Disaster Risk Reduction

Global Review 2007

United Nations

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Geneva, Switzerland

Representations of the universe as a series of concentric circles are common across many cultures. The 'endless circle' represented in the spiral here, is a symbol of the expanding universe – understood by the cycle of repetition and renewal.

The colors represent nature's elements and along with the spiral, emphasise the need for cosmic unity between human activity and processes of natural renewal.

Rajasthan, c. 18th century, ink and colour on paper.

Acknowledgements

The Disaster Risk Reduction: 2007 Global Review was prepared for release at the First Session of the Global Platform for Disaster Risk Reduction held in Geneva on 5-7 June, 2007[1]. The Review has been made possible due to extensive contributions received from International Strategy for Disaster Reduction (ISDR) partners across the world. In particular, these contributions have informed the analysis of trends presented in chapters 2 and 3.

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's Global Risk Identification Programme – particularly, the United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), the World Bank, the Inter-American Development Bank (IDB), Centre for Research on the Epidemiology of Disasters (CRED) and ISDR secretariat[2]. The Review also draws upon the findings of recent global reports on climate change[3]. This chapter was peer reviewed by experts involved in producing those reports, including Omar Darío Cardona Arboleda, Caroline Clarke, Uwe Deichmann, Maxx Dilley, Debarati Guha-Sapir, Kari Juhani Keipi, Allan Lavell, Pascal Peduzzi, Mark Pelling, Carlos Villacis, Ben Wisner as well as by staff members of the ISDR secretariat.

Chapter 3 (Progress in reducing disaster risk) derives its analysis from reports of progress in implementing the Hyogo Framework, recently submitted by Member States[4]. This chapter also draws 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 and the Pacific, Latin America and the Caribbean, and Europe. The country and regional reports submitted, and reviewed for this publication, are listed in Annex 4. A number of ISDR System-wide thematic platforms also submitted progress reports[5]. All reports are available on the ISDR website at the following link: PreventionWeb: www.preventionweb.net/hfareports.

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1 First Session of the Global Platform for Disaster Risk Reduction: http://www.preventionweb.net/globalplatform/

2 UNDP, (2004), Reducing Disaster Risk: a Challenge for Development; World Bank, (2005), Natural Disaster Hotspots: a Global Risk 3 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, UN/ISDR, (2004), Living with Risk: A global review of disaster reduction initiatives.

3 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.

4 63 member states responded to an ISDR request for progress reports on implementation of the Hyogo Framework, in January 2007. Additional country information was made available for this review from other sources, including regional meetings in Nairobi and Cairo in late 2006 and early 2007 respectively.

5 Refer to Annex 5 (List of Reports Received) for a list of contributions received from thematic platforms.

Preface

In January 2005, 168 countries approved the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA)*[6] 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) System[7] as an international mechanism to support the implementation of the above-mentioned Hyogo Framework for Action (also called 'Hyogo Framework').

Reporting on progress is an essential feature of the Hyogo Framework. Responsibility for monitoring and reporting is assigned mainly to states, and includes the preparation of national baseline assessments, periodic summaries, reviews of progress, and reports on risk reduction progress in other policy frameworks such as the Millennium Development Goals (MDGs)[8] and the Johannesburg Plan of Implementation for Sustainable Development. Reporting responsibilities are also identified for regional organizations, financial institutions and international organizations.

The Hyogo Framework calls on ISDR partners and the secretariat to prepare periodic reviews of progress and to identify gaps and challenges in implementation. In this context, the ISDR secretariat will coordinate the preparation of biennial global assessment reports – of which the first is to be launched by the UN Secretary-General in 2009. Biennial global assessment reports on disaster risk reduction will be based on a global risk update and an analysis of national and international progress made in addressing disaster risks. The biennial global assessment reports are intended to provide a strong foundation for profiling future priorities and policy on disaster risk reduction, while serving as an important advocacy tool at all levels.

It is expected that the ISDR System's first biennial report of 2009 will focus world attention on the costs of disaster risk, and measures taken so far to address vulnerability contexts. It will analyse the mutual impacts between disaster risk and human development with particular attention to how changing climate and disaster risk trends interact with migration flows, urbanization patterns, land-use planning, poverty trends and changing livelihood options. In doing so, the biennial global assessment report will galvanize additional political and economic support and commitment to disaster risk reduction.

The present 2007 Global Review provides a preview of some of the elements that will be assessed through the 2009 global assessment report. It begins with an initial characterization of global disaster risk trends, based on an interpretation of reports already published by partners of the Global Risk Identification Programme (GRIP). It proceeds with reviewing country progress in reducing disaster risks. The Review is based on an analysis of reports submitted by a number of countries in 2007, on progress with implementing the Hyogo Framework.

The 2007 Global Review concludes with a number of key issues and challenges that should be addressed as a priority by the ISDR System, if disaster risks are to be reduced within the context of achieving sustainable human development goals.

A consultative version of this Global Review was presented to the June 2007 First Session of the Global Platform for Disaster Risk Reduction as a preliminary draft and has been finalized following comments and the receipt of additional reports. Improved reporting and analysis by all ISDR System partners over the coming biennium will help prepare the upcoming 2009 global assessment report.

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

[7] 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.

[8] Millennium Development Goals: http://www.un.org/millenniumgoals/

Executive Summary

The Disaster Risk Reduction: 2007 Global Review contrasts and compares contemporary trends and patterns in disaster risk with the progress being made by countries in implementing the priorities for action outlined by the Hyogo Framework. In particular, the Review identifies scenarios of intensive risk (where concentrations of people and economic activities are likely to experience catastrophic disaster impacts from large-scale hazard events) and scenarios of extensive risk (where more dispersed populations are likely to experience highly localised, low intensity but cumulative disaster impacts from small-scale, mainly climatic hazards). The Review examines whether current progress in implementing the Hyogo Framework will reduce mortality and economic loss risk in the face of earthquake and climatic hazard in intensive risk and extensive risk scenarios.

A substantial and growing proportion of future disaster mortality will occur in large-scale catastrophes in areas of intensive earthquake risk if current trends in both disaster risk and its reduction continue. Both hazard exposure and relative vulnerability are higher in low and middle income countries that experience rapid urban growth, while earthquake risk is only partially susceptible to a reduction through improvements in early warning, preparedness and response – areas in which most progress is being made.

Conversely, in areas of intensive climate risk, mortality is being reduced through a combination of better development conditions and improvements in early warning, preparedness and response. Mortality is already very low in developed countries and is rapidly reducing in many developing countries. However, an increasing proportion of future disaster-related economic loss is likely to occur in climatic risk hotspots. There is an increasing concentration of economic assets exposed to climatic hazard, while improved early warning, preparedness and response has little impact on asset loss.

While extensive risk would appear to not contribute significantly to either global disaster mortality or economic loss, it is increasing rapidly and poses a considerable threat to the livelihoods of poor rural and marginal urban communities. Current progress in local-level disaster preparedness can potentially reduce the mortality associated with extensive risk. But it still represents a significant challenge to the achievement of sustainable livelihoods and human development goals such as the MDGs, in less developed and developing countries.

While disaster risk is driven by processes such as rapid urbanisation, social inequality and environmental degradation, global climate change is already modifying patterns of climate hazard and vulnerability. In intensive risk scenarios, climate change may stall and even reverse the trend towards reducing mortality and perhaps accentuate economic loss risk. Global climate change will particularly ratchet up current patterns of extensive risk, threatening livelihoods and stretching coping capacities to the limit. The rural and urban poor that experience extensive risk are particularly sensitive and susceptible to the impacts of global climate change and in many ways are on the "front line", where even small changes can have devastating consequences.

The Review concludes that a radical realignment of priorities in implementing the Hyogo Framework will be required if these trends are to be addressed adequately by the ISDR System.

To address extensive risk requires a new vision by the international disaster risk reduction community. The current emphasis on saving lives needs to be complemented by a vision of protecting and strengthening livelihoods and human development. Addressing localised, recurrent exposure to risk is the most effective way of protecting the livelihoods of vulnerable communities and of realistically achieving the MDGs.

Alongside efforts to strengthen preparedness and response, local disaster risk reduction strategies should address underlying risk factors, through measures such as livelihood diversification and protection, environmental management, adaptation to local climate change impacts, safe building and risk sensitive planning. Such measures require local involvement and ownership, as well as public and private investment.

Further, securing basic resources to sustain risk reduction efforts at both the national and local level are necessary. A challenge identified by the Review is that while political momentum may exist to create new institutional systems and legislation for reducing risks, the lack of dedicated resources from national budgets and of trained personnel to implement plans, may inhibit the operation of existing systems. In addition, the Review identifies the importance of applying gender equity and human security approaches to securing the above gains in a sustainable manner.

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Chapter 1

Introduction

1.1 Context

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[9]. However, these catastrophes were only the most visible manifestations of the ongoing unfolding of disaster risk.

