addressed. A wider application of risk transfer measures, including insuring agricultural production against climate shocks and the development of contingent financial facilities for both governments and the private sector can reduce economic loss risk.

Also, given the likelihood of more extreme climate hazard, there may be greater constraints on the economic feasibility of retrofitting, protecting and insuring key facilities in some areas, particularly in the case of low-lying small island developing states vulnerable to sea level rise.

4.3 Extensive Disaster Risk

Extensive disaster risk would appear to be increasing rapidly both in regions not exposed to regular large-scale hazard events and/or where increases in population density and urbanization are still incipient, as well as within hotspots. When such regions are subject to concurrent processes of urbanization, environmental change and the economic development of new territories, hazard exposure grows rapidly, due to increasing population and economic assets in hazard prone locations at the same time as new hazard patterns are generated

through environmental change and conditioned by global climate change. As a consequence, the extent, frequency and magnitude of highly localized flooding, drought, flash-flood, landslide and wildfire events and the exposure of population and economic assets to these events increases, creating new accumulations of disaster risk and potentially leading to the configuration of new climate risk hotspots. If similar processes occur in areas with seismic hazard, then new earthquake risk hotspots could develop.

At the global level it would seem that mortality associated with extensive risk represents a relatively small proportion of total disaster mortality. However, it is significant in some countries outside of intensive risk hotspots, and is increasing rapidly in areas of extensive risk, in particular associated with climatic hazard, indicating the rapid unfolding of additional disaster risk. Similarly, asset loss and livelihood disruption may be considerable and may have a particularly serious impact on informal settlements in urban areas as well as small towns and rural households and communities. Given that the number of small and medium scale disasters is increasing rapidly then asset and livelihood loss will also increase, eroding scarce development gains for the poor and challenging the achievement of the Millennium Development Goals. Climate change will increase extensive risk in many areas.

Extensive risk often escapes both national and international political attention for a number of reasons. The scale of the risks and the diffuse nature of the losses do not have the political impact of a single large event, even though the accumulated impact over time may be considerable. Most small and medium disasters are essentially local in character and affect rural and urban informal communities rather than strategic economic interests.

Taking into account these characteristics, it is encouraging to note that a relatively large number of countries report efforts to strengthen local capacities for disaster risk reduction at the level of local governments and administrations as well as community organizations. However, most of the progress being reported refers to the enhancement of early warning, preparedness and response capacities and for strengthening public awareness and education. The country reporting makes little reference to the strengthening of local capacities to reduce the underlying risk factors, whether through more effective planning or through investments to reduce existing risks. Similarly little mention is made

of links between local level risk management and efforts related to adaptation to global climate change, despite the fact that extensive disaster risk is clearly very sensitive to changes in climate hazard.

If these findings are correct, reductions in mortality may be achieved through improvements in early warning, preparedness and response. However, given that extensive risk would appear to be increasing rapidly, unless the underlying risk factors are addressed, it is possible that mortality risk will continue to increase faster than it can be reduced, while economic and livelihood losses, particularly for poor rural and urban communities will increase. Most seriously, unless the underlying risk factors are addressed, it is likely that in many regions extensive risk will continue to develop until they appear as new intensive risk hotspots.

As with the intensive risk hotspots, therefore, a change in approach is required, with a stronger emphasis in this case that the strategies and mechanisms will have to be applied fundamentally at the local level. These strategies will have greater possibilities of success and sustainability in those countries where there is a tradition of decentralizing authority and resources to the local level. In countries with a highly centralized tradition of governance, strengthening capacities for local level risk disaster reduction is far more challenging.

4.4 Key challenges for the ISDR system

The Hyogo Framework for Action outlines five Priority Areas for Action in order to reduce disaster risk and within each Priority Area identifies a range of specific themes. All these priorities are relevant to achieving the overall goals and objective of the HFA. Taking into account the HFA as an overall framework for guiding the ISDR system, the present review, and the analysis presented above, has highlighted a number of key challenges which should receive particular attention.

The challenges are outlined in substantive and indicative terms rather than as programme proposals. No attempt has been made here to identify how they could be addressed by ISDR system partners. The challenges identified refer primarily to HFA Priority Areas One, Two, Four and Five. Challenges may also exist in HFA Priority Area Three; however, they have not been highlighted in this review. However, attention is drawn to the ISDR guidance document

Words into Action: a Guide to Implementing the Hyogo Framework, which provides practical guidance of how to start addressing the five Priority areas.

Institutional Arrangements for Disaster Risk Reduction

Inadequate institutional arrangements remain the single largest challenge identified in this review. Existing arrangements have different degrees of effectiveness, depending on their positioning in national government, their degree of decentralization and multi-sector participation, the level of political support and their share of national budgets. However, with a few notable exceptions, both single-institution disaster management offices as well as multi-institutional national systems for disaster risk reduction, are still fundamentally focused on early-warning, disaster preparedness and response. In most cases the coordinating entity, is the one responsible for disaster response, bringing with it an emergency management perspective and skills, rather than a developmental risk reduction perspective. Where development sectors and line ministries are engaged in such systems, it is also often from a preparedness focus, rather than leading to a mainstreaming of a development perspective into disaster risk reduction. A major effort is therefore required to design, test, promote and support new institutional arrangements for disaster risk reduction, that are integrated into national development planning and public investment, can engage with the climate change, risk transfer, urban planning and management and social development communities and that are integrated and which have the necessary political authority and resources.

Risk Identification

Risk identification remains a challenge at all levels and scales given that it provides an essential baseline for any disaster risk reduction application, from response preparedness, through land-use planning to the programming of investments to reduce existing risks. At present, the country reporting indicates that while progress is being made in hazard identification and mapping, insufficient progress is still being made to integrate hazard exposure and vulnerability information in order to generate risk information that can be accessible to planners and decision makers on an appropriate scale.

Greater emphasis, therefore, is required in both compiling and institutionalizing disaster risk information at national and sub-national levels, including detailed disaster loss databases, applications

of indicators and indexes and detailed risk mapping and analysis. Moreover, specific efforts are needed to systematically incorporate such information into programmes to reduce underlying risk and to tailor preparedness for response to the real risks present

Early Warning

Early warning is one of the areas identified in this review where most progress is being made in a large number of countries and regions. Almost all countries have a monitoring and early warning system for the main weather and climate hazards.