Changes in disaster risk are influenced by underlying development factors such as urbanization, coupled with migration and increasing population densities, environmental change, globalization and poverty trends. Simultaneously, evidence continues to mount that global climate change is already modifying patterns of climatic hazards such as cyclone, drought and flood, with drastic implications on unfolding disaster risk.

The report on the economics of climate change produced by Nicholas Stern[10] in 2007, recent evidence presented by the Intergovernmental Panel on Climate Change (IPCC)[11], the United Nations Security Council's first ever debate on the impact of climate change on peace and human security, the G-8 summit of June 2007 which recognized inextricable links between poverty reduction and climate risks, and the upcoming 2007 Human Development Report on "Environment, Energy and Climate Change" 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 January 2005 Second World Conference on Disaster Reduction (WCDR II)[12] held in Kobe, Japan, a few weeks after the Indian Ocean tsunami, created a strong political impetus. 168 Member States adopted the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA). It calls for the pursuit of three strategic goals for the substantial reduction of disaster losses in lives and impacts on the social, economic and environmental assets of communities and countries within the next 10 years, in conformity with the MDGs.

In view of the increasing political momentum, measures have been designed to build on existing mechanisms to strengthen the ISDR as a system of partnerships composed of Governments, the United Nations System, intergovernmental and non-governmental organizations (NGOs), international financial institutions, scientific and technical bodies, civil society and the private sector, to implement the Hyogo Framework.

Since 2005, many countries and organizations have already realigned their policies and strategies to directly respond to the expectations and directions of the Hyogo Framework. For example: Hyogo Framework focal points have been established in 111 Member States and five territories; national platforms for disaster reduction have been initiated in 39 countries[13]; ministerial-level regional agreements and strategies have been agreed, or are being developed in many regions and sub-regions, and specific risk reduction strategies or initiatives have been developed by international agencies, including the UNDP, World Bank, International Federation of Red Cross and Red Crescent Societies (IFRC) and World Meteorological Organization (WMO). International commitment of

[9] EM-DAT (Emergency Events Database): The OFDA/CRED (USAID Office for Foreign Disaster Assistance/ Centre for Research on the Epidemiology of Disasters) International Disaster Database - www.em-dat.net - Centre for Research on the Epidemiology of Disasters, Catholic University of Louvain, Brussels, Belgium

[10] Nicholas Stern, (2006), "The Economics of Climate Change", The Stern Review.

[11] Intergovernmental Panel on Climate Change (IPCC), 4th Assessment Report, (2007). http://www.ipcc.ch/

[12] World Conference on Disaster Reduction, 2005: http://www.unisdr.org/wcdr/

[13] Until July 2007, 39 national platforms for disaster risk reduction have been registered with the ISDR secretariat: Botswana, Bulgaria, Burkina Faso, Burundi, Chad, China, Colombia, Comoros, Congo, Costa Rica, Czech Republic, Djibouti, Ecuador, France, Gabon, Germany, Ghana, Hungary, Iran, Japan, Kenya , Madagascar, Mali, Nicaragua, Niger, Nigeria, Panama, the Philippines, Russian Federation, Senegal, Seychelles, Spain, Switzerland, United Republic of Tanzania, Togo, Uganda, United States of America, Venezuela, Zambia. For further information on national platforms, see: http://www.unisdr.org/guidelines-np-eng

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development institutions is exemplified by the launch of the Global Facility for Disaster Reduction and Recovery (GFDRR)[14] by the World Bank in 2006.

The ISDR System aims to identify clear roles and responsibilities, and improve interaction among the various entities of the strengthened system. The Global Platform for Disaster Risk Reduction, which met 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 experiences in risk reduction practices, advocacy, reporting progress, and 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 "good practices" to ensure effective support to countries and regions. The ISDR secretariat will service the ISDR System in areas of policy coordination, advocacy, knowledge and information exchange, and joint work planning.

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 Review*. This short review provides an indicative statement on current trends and patterns in global disaster risk and on the progress being made by countries to reduce risk. It is meant to provide a bridge between the deliberations of WCDR II and the launch of the ISDR System's first biennial global assessment report on disaster risk reduction in 2009.

The 2007 Global Review contains two principal sections. The first section – through Chapter 2, presents an interpretation of contemporary patterns and trends in global disaster risk derived from analysis of data and information in recent global and regional reports[15] produced by partners of the Global

[14] For more information on the Global Facility for Disaster Reduction and Recovery: http://www.worldbank.org/hazards/gfdrr
[15] UNDP, World Bank, IDB, CRED, UNEP/GRID-Europe; UN/ISDR, op. cit.

Risk Identification Programme (GRIP)[16] and from previous reviews and analyses[17]. A number of broad risk scenarios are identified and discussed, including:

- The risk of catastrophic disasters in intensive risk hotspots, where people and economic activities are heavily concentrated in areas exposed to occasional or frequent large-scale climatic[18] and geological hazard events with chronic/pervasive impacts; and

- The risk of low-intensity asset loss and livelihood disruption over extensive areas, where people and economic activities are exposed to episodic and highly localized, principally climatic hazard events.

While recognizing the importance of environmental degradation, urbanization patterns, poverty spirals, increasing population densities and economic globalization as key 'drivers' of disaster risk, the section goes on to examine some of the implications of global climate change on disaster risk, drawing upon the findings of recent international reports.[19] The review also briefly draws attention to potential impacts of such emerging risk trends on human well-being, and poverty indicators as determined by the MDGs. The 2009 biennial global assessment report will examine this disaster-poverty interface in more detail, with a particular emphasis on changing livelihood options that many vulnerable communities across the world will have to cope with over the next decade.

The second section – through Chapter 3, presents evidence of global risk reduction trends and national and regional progress on reducing disaster risk. It is an analysis based on reports of progress in implementing the Hyogo Framework prepared by Member States[20] and on recent regional reviews carried out by the ISDR secretariat in cooperation with the World Bank and regional partners in the Pacific, Africa, Latin America and the Caribbean, Asia, Europe and Middle East and North Africa[21]. This section examines the key areas of focus in reducing risks as reported by national authorities. The trends captured, point us to interesting conclusions about where progress still needs to be made in contribution to the strategic goals of the Hyogo Framework.

Chapter 4 – as the concluding chapter, summarises each of the broad disaster risk scenarios identified and characterized in the previous chapters, complemented by analysis of national progress made in HFA implementation, and challenges encountered in the process. The conclusion also provides additional analysis on some key cross-cutting themes which were not explicitly reported by national authorities. Such themes include gender, capacity development, mainstreaming risk reduction, human security and a social equity approach in post-disaster recovery — framed within the context of achieving the MDGs. In particular, the imperative to address disaster risks in relation to livelihood strategies and poverty trends is presented as an important point for further analysis and implementation in risk reduction strategies.

[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] In the context of this Review, the terms 'climatic' and 'geological' have been used to denominate two broad categories of hazard and are not meant to represent strict scientific categories. All weather-related events such as floods, cyclones, storms, wild-fires, etc., have been grouped as 'climatic' hazard, together with drought, which is a climatic phenomenon. Earthquakes, tsunamis and volcanic eruptions have similarly been grouped as 'geological'. Landslides, avalanches, mudslides, etc., are often associated with a mix of geological and weather-related factors, but for the purposes of this report have been included within 'climatic' hazards.

[19] Nicholas Stern, op. cit.

[20] See Annex 5 (List of Reports Received) for list of country reports

[21] SOPAC; UN/ISDR Africa Regional Unit, World Bank; UN/ISDR Latin America and Caribbean; UN/ISDR, ADPC, ADRC; UN/ISDR, DKKV; UN/ISDR, World Bank, op. cit.

1.2 Methodological Challenges and Gaps

It is important to state from the outset that the first section of the Review contains an interpretation of global disaster risk trends which is indicative rather than comprehensive. The Review focuses only on observable trends and patterns from already published reports; it does not offer new data on hazards, vulnerabilities and emerging risks, or necessarily reflect the large number of risk identification studies and projects carried out by ISDR System partners at regional, national and local levels. Given the global scale of the analysis, it does not provide guidance on the characteristics of disaster risk in specific countries, localities or sectors.

The second section of the review specifically analyses the progress reported by national authorities across countries. Due to time constraints, a system-wide reporting mechanism on progress made in reducing disaster risk could not be organized. To which extent, the Review does not fully reflect the considerable efforts or different perspectives of other ISDR System partners, especially NGOs, academic institutions, and regional and local bodies, except where these are reported by national authorities. Insights into progress made on key 'cross-cutting' issues, such as gender equity, social justice and governance are highlighted where these have been mentioned in national reports. Overall, such issues are however not prominently featured in the national reporting. Similarly, while the Review notes the conclusions of thematic reports submitted on early warning, El Niño, climate change, wildland fire, recovery and knowledge and education by six ISDR System partners[22], it does not overview global progress in any of these themes.

These methodological limitations can be viewed as an opportunity for honest reflection. The Review provides key insights into how disaster risk reduction is currently conceived and practiced by national authorities undertaking implementation of the Hyogo Framework's priorities. Understanding the current status of national disaster reduction practice is an essential preliminary to realigning system-wide efforts to achieve the Hyogo Framework strategic goals.

In acknowledging the reporting challenges and gaps encountered by this review process, upcoming biennial global assessment reports will systematize reporting on Hyogo Framework outcomes with a view to providing sound coverage of national, regional and global realities on progress made with reducing disaster risks by ISDR System-wide partners.

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[22] See Annex 5 (List of Reports Received)

Chapter 2

Global Disaster Risk:
An Interpretation of Contemporary Trends and Patterns

2.1 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, drought[23] and landslides; through the frequency and magnitude of hazard events[24] and through the vulnerability of communities and economies, understood in terms of lack of capacity to absorb and recover from hazard impacts. Risk becomes manifest when disasters occur but often is invisible to those taking development decisions at all levels. Risk identification and analysis can therefore be described as a process of making the invisible more visible. Only when risk has been visualized can it be addressed.

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

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. Identifying global risk patterns increases understanding of how underlying processes such as climate change, environmental degradation, urbanization and socio-economic development configure disaster risk and vulnerability over time and space. These processes are fundamentally global in character and require a coordinated international commitment.

Risk identification at the global level, will provide key information for the ISDR System. To justify sufficient 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 impacts effectively, the linkages between development processes, such as urbanization and environmental change, and risk trends and patterns, must be revealed and understood in addition to 'invisible' risk factors such as gender bias, social inequity, socio-political conflict and poor governance. In other words, if the ISDR System is to contribute to reducing disaster risk and not just respond to its manifestations, then it is essential to identify, understand and visualize the nature of risk.

This chapter interprets past reports and studies produced by UNDP, UNEP, the World Bank, IDB and Centre for Research on the Epidemiology of Disasters (CRED)[25] to profile contemporary trends and patterns in global disaster risk. The interpretation provides a baseline of current knowledge on global disaster risk against which progress in reducing risk can be examined. These reports have made crucial progress in identifying patterns of global hazards, the exposure of people and economic activities and initial profiles of vulnerability and risk. In addition, links between development and disaster risk, such as between rapid urbanization and earthquake risk, have been established.

At the same time, it is clear that more progress has been made in identifying and measuring global patterns of natural hazard and exposure than in highlighting those factors that contribute to social, economic, political, cultural and other kinds of vulnerability. For example, global data on disaster loss and on disaster risk is not disaggregated in a way that facilitates an analysis of the different socio-economic implications disaster risk has on women and men, on the young and old, or on other most vulnerable sections of societies across different risk scenarios.

[23] Since drought has a strong food insecurity component, in some analysis it is differentiated from other climatic hazards.
[24] See Annex 1 (Technical Annex): Note 1 – Hazard.
[25] UNDP, UNEP, World Bank, IDB, CRED, op. cit.

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Taking into account the limitations posed by existing global knowledge, this Review examines two kinds of hotspots:

1. Intensive disaster risk, where people and economic activities are heavily concentrated in areas exposed to occasional or frequent hazard events with chronic impacts; and
2. Regions of extensive disaster risk, where people are exposed to highly localized hazard events of low intensity, but with frequent asset loss and livelihood disruption over extensive areas.

In both kinds of hotspots, the review contrasts the risk associated with climatic and geological hazards - with respect to both mortality and economic loss.

The concepts and definitions used, based broadly on standard definitions used by the ISDR[26], are explained to make the analysis accessible to readers non-conversant with the technical use of such terminology. A set of technical notes, contained in Annex 1, provide greater detail on definitions, as well as on the technical and methodological aspects of the evidence presented.

[26] 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).

2.2 Intensive Disaster Risk Hotspots

Intensive risk

Intensive disaster risk describes a scenario where significant concentrations of people and economic activities are exposed to severe, large-scale hazards, with major impacts in terms of mortality and economic loss.

Realized disaster risk[27] is heavily concentrated in a number of intensive risk hotspots, at least in terms of mortality. Between 1975 and 2005, the total number of disaster deaths recorded by the CRED EM-DAT[28] database was more than 2,300,000. However, as Table 1 indicates, 82 per cent of these occurred in only 21 large disasters with over 10,000 deaths each. Of these, 450,000 deaths occurred in the 1983 famine in Africa and 138,866 due to tropical cyclone Gorky in Bangladesh in 1991. More recently, of the 89,916 deaths recorded in EM- DAT in 2005, 73,338 corresponded to the Kashmir earthquake. Of the 241,400 deaths EM-DAT recorded in 2004, 226,408 corresponded to the Indian Ocean tsunami. Most disaster mortality therefore is concentrated in a very small number of major disasters.

Table 1
Largest disasters 1975-2005 (>10,000 killed)

Year	Hazard	Country	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 (Islamic 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 (Islamic Rep.)	26,796
2003	Heat wave	France, Italy	34,947
2004	Tsunami	Indian Ocean	226,408
2005	Earthquake	Pakistan	73,338

Data Source: EM-DAT OFDA/CRED International Disaster Database

[27] See Annex 1 (Technical Annex): Note 3 – Disaster Risk.
[28] The EM-DAT (Emergency Events Database) is maintained by CRED (Centre for Research on the Epidemiology of Disasters), 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 Annex 1 (Technical Annex): Note 2 - EM-DAT Disaster Database.

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In terms of economic loss, realized risk is slightly less concentrated. Table 2 indicates that 38.5 per cent of total economic losses between 1975 and 2006 were concentrated in 21 disasters that each caused more than USD 10 billion of damage.

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

Year	Hazard	Country affected	Total damages in million USD
2005	Hurricane	United States	125
1995	Earthquake	Japan	100
1998	Flood	China (People's Rep.)	30
2004	Earthquake	Japan	28
1992	Hurricane	United States	26.5
1980	Earthquake	Italy	20
2004	Hurricane	United States	18
1997	Wild Fires	Indonesia	17
1994	Earthquake	United States	16.5
2004	Hurricane	United States	16
2005	Hurricane	United States	16
1995	Flood	Korea D.P.R.	15
2005	Hurricane	United States	14.3
1999	Earthquake	Taiwan (China)	14.1
1988	Earthquake	Soviet Union	14
1994	Drought	China	13.8
1991	Flood	China	13.6
1996	Flood	China	12.6
1993	Flood	United States	12
2002	Flood	Germany	11.7
2004	Hurricane	United States	11

Data source: EM-DAT OFDA/CRED International Disaster Database

Hazard exposure

Intensive risk hotspots occur because hazard exposure 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 exposure or physical exposure is used to measure this concentration by combining the level of a hazard's frequency and potential severity in a location, with the number of people and assets including infrastructure and economy exposed. Processes such as urbanization, growing population density and unregulated economic activities can play a key role in concentrating exposure in certain hazard-prone areas. Through other processes such as environmental degradation and land-use change, development can also increase the severity of hazard itself, particularly climatic hazards. Development activities, therefore, are a key driver of patterns of hazard exposure, and unfolding risk.

According to UNEP's Global Resource Information Database (GRID) Europe and UNDP[29], 118 million people are exposed annually to earthquakes (magnitude higher than 5.5 on Richter Scale), 343.6 million people are exposed annually to tropical cyclones, 521 million are exposed annually to floods while 130 million people are exposed to meteorological drought[30]. Additional analysis by UNEP/GRID and the Norwegian Geotechnical Institute has shown that 2.3 million people are exposed to landslides every year mostly in Asia and the Pacific (1.4 million) and Latin America and the Caribbean (351,600)[31].

Vulnerability

Hazard exposure goes a long way in explaining why disaster risk is concentrated in intensive risk hotspots but by itself it is not enough. Disaster risk is also a function of the vulnerability[32] of whatever is exposed.

Vulnerability can be broadly defined as a measure of the capacity to absorb the impact and recovery from a hazard event and is conditioned by a range of physical, social, economic and environmental factors or processes. Like hazard exposure, development activities influence patterns of vulnerability in a society and modify those conditions over time, making different social and economic sectors in a society more or less able to resist and recover from hazard events.

Human vulnerability (used here to describe people's vulnerability to hazard as opposed to the vulnerability of physical elements such as buildings/ infrastructure or the vulnerability of an economy) is often characterized by precarious settlements located in fragile ecosystems, structurally unsafe buildings and uncertain livelihood options.

One way of measuring human vulnerability[33] is that, for a given level of hazard exposure, countries experience very different levels of mortality. Mortality for a given level of hazard exposure over a given period of time can be described, from one perspective, as a measure of relative mortality risk. However, it can also be viewed as a proxy value for all the physical, social, environmental, economic, political and cultural vulnerability factors that increase or decrease the probability of mortality. For example, improved disaster preparedness systems and emergency health facilities or improved building standards may reduce mortality. Other factors, such as the occupation of extremely hazard-prone locations by socially and economically excluded populations, environmental degradation that alters the strength, frequency, extent and predictability of hazard events and chronic poverty trends, are factors that may increase mortality.