While this progress is encouraging a number of challenges have been identified. These include improving the institutional linkages between hydrological and meteorological services on the one hand and the organizations responsible for disaster risk management at the national level, ensuring that vertical linkages exist between the national level and local level to ensure that local communities have access to understandable warning information and that local capabilities to use warning information is strengthened. Another challenge is to ensure sustainability, given the cost of maintaining infrastructure, equipment and capacities in many countries.

The use of early warning information in the agricultural sector is another challenge that has not been described in most of the country reporting.

Public and Private Investment in Disaster Risk Reduction

This review has identified few programmes of public investment oriented towards reducing existing disaster risks, although in many countries funds have been created to support disaster relief and, to some extent, recovery.

A key challenge, therefore, is to introduce disaster risk reduction as an investment item in public sector budgets, with a specific focus on identifying and reducing the risks associated with publicly owned infrastructure, buildings, social services, cultural heritage and other elements of national patrimony. At the same time, most development investment in risk prone countries is made by the private sector. Reporting on private sector investment to reduce risks is absent from the country reporting. While much more may be happening than is reported, another challenge is to more effectively engage the private sector to invest in reducing its own disaster risk and importantly associated risk, for example in

the surrounding areas and communities it depends on for labour and resources.

Urban risk reduction has been identified in this review as a challenge in both earthquake and climatic risk hotspots. Efforts need to be made to secure a greater engagement of both the municipal authorities of urban areas but also the national agencies responsible for land-use planning and urban development in the governance arrangements for disaster risk reduction.

A key challenge is to ensure the application of urban disaster risk measures such as, enhanced urban planning and building regulation, innovative mechanisms appropriate to reducing risk in informal, unregulated and rural settlements, measures designed to address the causal factors of urban risk, related to land tenure, urban poverty, a wider application of risk transfer mechanisms and others.

Climatic Risk Reduction

This review identifies the need for a greater integration of national efforts to reduce disaster risk with those efforts to adapt to global climate change. From the country reports, it would appear that there is little systematic integration between the institutional frameworks, legislation, policies and strategies to address disaster risk with those related to adaptation to climate change.

Given the potentially enormous impact that climate change will already have on patterns of climatic risk, a key challenge is to strengthen national and local capacities to manage and reduce the risks associated with existing climate variability as a way of building the capacity necessary to address the further unfolding of disaster risk under the influence of global climate change. To achieve this, closer linkages need to be forged between the policy arenas of climate change and disaster risk reduction, at both

national and international levels. The implementation of the Hyogo Framework needs to be more clearly recognised as a primary tool to achieve the adaptation goals of the UN Framework Convention on Climate Change

Local Level Disaster Risk Reduction

Addressing local level risks is fundamental if areas of extensive disaster risk are not to evolve into new intensive risk hotspots. This is a hidden problem that is not receiving sufficient attention from the international community. A key challenge therefore is that existing programmes of local level disaster risk reduction, that are primarily focused on strengthening capacities for preparedness and response begin to embrace capacities for reducing the underlying risk, both through planning and environmental management as well as through investments in specific projects to reduce existing risks. The role and commitment of local authorities to such an agenda is crucial.

Post Disaster Recovery

Given the inevitability of future large-scale catastrophes, intensive risk hotspots post-disaster recovery will continue to offer a major opportunity to reduce disaster risk in many countries, given that major disasters actually eliminate part of the existing risk.

However, experience shows that recovery works best to reduce risk when appropriate technical, legal, institutional and financial risk reduction mechanisms are already in place before the disaster happens. In a large scale emergency context it is extremely difficult to change pre-existing patterns of planning and building, even when the political will exists, if the necessary disaster risk reduction framework does not exist.

Annex 1

Technical annex

Note 1

By analysing the EM-DAT database, it is possible to reveal patterns and trends in disaster occurrence and loss globally, comparing countries, comparing time periods and comparing hazard types. The EM-DAT database contains data entries from 1900 through to the present, and registers events as disasters if they produced 10 or more deaths, 100 or more affected people, or where a state of emergency was declared or a call for international assistance was made. The data has a global level of observation and a national scale of resolution. The data is gathered from UN agencies, government sources, IFRC, insurance sources, press and others and is maintained by CRED. EM DAT has a number of data fields including, numbers killed and affected, and economic losses.

Note 2

Disaster risk refers to the probability of a given element in a given location in a given period of time suffering loss or damage due to a given hazard. According to whether risk is looked at from a social, economic or physical perspective, the element may be a person, a building or a country's economy. According to the scale of analysis the location may be a specific place, a city, a local government administrative area or an entire country. Similarly, the period of time could be anything from a few hours to centuries. Disaster risk is usually used to refer to risks associated with hazards with geological characteristics (earthquakes, volcanic eruptions, tsunamis) or those related to weather and climate (floods, droughts, cyclones, mudslides etc.). For the sake of simplicity in the rest of this report we will refer to these as geological hazards and climatic hazards respectively, although these are not strict scientific definitions. Some hazards such as landslides have both geological and climatic causes. In this report they have been included with climatic hazards as unlike other geological hazards they are sensitive to patterns of environmental and climatic change.

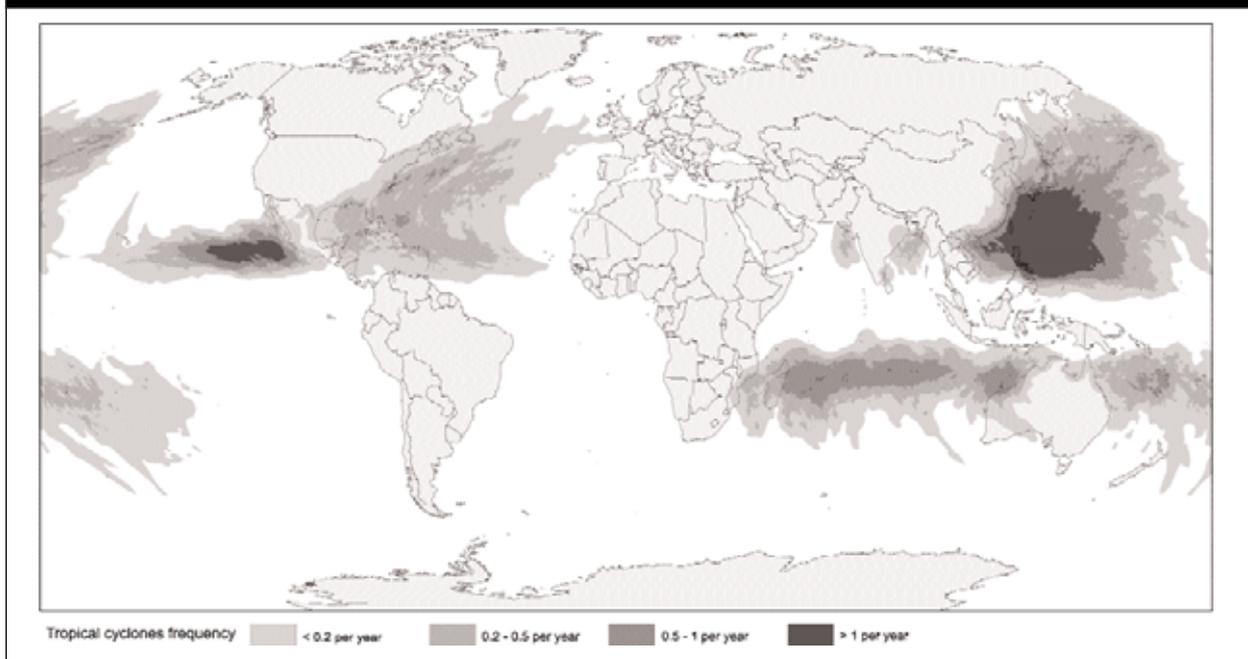
In other words, disaster risk can be expressed in various ways according to the circumstances. Examples might include the expected mortality due to earthquakes over the next 10 years in India, the probability of the gross domestic product (GDP) of Jamaica being reduced by hurricanes in the next year, and the chance of a specific bridge in Kenya being damaged by a flood in the next 100 years. Disaster risk may be described with respect to single hazards or multiple hazards, for example, what is the annual probability of mortality due to a combination of floods, landslides and earthquakes in a given province. Disaster risk may also be described in relative or absolute terms. In absolute terms, a country may have many billions of dollars of economic assets at risk to earthquake. However, in relative terms this may be a small percentage of its total GDP or of its economic capacity to recover.

Note 3

Hazards are potentially damaging physical events, phenomenon, and/or human activities that may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation. Hazards can include latent conditions that may grow or contribute to future events and can have different origins: natural (geological, hydro-meteorological, and biological) and/or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential, or combined in their origin and effects. They may occur over a very short period, such as a tornado, or may develop and persist over very long periods, such as a drought. Each hazard is characterized by its location, strength, frequency, time evolution and probability.

The strength of a hazard is measured in terms of its magnitude, intensity or toxicity. The frequency is measured in terms of its probability of occurrence, also called period of return: high probability, low probability or continuous. Each hazard type has a different rapidity of onset, for example, sudden, rapid or continuous. Their

Figure 17
Hazards: Tropical cyclone frequency



Source: UNEP/GRID-Europe, Cyclones frequency, PREVIEW cartography, P. Peduzzi © UNEP (2007)

respective predictability is also variable. Each type of hazard comprises a suite of specific damage factors, such as strong wind, ocean wave height, weight of ash fall, height of flood, turbulence of water flow, etc. The impacts resulting from a hazard will depend on the related exposure and vulnerability, but each type of hazard has a destructive capacity resulting from its strength, frequency and predictability. Their impacts vary in areas affected and on duration.

The level of hazard in any given place refers to the probability of an earthquake, cyclone or other hazard event, of a given magnitude, intensity or extent occurring in a given space of time. A region that experienced an average of 10 earthquakes with magnitude 6.0 every decade would be more hazardous than a similar region that experienced only one such earthquake every 50 years. Measuring hazards may be complicated by the activation of secondary hazard events. Earthquakes often provoke landslides and fires. Cyclones may cause coastal flooding. Climatic events such as El Nino may be associated with multiple hazard types over wide areas.

While atmospheric processes and earthquakes and volcanic eruptions are completely natural, many hazards are influenced by human activities.. For example, building on flood plains, or deforestation of river basins may change the frequency, magnitude and extent of flooding. Even earthquake intensity can be modified by factors such as groundwater extraction, land reclamation or by the weight of mega-dams. Development, therefore, plays a key role in configuring hazard exposure over time. At the local level, hazard is modified through processes such as urbanization and environmental change. Globally, there is now a critical mass of evidence which shows that climate change is drastically altering patterns of climate hazard. Development, also influences the distribution of population, infrastructure and economic activities and hence the degree and distribution of exposure.

Note 4

UNDP, (2004), Reducing Disaster Risk: a Challenge for Development, together with the World Bank Op. Cit., and additional work carried out by UNEP-GRID, the Norwegian Geotechnical Institute and others have, for the first time provided a comprehensive vision of hazard exposure for the principal hazard types, namely earthquake, flood, drought, tropical cyclone volcanic eruption and landslide. While the datasets and methods

used vary from hazard to hazard, hazard exposure has been calculated for people by combining population densities with the frequency and magnitude of hazard events and for economic activities by combining the value of GDP with the frequency and magnitude of hazard events.