Clearly, mortality is one possible outcome of vulnerability. Other outcomes include injury, loss of livelihood, long-term health problems and psycho-social ailments, the partial or total displacement of communities, and the deterioration of living conditions, social services and the environment, which, for some hazard scenarios, may be far more significant

[29] See Annex 1 (Technical Annex): Note 4 - Hazard Exposure.

[30] 'Meteorological drought' refers to a significant deficit in rainfall over an extended period, e.g. three months with less than 50 per cent of the usual precipitations. Meteorological drought may lead to agricultural drought, where crops and harvests are negatively affected. However, lack of precipitation may be offset by irrigation, use of ground water and by water storage in many cases. Similarly, agricultural drought does not necessarily lead to mortality and other human impacts, given that it can be offset by food imports, stockpiles and other measures.

[31] Nadim, F. O. Kjekstad, P. Peduzzi, C. Herold and C. Jaedicke, (2006), Global Landslides and Avalanches Hotspots, Landslides.

[32] See Annex 1 (Technical Annex): Note 5 – Vulnerability.

[33] See Annex 1 (Technical Annex): Note 6 – Disaster Risk Index.

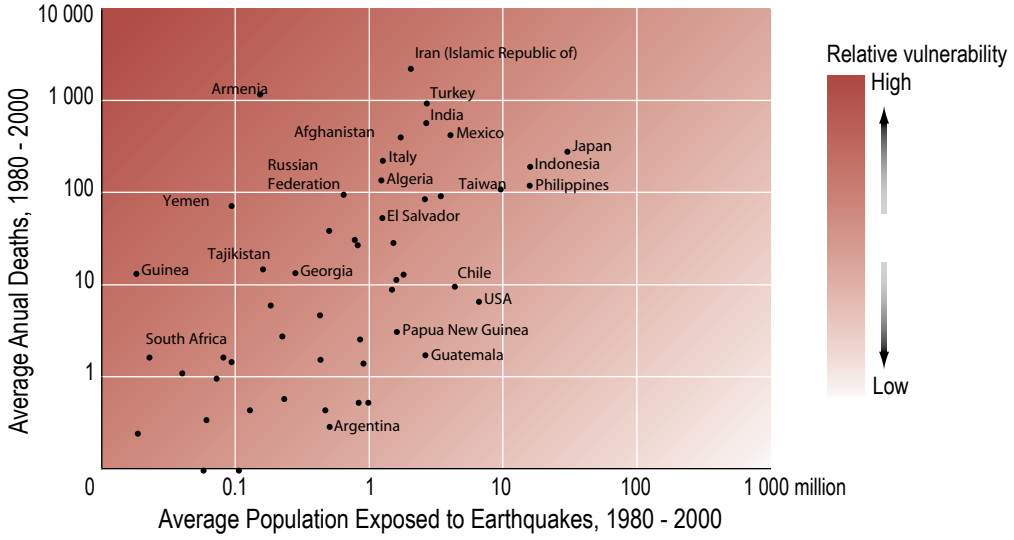
than mortality. For example, frequent floods may cause low mortality but a very extensive disruption of livelihoods and infrastructure. Unfortunately, data availability constraints do not currently allow the analysis of human vulnerability using disaster-related outcomes other than mortality.

Figure 1 shows a distribution of relative human vulnerability for earthquakes, expressed in terms of realized mortality from 1980-2000 for populations exposed to earthquakes. Countries on the top left of the figure are more vulnerable relative to those on the bottom right. It is important to highlight this difference when interpreting the figure. Below the trend line, countries like Japan and the United States of America may have high levels of hazard exposure but low levels of vulnerability relative to that exposure. In contrast, a country like Yemen has a high level of vulnerability relative to its level of hazard exposure. From this perspective, there are very wide variations in relative vulnerability between countries. In the case of earthquakes[34], the number of people killed per million exposed each year in the Islamic Republic of Iran (1,074) is over 1,000 times greater than that of the United States of America (0.97) and 100 times greater than that of Japan (9), even though exposure is greater in the latter two countries. That implies very wide variations in mortality for similar levels of hazard exposure that can only be explained in terms of differential contexts of vulnerability. 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. At the same time, risk increases along the trend line from bottom left to top right illustrated by countries such as the Islamic Republic of Iran, which combine high relative vulnerability with large numbers of people exposed.

Figure 1

Relative Vulnerability to Earthquakes

This graph shows the vulnerability of national population for earthquakes. On the x-axis, the number of population yearly exposed (in average) to earthquakes while the y-axis, shows the average number of deaths as recorded in EM-DAT. The ratio killed / exposed provides a proxy for vulnerability, e.g. Iran is 1000 times more vulnerable than the USA.



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

[34] Taking into account the methodological limitations of the DRI explained in Annex 1 (Technical Annex): Note 6.

In the case of tropical cyclones (Figure 2), the relative vulnerability of the United States of America (2.49) is more than 15 times greater than that of Cuba (0.16). This result was also 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. Similarly, Figure 3 shows that the relative vulnerability of Haiti is far greater than that of the Dominican Republic, even though both countries share the same island and have similar numbers of exposed population.

Risk

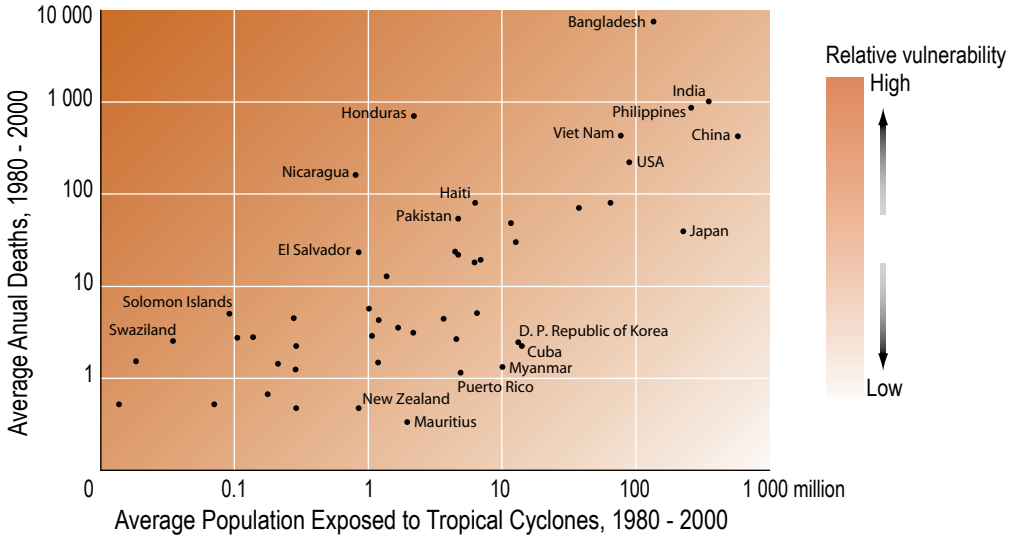
Unless existing risk levels are drastically reduced, it is likely that in the future, large-scale catastrophes involving significant mortality, economic loss and other outcomes will occur in intensive risk hotspots, where high relative vulnerability is combined with major concentrations of hazard exposure. The level of disaster risk in these intensive risk hotspots has been calculated for earthquake, flood, tropical cyclone, drought and landslide and for multiple hazards, by multiplying hazard exposure with a vulnerability indicator[35]. Disaster risk has been calculated in terms of mortality, total economic loss and economic loss as a proportion of Gross Domestic Product (GDP) density.

Mortality and economic loss hotspots for earthquakes (Figures 4) 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

Figure 2

Relative Vulnerability to Tropical Cyclones

Same representation as in Figure 2, this plate shows vulnerability to tropical cyclones. Yearly average exposed population is on the x-axis, average recorded killed on the y-axis. Once comparing the killed per exposed, Cuba is 12.5 times less vulnerable than the USA.



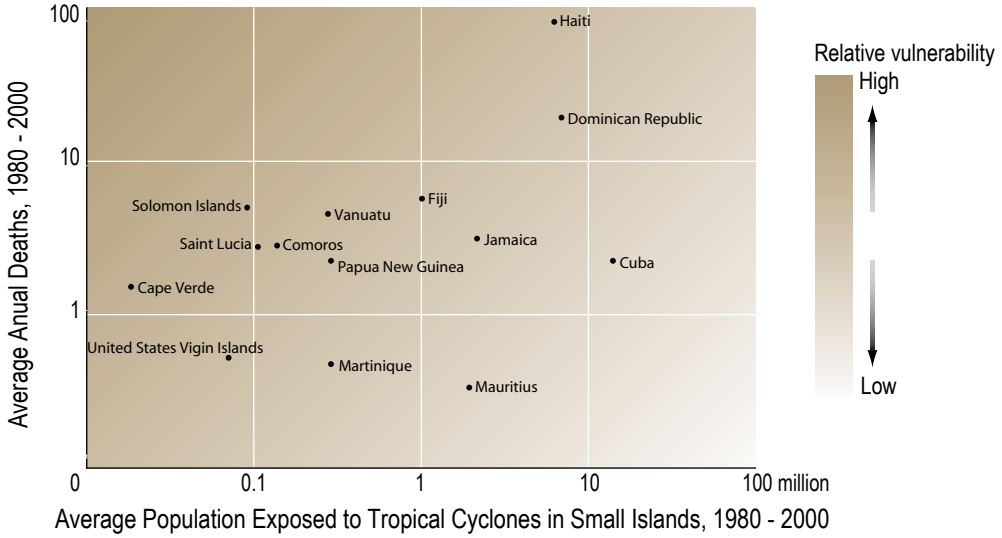
Source: Reducing Disaster Risk, UNDP 2004
Data on exposure: UNEP/GRID-Europe,
Data on mortality, EM-DAT OFDA/CRED International Disaster Database

[35] See Annex 1 (Technical Annex): Note 7 – Disaster Risk Hotspots.