Note 5

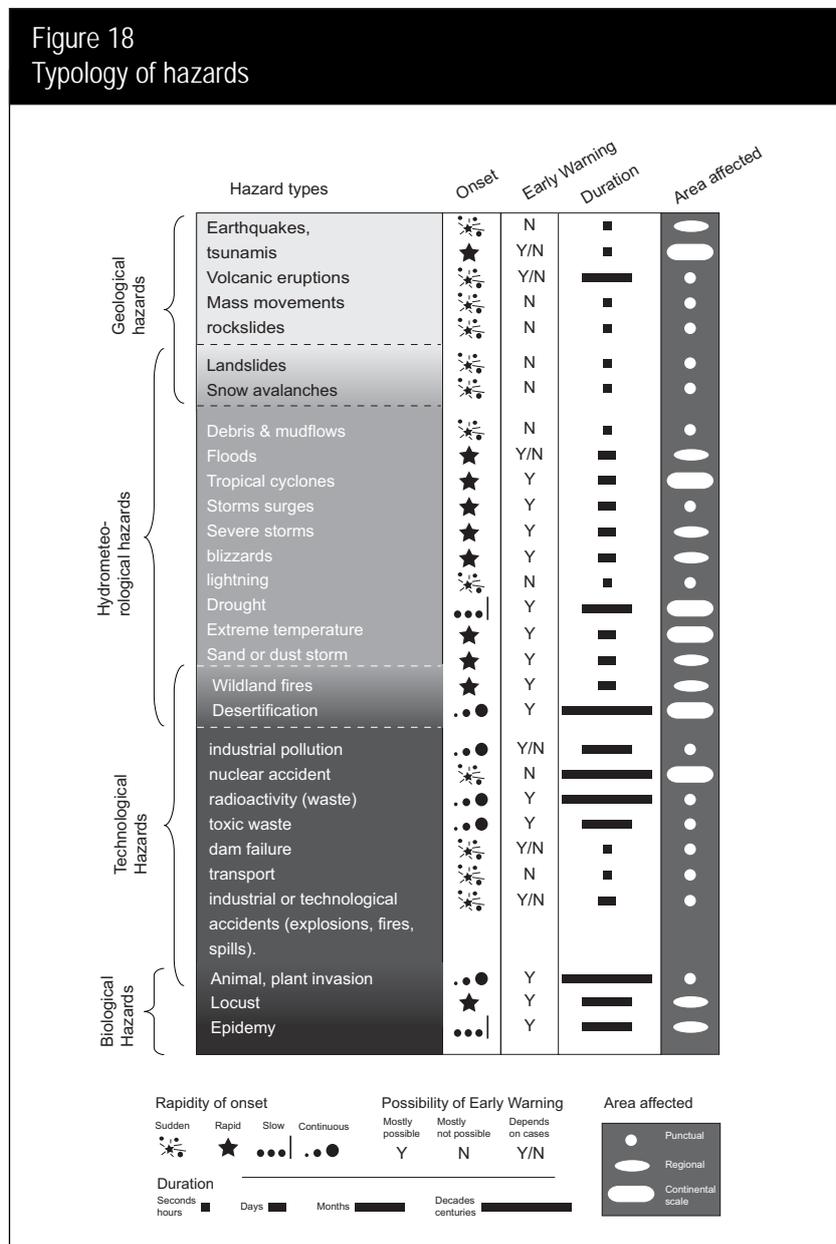
When an earthquake hits a city, some structures resist the impact better than others. This is an example of physical vulnerability. Poor communities often live in more vulnerable structures and settlements and suffer as a result disproportionate rates of mortality and injury. This is an example of the inter-play of physical and social vulnerability. When poor people lose the few assets they have in a disaster, recovery may be more difficult than in the case of those with reserves and insurance, a case of economic vulnerability. In some contexts, particular social groups may live in conditions that are highly vulnerable to hazards or have less access to early warning and disaster relief. In other cases, the most vulnerable may be women, children and/or the elderly. While poverty plays a key role in configuring vulnerability, the two are not synonymous. Social capacities, such as extended families and strong communities, may balance and in some cases outweigh economic vulnerabilities.

Vulnerability to specific natural hazards may overlay vulnerability to every-day hazard. These include disease, economic hardship, malnutrition, inadequate or inexistent sanitation, conflict and crime, among others. The priority assigned by people to natural hazards depends on the relative importance of these other every-day hazards in their day to day lives. This is a particular challenge for managing risk associated with low frequency but potentially high impact hazards.

Note 6

A global vision of human vulnerability has been provided by UNDP's Disaster Risk Index (DRI) which more appropriately could have been called a Disaster Vulnerability Index. The Index is constructed using mortality figures from the EM-DAT database as a proxy for manifest risk. The DRI expresses human vulnerability as the relationship between the average number of people killed by a hazard type annually in a country over a twenty year period (1980 - 2000) and hazard exposure for the same period and country. Put simply, if in both country "X" and "Y" one million people were

Figure 18
Typology of hazards



Source: Adapted from Reducing Disaster Risk, p. 39, ISDR 2005 and P. Peduzzi, Environment & Poverty Times N3, p.7, UNEP 2005.

exposed to three similarly strong earthquakes per year, then their hazard exposure would be identical. However, if in country "X" an average of 10,000 people were killed in earthquake disasters a year and in country "Y" only 100 people, the human vulnerability for earthquakes would be 100 times greater in country "X" than in country "Y". Manifest risk, as derived from loss data, however, has limitations if used for the estimation of future risk levels. In the case of infrequent events, such as tsunamis, the approach is simply not valid particularly when working with historical datasets of only 20 years. A country that has not experienced a strong earthquake in the last 20 years and therefore has no earthquake related mortality would appear to have no earthquake risk. Risk would definitely exist, however, if strong earthquakes occurred in the country every 50 or 100 years, even if no earthquake had occurred in the 20 year reporting period. Conversely, risk and vulnerability levels will be distorted upwards if an extraordinary catastrophe happens in the reporting period.

Note 7

World Bank, Op.Cit. 2004. The vulnerability coefficient was constructed from EM-DAT loss data over the same 20 year period as used in the DRI. The loss data was classified by region and wealth class which enabled the distorting effect of individual extraordinary events to be minimized. However, this approach also presents problems. Most of the variance in EM-DAT mortality between countries is explained by hazard exposure and not by vulnerability factors (90% for earthquakes; 82% for tropical cyclones and 86% for floods). The classified vulnerability coefficients may therefore tend to reflect differences in hazard exposure between different regions and wealth classes rather than differences in vulnerability. The use of a vulnerability coefficient of this kind probably has the effect of flattening differences in risk between hotspots. It is not known if the variability in EM-DAT economic loss data is also explained by hazard exposure.

Note 8

The IDB study compared the likely economic loss attributed to a major disaster in a given time period with the economic coping capacity of the country, resulting in an indicator known as the Disaster Deficit Index. Seven criteria were used to calculate the countries economic coping capacity: Insurance and reinsurance payments for insured government owned goods and infrastructure; Disaster reserve funds; Public, private, national and international aid and donations; New taxes; Budgetary reallocations, which usually corresponds to the margin of discretionary expenses available to the government; External credit that the country could obtain from multilateral organizations and the external capital market, and Internal credit the country may obtain from commercial banks as well as the central bank. The Disaster Deficit Index can therefore be considered as an indicator of a country's economic vulnerability to disaster. Unfortunately, at present the indicator has only been applied in Latin America and the Caribbean, and therefore it is impossible to identify global trends.

Note 9

Disaster occurrence and loss may occur abruptly as in the case of earthquakes or landslides, sometimes gradually as in the case of drought, sometimes visibly, as in the case of badly damaged houses and infrastructure, sometimes invisibly, as in the case of disrupted communities. Disasters are usually measured in terms of human impact (number of mortalities and injuries, number of displaced people etc.) and in terms of physical impact (number of houses damaged or destroyed, number of hectares of crops lost, hospitals and schools damaged etc.). Disasters can be measured in terms of economic loss: direct loss, which is the monetary cost of damage and destruction and indirect loss, which refers to the wider disruption of trade and economic activities. Absolute economic loss is usually greater in regions with a large concentration of infrastructure and economic activities, than in poorer or peripheral regions. However, relative economic loss may be far greater in those areas due to higher levels of vulnerability.

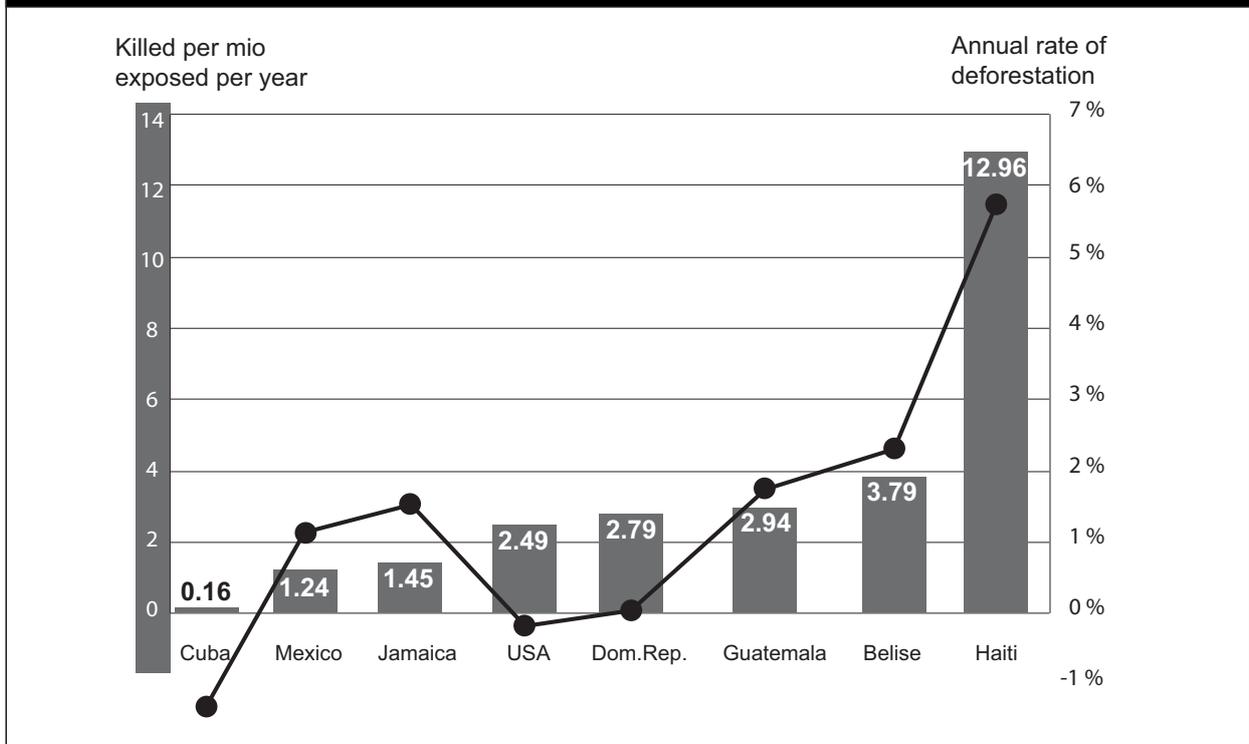
Note 10

In the case of tropical cyclones, a strong correlation existed between mortality, a high percentage of arable land and a low rank on the Human Development Index (HDI)⁶¹. In other words, countries with large, predominantly rural populations and low levels of human development are most closely associated with high mortality in tropical cyclones. Possible explanations for this correlation are that rural housing in poor countries will tend to be more vulnerable to high winds, flooding and landslides than urban housing. Conversely, the weakness or non-existence of emergency and rescue services in rural areas of poor countries and lack of access to disaster preparedness and early-warning are all vulnerability factors that could also contribute to cyclone mortality risk. There is also a correlation between mortality risk in tropical cyclones and environmental quality. Countries with very high rates of deforestation and low human development such as Haiti, suffer far greater mortality than neighbours such as the Dominican Republic, for example (Figure 19).

In the case of floods, mortality risk was closely associated with countries with low GDP per capita and low densities of population. Mortality from floods is therefore high in countries with sparsely populated, poor rural areas, where disaster preparedness and early warning is weak or non-existent and where health coverage is not easily accessible. In such areas people would have less possibility to evacuate from flood prone areas and would be more vulnerable to flood-related diseases.

In contrast, in the case of earthquakes, rapid urban growth was the development indicator most closely correlated with risk. In many rapidly growing cities, earthquake risk considerations are not factored into the building and planning process and the sheer rapidity of urban growth conspires against the regulation of buildings and

Figure 19
Tropical cyclones impacts and environment quality



Source: Adapted from Reducing Disaster Risk, p. 39, ISDR 2005 and P. Peduzzi, Environment & Poverty Times N3, p.7, UNEP 2005.

61 SUNDP Op.Cit

settlements in a way that reduces risk. In contrast to climate related hazard, earthquake early-warning is still a scientific challenge, while the relative infrequency of major earthquakes, tsunamis and volcanic eruptions conspires against preparedness.

Note 11

Economic loss data for disasters is far less robust than mortality data, at least in public domain and private sector databases. Detailed studies of the economic impact of specific large-scale disasters have been carried out by governments with support from the World Bank, UNDP and the regional development banks, using a methodology developed by the Economic Commission for Latin America and the Caribbean (ECLAC). The ECLAC methodology is usually applied in the aftermath of a major disaster in order to provide a technical justification for loan financing for recovery and reconstruction and provides an exhaustive calculation of both direct and indirect economic losses. However, ECLAC style assessments are only carried out for a fraction of disasters globally and thus provide a snapshot of specific disasters rather than a global vision. EM-DAT contains economic loss entries for less than a third of the disasters registered, and its figures differ significantly from those of ECLAC, for disasters included in both. So while EM-DAT probably provides the best public domain data on the global economic cost of disasters, it is still less than a perfect sample. Due to the lack of standardized methods for recording and calculating economic cost, except for those cases where the ECLAC methodology has been applied, economic cost estimates even for individual disasters are not necessarily accurate.