Figure 3

Relative Vulnerability to Tropical Cyclones in Small Islands

This is a zoom in from Figure 2 with a special focus on small island developing states (SIDS). Haiti and the Dominican Republic are located on the same island and quite logically have a similar exposure to tropical cyclones. However, Haiti suffers on average 4.6 more deaths per person exposed than the Dominican Republic.



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

level of hazard. Cities concentrate a substantial proportion of a country's gross domestic product (GDP), implying that the indirect economic loss would be national in character. In the case of some mega-cities, for example Tokyo, the impact in economic terms would be global. In the case of earthquakes, both economic loss and mortality hotspots are heavily concentrated in rapidly urbanizing developing countries.

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.

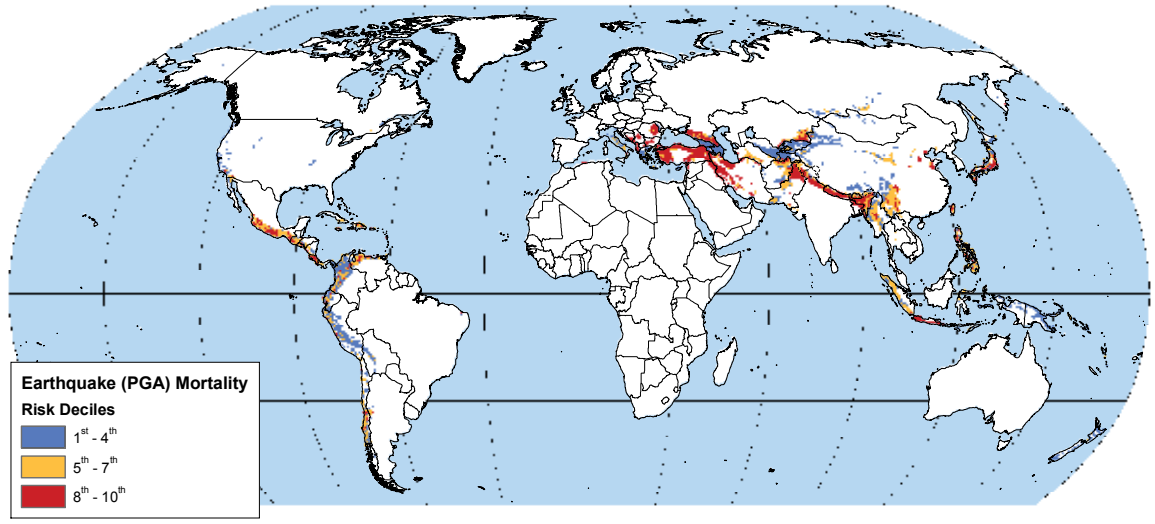
Flood mortality hotspots are concentrated in major river basins in South and East Asia as well as in Latin America. As in the case of cyclones, economic loss hotspots include areas of Europe and the eastern United States of America, with relatively low mortality risk.

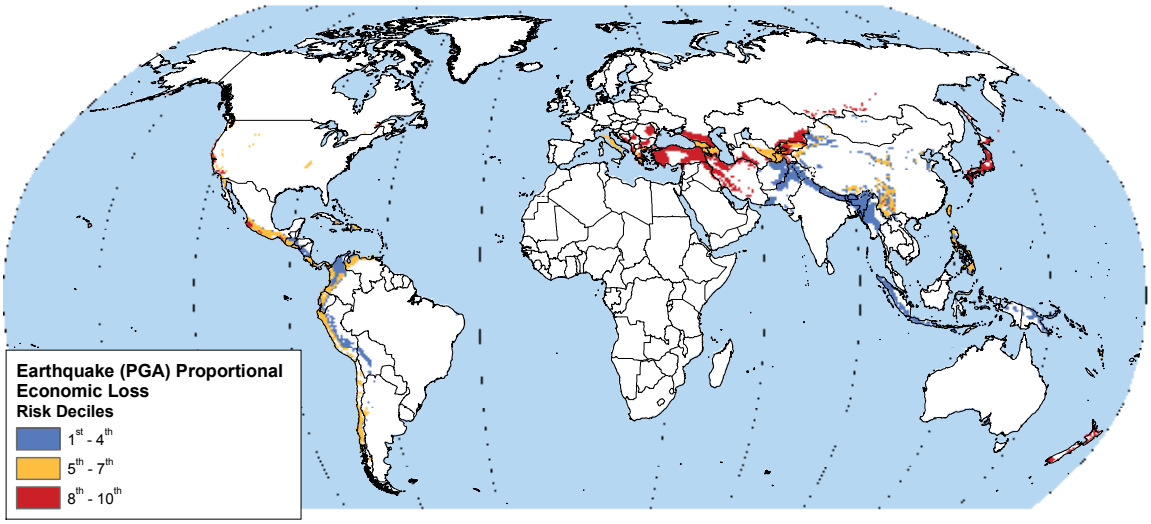
Drought mortality hotspots (Figures 5) are concentrated exclusively in sub-Saharan Africa. Economic loss hotspots for drought, in contrast, are located in more developed regions, for example in southern Europe and the Middle East, Mexico, north-east Brazil and north-east China.

Figure 4

Mortality, economic and proportional economic loss from earthquakes

These maps show distribution of mortality and economic risk for earthquakes. This visualization shows a broadly similar distribution of mortality and economic loss risk for earthquakes.