Note 12

Most of these databases have been produced by a variety of governmental, non-governmental and academic organizations using the DesInventar methodology, originally developed by the Network for Social Studies in Disaster Prevention in Latin America: LA RED, and with technical support provided by UNDP and other sources. DesInventar records all disaster losses occurring in a local administration area and has no minimum threshold. The principal data sources are national and local press and government data. DesInventar records a variety of disaster loss variables, including numbers killed and affected, housing and infrastructure damaged and destroyed, and, if available, also estimates of economic loss. With their higher resolution and a lower level of observation, national disaster databases contain far more information than it is possible to record at the global level, including thousands of small and medium scale disasters, that are either below the EM-DAT threshold or are simply not reported internationally. They thus provide a more complete picture of absolute disaster loss at the national level, as well as permitting sub-national comparisons and analysis.

Note 13

In a study that compared the EM-DAT database with four national disaster databases for Chile, Colombia, Jamaica and Panama⁶², two thirds of the total dead and missing over a 30 year period registered in both databases, for the four countries occurred in a single disaster associated with the eruption of the Nevada del Ruiz in 1985: a conclusion coherent with the tendency for mortality to be concentrated in a few large-scale catastrophes. Excluding this disaster from the analysis, approximately 27% of the total mortality registered in the national databases corresponded to medium scale events apparently not reported in EM-DAT. Due to the methodological problems of comparing the two databases it is possible that a part of this mortality is represented in EM-DAT. However, there is clearly a variable proportion of disasters, above the EM-DAT threshold, that are not reported internationally. Another 18% of the total mortality in the national databases corresponded to small-scale events below the EM-DAT threshold. Including the Nevado del Ruiz disaster, these figures are reduced to 10% and 7 % respectively.

62 Dilley et al., IRI, Columbia University, (2007, unpublished) revised and updated an original study by LA RED, (2002), Comparative Study of Disaster Databases, document produced for ISDR Working Group 3 on Vulnerability, Risk and Impact Assessment

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Annex 3

Acronym List

ADPC	Asian Disaster Preparedness Centre
ADRC	Asian Disaster Reduction Center
AMCEN	African Ministerial Conference on Environment
AU	Africa Union
BCPR	Bureau for Crisis Prevention and Recovery
CAF	Andean Development Community
CAN	Andean Community
CARICOM	Caribbean Community
CAPRADE	Andean Committee for Disaster Prevention and Relief
CBDRM	Community-based disaster risk management
CDERA	Caribbean Disaster Emergency Response Agency
CEPREDENAC	Centro de Coordinación para la Prevención de los Desastres Naturales en América Central
CIIFEN	Centro Internacional para la Investigación del Fenómeno de El Niño
CRED	Centre for Research on the Epidemiology of Disasters
DANIDA	Danish International Development Agency
DDI	Disaster Deficit Index
DFID	UK Department for International Development
DRI	Disaster Risk Index
ECCAS	Economic Community of Central Africa States
ECOWAS	Economic Community of West African States
GDP	Gross domestic product
GEWS	Global early warning system
GFDRR	Global Facility for Disaster Reduction and Recovery
GFMC	Global Fire Monitoring Center
GRID	Global Resource Information Database
GRIP	Global Risk Identification Programme
HDI	Human Development Index
HFA	Hyogo Framework of Action 2005-2015: Building the Resilience of Nations and Communities to Disasters
IDB	Inter-American Development Bank
IDNDR	International Decade for Natural Disaster Reduction
IFRC	International Federation of Red Cross and Red Crescent Societies
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Intergovernmental Authority on Development
IEWP	International Early Warning Programme
ICG/IOTEWS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System
IPCC	International Panel on Climate Change
IRI	International Research Institute for Climate and Society
ISDR	International Strategy for Disaster Reduction
IUCN	International Union for the Conservation of Nature and Natural Resources
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goal
NAPA	National Adaptation Plans of Action
NEPAD	New Partnership for Africa's Development
NGI	Norwegian Geotechnical Institute
NGO	Non-governmental organization

SAARC	South Asian Association for Regional Cooperation
SADC	Southern Africa Development Community
SDC	Swiss Development Cooperation
SICA	Central American Integration System
SIDA	Swedish International Development Cooperation Agency
SOPAC	Secretariat of the South Pacific Applied Geoscience Commission
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN/ISDR	Inter-Agency Secretariat of the International Strategy for Disaster Reduction
UN/ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO/IOC	UNESCO's Intergovernmental Oceanographic Commission.
UNICEF	United Nations Children's Fund
WCDR	World Conference on Disaster Reduction, Kobe, Hyogo, Japan, 18 to 22 January 2005.
WMO	World Meteorological Organization

Annex 4

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Global Risk Identification Programme (GRIP): <http://www.gri-p.net>

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LA RED: DesInventar: <http://www.desinventar.org>

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World Population Prospects: The 2006 Revision Population Database: <http://esa.un.org/unpp/>

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Annex 5

Reports received

From countries or territories

Algeria, Argentina, Armenia, Botswana, Brazil, Burkina Faso, Burundi, Cameroon, Cap Verde, Cayman Islands (UK), Chile, Colombia, Comoros, Congo, Costa Rica, Djibouti, El Salvador, Eritrea, Finland, France, Gabon, Gambia, Georgia, Germany, Guatemala, Guinea, Hungary, India, Iran (Islamic Republic), Iraq, Jamaica, Kazakhstan, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mongolia, Mozambique, Namibia, Nepal, Niger, Nigeria, Norway, Pakistan, Paraguay, Philippines, Rwanda, Saint Lucia, Saint Kitts and Nevis, Senegal, Seychelles, Sierra Leone, Singapore, Sri Lanka, Sweden, Switzerland, Tajikistan, Thailand, Togo, Turks and Caicos Islands (UK), Uganda, United Kingdom of Great Britain and Northern Ireland, United Republic of Tanzania, United States of America, United States Virgin Islands (USA), Yemen, Zambia, Zimbabwe.

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From organizations and ISDR thematic platforms

Centro Internacional para la Investigación del Fenómeno de El Niño (CIIFEN)

Global Fire Monitoring Center (GFMC)

International Early Warning Programme (IEWP)

International Recovery Platform (IRP)

Thematic Cluster / Platform on Knowledge and Education

Working Group on Climate Change and Disaster Risk Reduction

Annex 6

Reporting on disaster risks and progress in disaster risk reduction. Outline 25 April, 2007

1. Reporting requirements of the Hyogo Framework for Action

Monitoring and reporting on progress is an essential feature of the Hyogo Framework. Responsibility for monitoring and reporting is assigned mainly to States (see para-graph 30), with specific requirements including the preparation of national baseline assessments, periodic summaries and reviews of progress, and reports on risk reduction progress in other policy frameworks (e.g. Millennium Development Goals), as well as contributing to regional assessments. States also agreed to develop procedures for reviewing progress against the Hyogo Framework and to develop or refine indicators for national level use.

Reporting responsibilities are also identified for regional organizations and institutions (paragraph 31), international organizations (paragraph 32) and the ISDR system partners and secretariat (paragraph 33). These include: the development of generic indicators of disaster risk and vulnerability at national and local scales for use by decision-makers; the assembly of statistics on disaster occurrence, impacts and losses, regional risks and long-term changes; the implementation of measures for regular assessment of progress; the collection of data and provision of forecasting on hazards, vulnerabilities and risks and disaster impacts; and the coordination of a process to develop generic, realistic and measurable indicators. The ISDR secretariat is also requested to develop a matrix of roles and initiatives; to identify gaps in implementation; and to prepare periodic reviews of progress, in context of the General Assembly and related processes.

2. Reporting process in 2007

The ISDR secretariat initiated the reporting process with a request issued on 26 January 2007 to the nationally-nominated focal points for the Hyogo Framework (and to the Permanent Missions to the United Nations in Geneva), accompanied by a guidance document "Guidelines for Reporting on Progress on the Implementation of the Hyogo Framework: Measuring Progress in Disaster Risk Reduction". This document provided background information, explanations of the rationale and benefits of reporting, and guidelines on the format of the report. Similar requests were also made to IATF/DR members, and to the leaders of the ISDR-associated thematic platforms. The requested format comprised three parts, as follows:

- Part A: Cover note to identify the reporting organization, its reporting responsibility and the scope of the reporting provided.
- Part B: Short overview of around three pages of the main features of progress toward implementing the Hyogo Framework, including the main achievements and the challenges faced, and the good practices and lessons learned. It was proposed that this be structured as follows:
 - i. Brief description highlighting national and regional context;
 - ii. Summary on impact of initiatives on people and economy: progress towards achieving the Hyogo Framework strategic goals and priority areas;
 - iii. Recommendations if any, and updates in terms of planning and project including in changes in policies, rules and regulations.
- Part C: Compilation of detailed information on specific initiatives on disaster risk reduction, structured on the five priority areas of the Hyogo Framework. A template was given to support a standard report format for each initiative, covering the initiative's objectives, main activities, results and achievements made, major challenges and lessons in implementing the initiative or programme, and lastly, the next steps planned. The document provided an example of a compilation of information.

It is intended that this reporting process should become an annual process in order to underpin a variety of reports to UN system bodies, in particular:

- i. The report on progress to the Global Platform for Disaster Risk Reduction (this year to be held over 5-7 June).
- ii. The Secretary-General reports on the ISDR and on other related topics to the General Assembly (usually prepared during July).
- iii. Other reports as required, for example to ECOSOC or by regional organizations.
- iv. Periodic in-depth global assessments of trends in disaster occurrence, disaster risk and progress in disaster risk reduction (see section 4 below).

The reports will be made available on the ISDR secretariat web site.

3. Report to the Global Platform for Disaster Risk Reduction, 5-7 June 2007

The timetable for this first period of reporting is very compressed, which has presented difficulties to the reporting agencies in responding to the requests for reporting and to the secretariat in summarising the available information in time for the 2007 Global Platform meeting. A draft report of about 50 pages will be made available in English in the week before the meeting. The feedback and inputs provided during the session will be incorporated into the report, which will be completed by mid July in time for directly informing the preparation of the relevant Secretary-General's reports to the General Assembly.

As of 25 April 2007, 42 states had provided national reports. Additional information is also available from other sources, including from previously collected information that has been already captured in the Matrix of Commitment and Initiatives (see section 6 below), and through enquiries conducted in late 2006 and early 2007 under certain regional projects. Of particular note is the initiation of processes to generate regionally aggregated reports for four regions, Africa, Asia, Latin America and the Caribbean, and Middle East-North Africa, which will provide a regionally informed foundation to the report to the Global Platform.

The report to the Global Platform will cover the period 2005-2006, with a view to updating on progress since the last major reporting exercise associated with the World Conference on Disaster Reduction, in January 2005. It will cover, firstly, recent trends and patterns in disasters and global disaster risk, mainly culled from recent global and regional reports such as those produced by partners of the Global Risk Identification Programme and by the IPCC Fourth Assessment Report, and secondly, the progress being made by countries and organizations to reduce the risks and to implement the Hyogo Framework. Because the information available covers a limited number of countries, the report necessarily will provide only a partial and hence indicative account of the progress being made.

A number of initial points can be identified to date. The first year of the period, 2005, immediately following the devastating Indian Ocean tsunami, saw a succession of major events including the earthquakes in Kashmir and Hurricane Katrina, while the following year was less extreme with relatively few major events. Nevertheless in 2006 there were 426 reported natural disasters that killed more than 23,000 people, affected 143 million others, and were the cause of more than US\$34.6 billion in economic damages. Asia remained the most affected continent, and floods and windstorms continued to be the two major causes of economic impact.⁶⁴

The evidence from the risk assessments indicates two broad global trends:

- i. The risk of catastrophic disasters in hotspots, where people and economic activities are intensively concentrated in areas exposed to large-scale hazard events. Events of this sort are well publicised and often result in significant responses, including moves to implement risk reduction measures in the countries concerned.

64 <http://www.em-dat.net/documents/CRED%20CRUNCH%208%20-%20March%2020071.pdf>

- ii. The risk of low-intensity asset loss and livelihood disruption, sometimes over extensive areas, where people and economic activities are exposed to localized hazard events, mainly climate-related. These events generally are not well publicised and typically do not lead to any major changes in policy or behaviour.