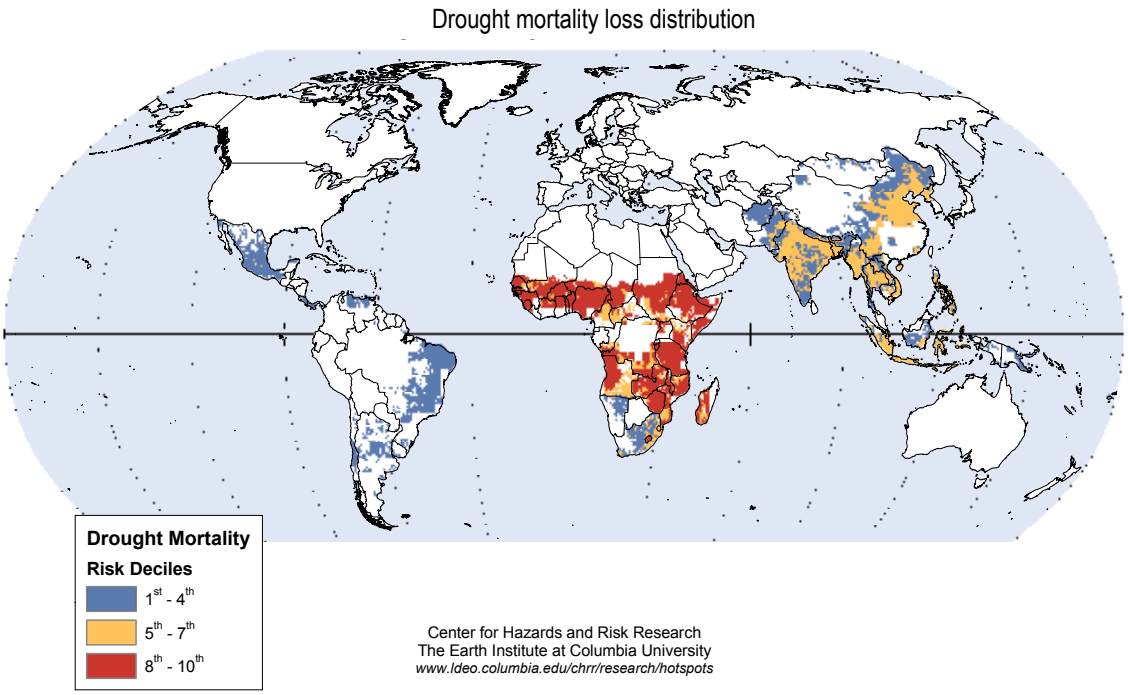


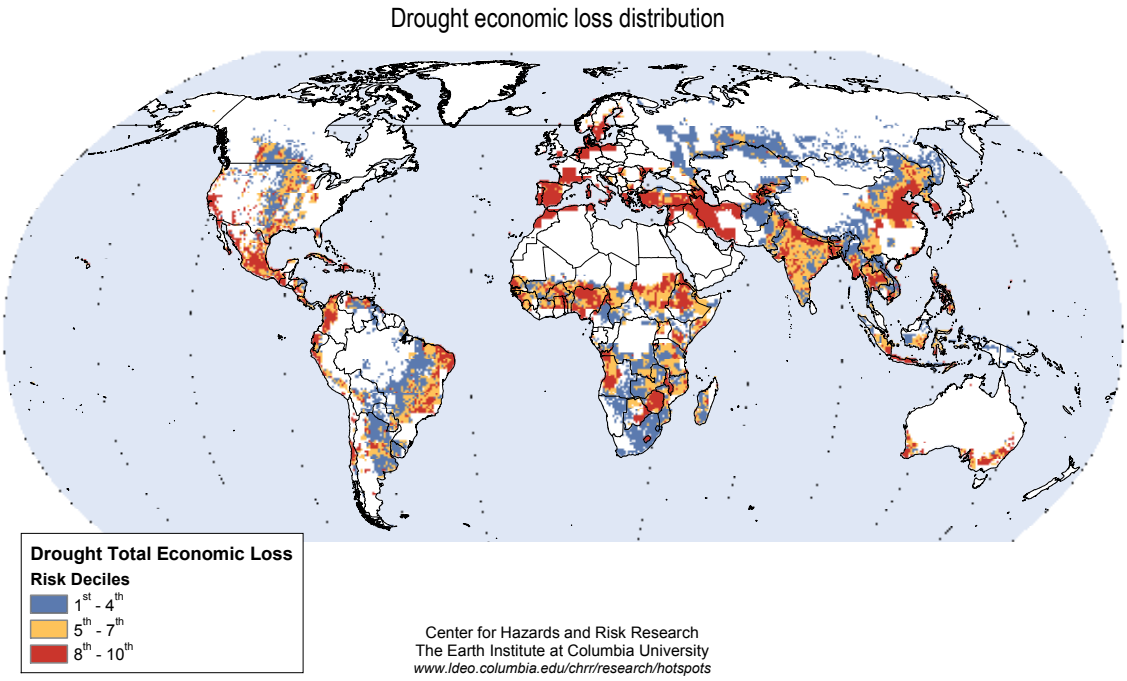
Source: Natural Disaster Hotspots: a Global Risk Analysis Synthesis Report, World Bank

Figure 5

Drought mortality and economic loss distribution

These maps show the distribution of both mortality and economic risk from drought. This visualization shows a radically different distribution pattern in the case of drought. Mortality is heavily concentrated in Africa and other developing countries, whereas economic loss risk also affects developed countries.





Source: Natural Disaster Hotspots: a Global Risk Analysis Synthesis Report, World Bank

Economic resilience

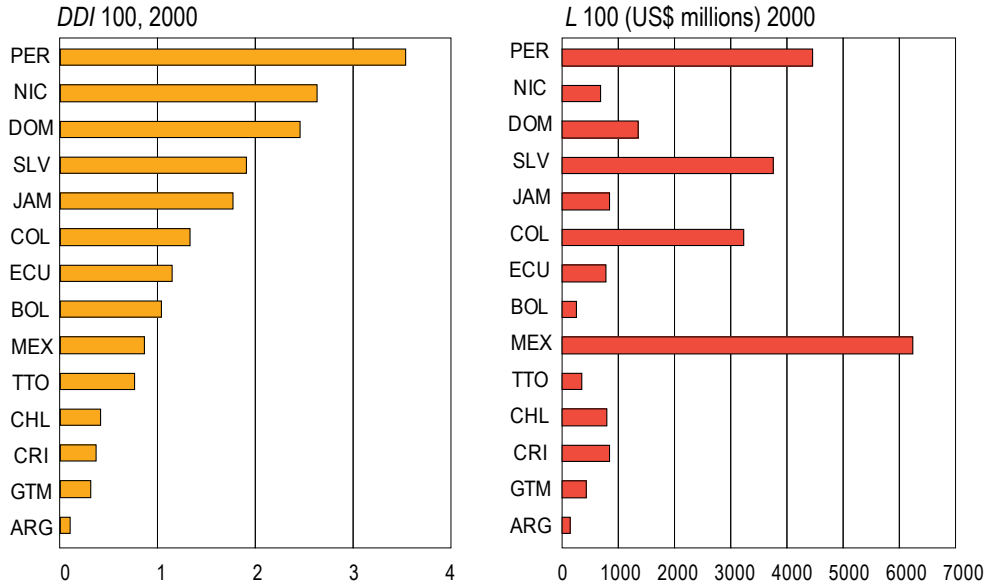
Even when economic loss risk is described in relative terms as a proportion of GDP, it provides only a crude measure of the capacity of a country to absorb and recover from the economic impact. This depends on many other factors associated with economic resilience to cope with extreme catastrophic events, including potential reinsurance and insurance payments, the existence of disaster reserve funds, access to external credit from multilateral organizations and capital markets and others. A study of the economic resilience of 14 Latin American and Caribbean countries, on the basis of the likely impact of a maximum probable event and a combination of seven resilience indicators, was calculated by IDB[36].

This study shows enormous variations between countries. Figure 6 shows the likely maximum loss values for the maximum catastrophe likely to occur in a 100-year period for the 14 countries and the calculation of a Disaster Deficit Index which compared the maximum loss value with the combined resilience indicators. All values above 1.0 indicate an inability to cope with the likely cost of a maximum catastrophe in a 100-year period[37]. 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.

Figure 6

Disaster Deficit Index for a 100-year catastrophe

The Disaster Deficit Index (DDI) measures a country's economic resilience with respect to the probable maximum loss that could occur from a natural hazard with a100-year return period. The right hand graph expresses the maximum probable losses. The graph on the left shows the country's capacity to cope with such losses. A value above 1 reflects lack of resilience. Although the maximum probable loss is much higher for Mexico compared with Nicaragua (6,273 and 682 million USD respectively), Mexico has far greater resilience (0.86) than Nicaragua (2.63). See Annex 1 (Technical Annex) Note 8 for further explanation.



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

[36] Cardona, O. D, (2005), Indicators of Disaster Risk and Disaster Risk Management. IDB. For further information see Annex 1 (Technical Annex): Note 8 – Disaster Deficit Index.

[37] Maximum Considered Event in a 100-year period. Five per cent probability of occurrence in a 10-year period.

Trends in mortality

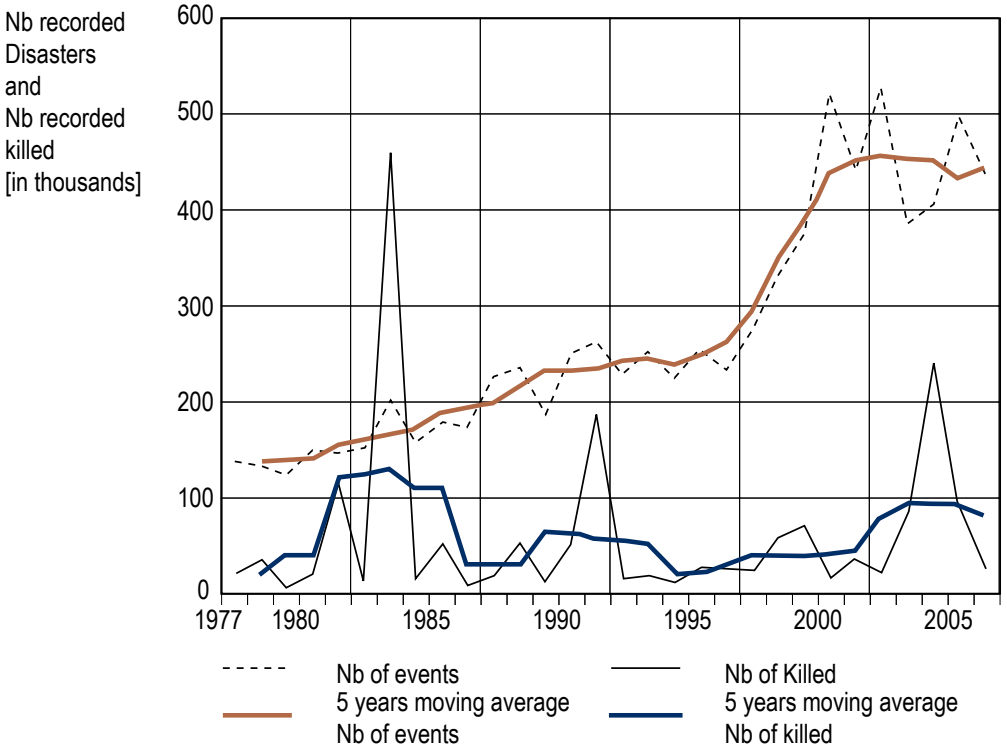
Figure 7[38] indicates that disaster occurrence, over the last 30 years, has increased far faster than the number of deaths, which has remained relatively constant.

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 across regions. As Figure 8 indicates, most of the reduction in mortality is due to a dramatic fall in drought mortality since the major drought disasters of the early 1980s in Africa. In contrast, as Figure 9 shows, mortality rates for other climatic hazards and for geological hazards are still rising globally while mortality is also increasing in all regions.

Figure 7

Trends of recorded natural disasters and numbers killed, 1977-2006 (CRED)

This graph displays two different sets of information - the annual number of disaster events recorded by EM-DAT and the annual recorded mortality - using a five-year moving average. The fact that disaster occurrence has almost doubled between 1995 and 2005 may be influenced by increased access to information and increasing exposure of population and economic assets. However, it is likely that this is also associated with a dramatic increase in the number of small-scale climatic hazard events with relatively low mortality. In contrast, the 'flat' mortality trend is conditioned by major reduction in drought mortality in Africa since the early 1980s.



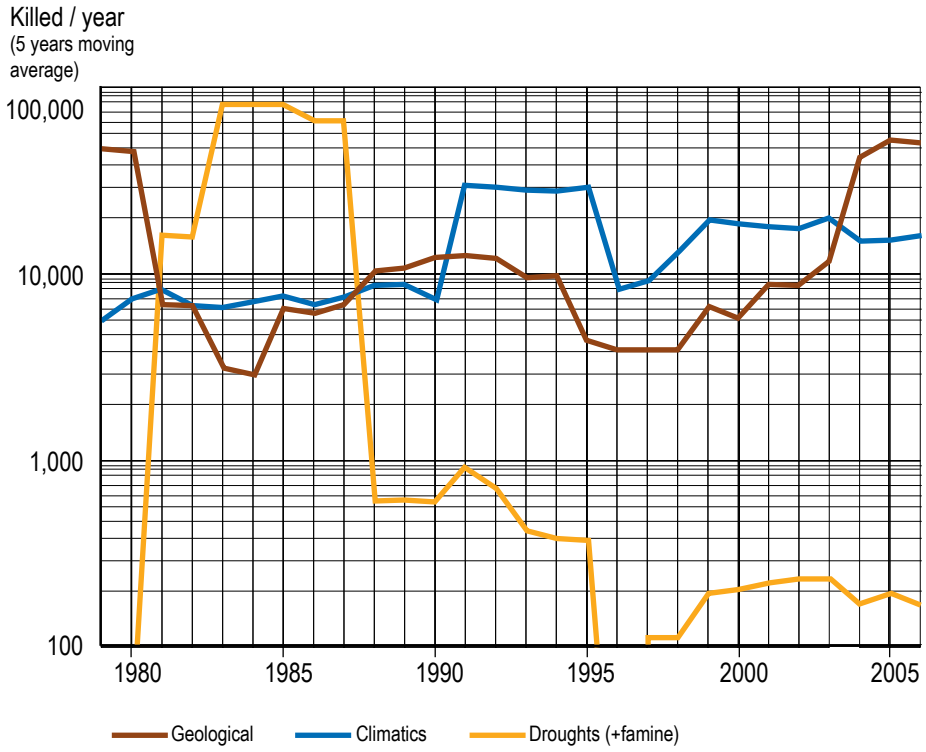
Sources: EM-DAT: The OFDA/CRED International Disaster Database

[38] See Annex 1 (Technical Annex): Note 9 – Disaster Loss.

Figure 8

Numbers killed per year, by type of hazard

Annual mortality recorded by EM-DAT, displayed using a five-year moving average, evolves in radically different ways for specific hazard classes. While mortality associated with geological hazards has increased since the late 1990s (in particular due to the 2003 Bam earthquake in Iran, the 2004 Indian Ocean tsunami and the 2005 Kashmir earthquake), mortality associated with climatic hazards has remained stable, except for drought where mortality has dramatically reduced.--



Data source: EM-DAT, OFDA/CRED International Disaster Database

One possible explanation for the apparently rapid increase in disaster occurrence is that this is associated with large numbers of smaller scale climatic hazards with relatively low mortality. This will be examined in detail in the section on extensive risk below. Given that most deaths occur in large-scale catastrophes, mortality risk in intensive risk hotspots would still seem to be increasing, particularly for geological hazards. This would be unsurprising given that mortality risk is sensitive to the underlying development processes in geological risk hotspots and climatic risk hotspots in very different ways.

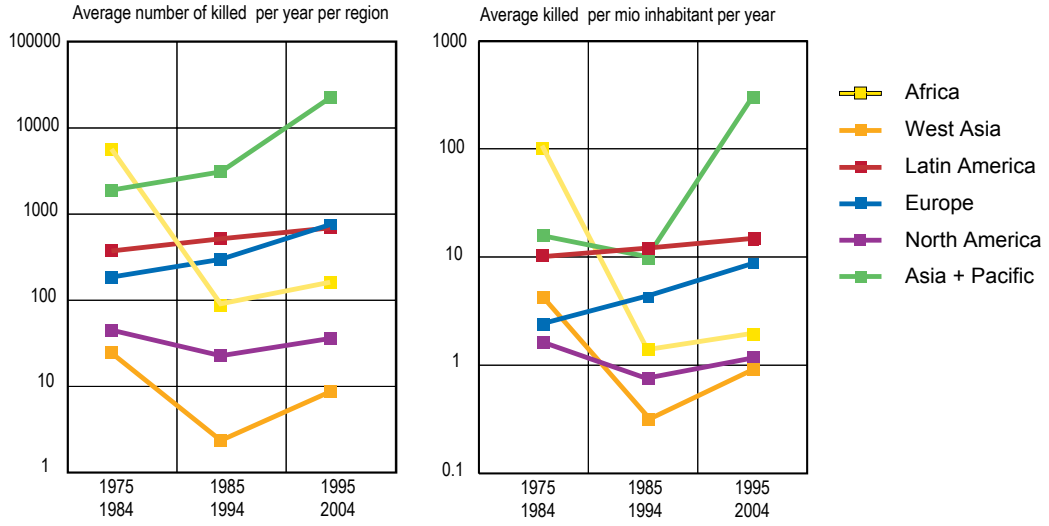
In the case of two key climatic hazards (tropical cyclones and floods), a correlation of mortality risk[39] with a range of social, economic and environmental indicators[40] showed that high mortality was correlated with factors such as large rural populations and low levels of human development. This implies that economic and social development with improved

[39] The existence of a correlation does not imply a causal relation; however it does pose hypothesis regarding possible causalities.
[40] UNDP op. cit.

Figure 9

Trend in numbers killed by region over decades

The two graphs show trends by averaging killed and killed per million inhabitants by decades and by regions. During the large famine of the eighties, Africa was the continent most affected by natural hazards. The decrease is well shown after 1984. The continent that suffers the most casualties in both absolute and relative terms is Asia. Although, the high figure is largely due to the victims from the 2004 tsunami.



Data source: EM-DAT, OFDA/CRED International Disaster Database

health, sanitation, infrastructure and communications in many rural areas is associated with a reduction in mortality risk. 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. While mortality risk in climatic risk hotspots in less developed regions remains high[41], its evolution in recent years (Figure 9) is fairly flat.

This conclusion is supported by the spatial distribution of mortality risks in climatic risk hotspots[42]. In the case of floods, cyclones and drought, mortality risk is heavily concentrated in less developed regions and is far less in more developed regions. In the case of drought (Figures 5), this distribution is particularly notable. This indicates that economic and social development, together with factors such as improved disaster preparedness and early warning, can lead to a reduction in mortality risk in the case of climatic hazard.

In the case of geological hazard, in particular earthquakes, mortality risk corresponds very differently. High earthquake mortality risk is closely correlated with very rapid rates of urbanization, particularly in developing countries such as Turkey and Iran. Given that earthquake mortality is closely associated with building collapse, this may reflect contexts where there are difficulties in implementing building regulations and planning controls when urban growth is very fast accompanied by the growth of unregulated urban settlements. When economic

[41] See Annex 1 (Technical Annex): Note 10 – Vulnerability factors.
[42] World Bank op. cit

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and social development is characterized by this kind of urban growth, it may lead to an increase rather than a decrease in earthquake mortality risk.

In contrast to climatic hazard, earthquake mortality risk is far less sensitive to reductions through enhancements in early warning, preparedness and response. The relatively infrequent occurrence of earthquakes also conspires against the incorporation of risk reduction considerations into urban development. Earthquake mortality risk is less in developed countries with slower rates of urban growth, associated with established planning and building standards and regulated settlement and urban development. Clearly a more disaggregated analysis by gender, age and other factors is required to better understand the processes driving these risk trends; however, the trends in the case of climatic and earthquake risk hotspots would appear to be very different.