It is clear, however, that over 2005 and 2006, many governments and organizations have recognized the need to raise the priority of disaster risk reduction and are directly responding to the expectations and directions of the Hyogo Framework. Evidence of this may be seen in the following items.

- i. Official Hyogo Framework Focal Points have been established by 104 countries and 5 subsidiary territories.
- ii. National platforms for disaster reduction have been initiated in 36 countries.
- iii. Ministerial-level regional agreements and strategies have been agreed, or are being developed in several regions and sub-regions, (Africa, Asia, and the Pacific Islands).
- iv. Specific risk reduction strategies or initiatives have been developed by a number of international agencies, including the UNDP, World Bank, and WMO.
- v. The UN and ISDR partners have strengthened the ISDR system, with the support of governments, to actively and systematically promote and support the implementation of the Hyogo Framework.

4. Global Disaster Assessment Report

The Hyogo Framework calls on the ISDR partners and secretariat to prepare periodic reviews of progress and to identify gaps in implementation. In response, a long-term project, coordinated by the ISDR secretariat, has been established to prepare a major global stocktaking report on trends in disaster occurrence and risks and progress on disaster risk reduction, for release in early 2009. The global disaster assessment report (working title only) aims to be a landmark assessment based on thorough analysis of achievements and gaps, that will provide a foundation for future priorities and policy on disaster risk reduction, as well as an important advocacy tool at all levels.

The report will also provide an important stimulant to the assembly of statistics on disaster occurrence, impacts and losses, regional risks and long-term changes and to the collection of data and provision of forecasting on hazards, vulnerabilities and risks and disaster impacts; the need these activities being specifically identified in the Hyogo Framework.

This report will be developed as an integral part of the ongoing work on reporting by the ISDR system and ISDR secretariat. It will draw on the information routinely provided by Governments and ISDR system partners, and its analyses will progressively inform the ISDR annual reports and other reports. It will also make use of inputs from ISDR partners, regional and sub-regional organizations, consultant studies, and special data analyses. Its quality will be secured by peer reviews, ISDR consultation and guidance processes, and secretariat overview. A senior expert has been seconded from UNDP to lead the production of the report, and the project is also supported by the World Bank partnership with the ISDR secretariat.

5. Guidance on indicators

The Hyogo Framework requested the ISDR system, supported by the ISDR secretariat, to coordinate the development of "generic, realistic and measurable indicators" for disaster risk reduction. It encouraged States to thereafter develop and refine indicators for national use. Indicators, benchmarks and targets are commonly accepted tools to focus and guide development investments, the Millennium Development Goals being an important example. The effective development and application of indicators and benchmarks for disaster risk reduction will require collaborative and concerted effort by academics, practitioners and policymakers, with a strong focus on practicality and effectiveness in the particular national settings.

A guidance paper on indicators has been developed to respond to the Hyogo Framework request noted above, drawing on an online consultation held in 2005 and on consultant drafts and expert inputs, and will be published in mid 2007. The paper includes a proposed draft set of indicators to address the Hyogo Framework's stated outcome, strategic goals and priorities for action.

It is expected that a number of countries will actively explore the application of the indicators once they are published, with the support of UNDP and other ISDR system partners. The ISDR secretariat will also seek to foster follow-up activities, including workshops, to advance the development and use of indicators in national and international programming and reporting, along with associated practices such as benchmarking.

6. Matrix of commitments and initiatives

The Hyogo Framework calls upon the ISDR secretariat to develop a matrix of commitments and initiatives in support of follow-up to the Framework. Information for the matrix has been gathered principally for international and regional levels, and is structured with the aim to support planning, guidance and reporting on accomplishments and to assist in identifying gaps or overlapping commitments. The format of the matrix is aligned with the Framework's five priority areas of action. The reporting format referred to in section 2 above has the same common format, to enable reported information to be added to the matrix where relevant.

The matrix currently exists in a spreadsheet format on the ISDR website, together with initial emerging elements of analysis. However, to make the information more readily available and to facilitate its analysis, the ISDR secretariat is now working to convert the information into a structured form that will allow its conversion to a relational database and to make the database available on line via the web. The database is expected to be fully operational by the end of 2007.

7. Future challenges and priorities

Given that States have the primary responsibility for taking measures to reduce disaster risk, and for monitoring and reporting on their progress, the ISDR system and secretariat needs to focus on assisting national efforts towards these ends, in addition to the task of collating information for international purposes. It is desirable to give priority to the countries most in need, in terms of their vulnerability and lack of capacities, and to stimulate efforts toward building practicable and durable capacities for systematic monitoring and reporting, including underpinning data systems and methodologies.

Routine monitoring and reporting require considerable effort and resources over periods of years, particularly by States. Many governments are already concerned about the burden of monitoring and reporting for the numerous international conventions and agreements to which they are party. Current efforts to institute a systematic common reporting process, with an annual cycle of reporting requests and accessible electronic databases of information, will help to simplify and reduce the demands. Nevertheless, further continued study and dialogue will be needed to ensure cost-effectiveness and sustainability of reporting at national, regional and international levels.

Regional and sub-regional organizations are identified in the Hyogo Framework as important elements of monitoring and reporting processes, but to date this role has not been well developed. Systematic dialogue and engagement will be needed to clarify and strengthen the role and operational responsibilities of regional and sub-regional organizations in the reporting processes. Similarly, the supporting role of ISDR system partners remains to be developed.

While it makes sense to start the operational reporting process in a modest way and to develop the capabilities of all parties as experience allows, it is clear that the progress on reporting is less than satisfactory. More concerted efforts are needed to make reporting an intrinsic and effective part of risk reduction policy and practice. Among other things, there appears to have been little progress toward meeting the Hyogo Framework's call for national

baseline assessments, periodic summaries and reviews of progress, reports on risk reduction progress in other policy frameworks (e.g. Millennium Development Goals (MDG)), procedures for reviewing progress and to develop or refine indicators at national level, or to undertake regional assessments.

The ISDR secretariat will continue to seek close linkages between the reporting activities and other ISDR system activities, including the development of guidance materials for the implementation of the Hyogo Framework, the development of the matrix of commitments and initiatives, and the building of the ISDR information portal "PreventionWeb". It will also work toward developing more specific guidance, for example on the practical implementation of indicators, on systematic monitoring and reporting methods, and on ensuring disaster risk reduction inputs to other reporting processes, such as for the MDGs and climate change.



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