Given that economic development will continue to drive rapid urbanization in areas characterized by earthquake hazard, it would seem likely that earthquake risk hotspots will continue to concentrate mortality risk. It is projected that by 2010 more than 50 per cent of the world's population will be living in cities. More than 30 per cent of urban population is living in slums[43] - which are unregulated. Improvements in disaster preparedness and response are unlikely to reduce more than a small part of this mortality risk. As much of this risk has already been accumulated, as in large mega-cities without a history

[43] 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.

of recent major earthquakes, a significant part of future mortality in such locations is perhaps inevitable.

In the case of climatic hotspots, even in less developed regions, there is evidence to suggest that mortality risk may be stabilizing and perhaps reducing due to the combined effects of social and economic development and improvements in early warning, disaster preparedness and response. However, the experience of the 2003 European heat wave and of Hurricane Katrina in the United States in 2005 shows that even highly developed countries can experience serious rates of mortality, when preparedness and response capacities are unable to cope with unexpected events or response systems and mechanisms have been allowed to lapse. The next section will discuss how climate change may drastically modify current assumptions about risk levels.

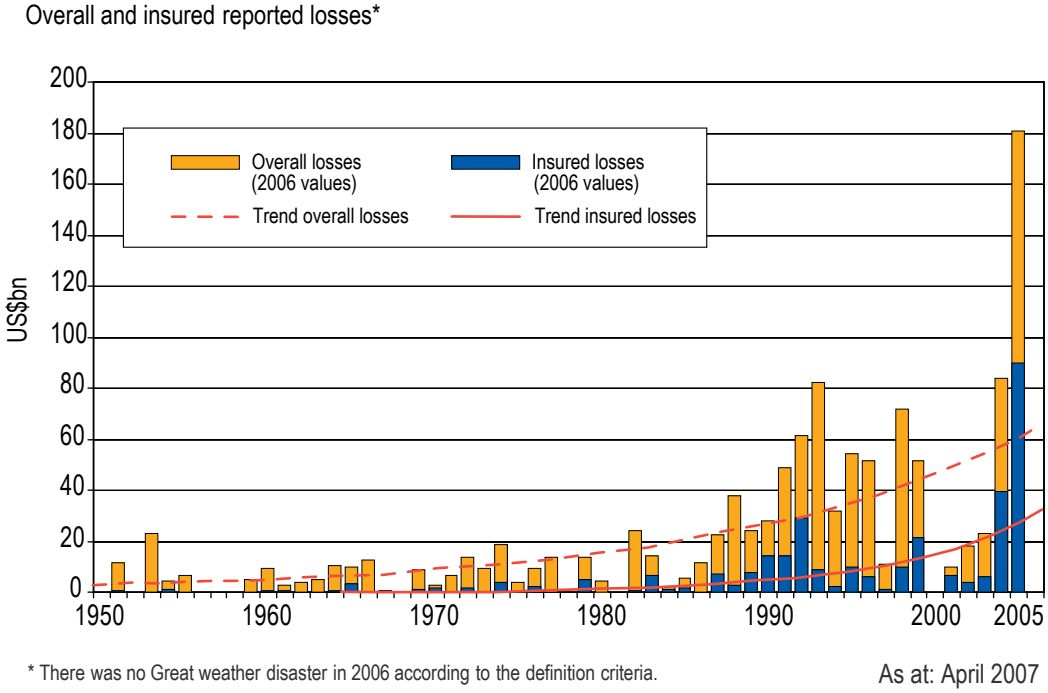
Trends in economic loss risk

In the case of economic loss risk, Figures 10 and 11 show a total economic loss of USD 1,700 billion, insured losses of USD 340 billion and a very clear upward growth trend in large-scale disasters over the last 50 years. 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[44]. This assumption can be supported by the spatial distribution of economic loss risk for all kinds of hazards in more developed countries. As the value of assets such as property increases in many developed countries, economic loss risk will also increase. However, in general, higher levels of economic development are consistent with a greater number of economic assets at risk for both kinds of hotspots.

Figure 10

Great weather disasters 1950–2006

Economic losses recorded by Munich Re are increasing. However, this could be due to different causes (not mutually exclusive): increase in value property, increase in assets exposure, increasing access to climatic hazard information (due to Internet and launch of new satellites), or if weather hazards are increasing due to climate change. The causalities have to be further studied.



* There was no Great weather disaster in 2006 according to the definition criteria.

As at: April 2007

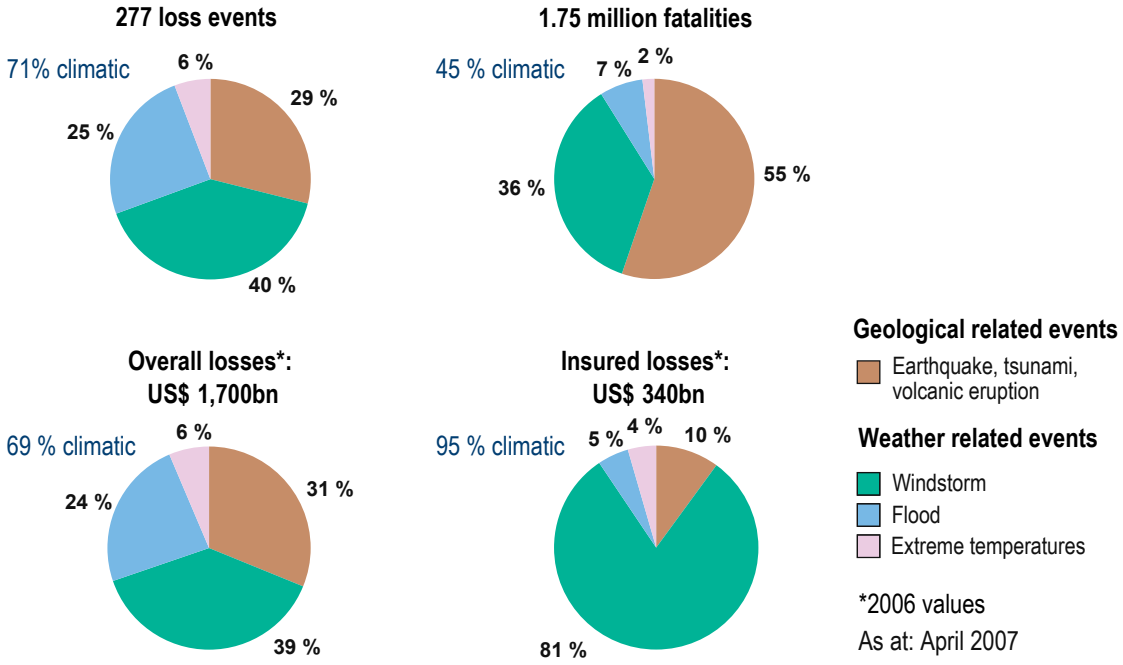
Sources: © 2007 Münchener Rückversicherungs-Gesselschaft Geo Risks Research, NatCat SERVICE

[44] See Annex 1 (Technical Annex): Note 11 – Economic Loss Data.

Figure 11

Great natural disasters 1950–2006: Percentage distribution worldwide

Climatic events represent 71 per cent of large-scale economic disasters, causing 45 per cent of recorded mortalities, but responsible for 69 per cent of economic losses and 90 per cent of insured losses.



Sources: © 2007 Münchener Rückversicherungs-Gesselschaft Geo Risks Research, NatCat SERVICE

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. 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 11 shows that windstorms, floods and extreme temperatures accounted for 71 per cent of the disasters recorded, 69 per cent of the total economic loss but only 45 per cent 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 in 2005 was responsible for 1,833 deaths in the United States of America, it caused more than USD 125 billion in economic losses. In contrast, Hurricane Mitch in 1998 in Central America was responsible for over 11,000 deaths but only USD 5 billion in economic losses[45].

[45] Sources: EM-DAT, (2007).

2.3 Extensive Disaster Risk

Extensive disaster risk describes a scenario where smaller concentrations of people and economic activities are exposed to frequently occurring but highly localized hazard events, such as flash floods, landslides and wild fires, with relatively low intensity asset loss and livelihood disruption over extensive areas

The attention of the humanitarian community, the private sector and the media is overwhelmingly focused on the effects of large-scale catastrophes in intensive risk hotspots. As described above, these disasters account for the vast majority of mortality cases. Discounting these large-scale events, annual disaster mortality across the globe, according to EM-DAT, was only 11,260 for the decade 1975-1984, 14,586 for 1985-1994 and 7,021 for 1995-2004 (Table 3), figures that are extraordinarily flat if one considers population growth over the same period. The global population reached 6.54 billion in 2006[46] and continues to grow at a rate of 80 million per year (the equivalent of a country the size of Germany or Viet Nam).

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	112,596	97,680	11,260
1985-1994	235,666	145,864	38,153	14,586
1995-2004	360,971	70,211	43,118	7,021
TOTAL KILLED	1,460,841	328,671		

Data source: EM-DAT OFDA/CRED International Disaster Database

EM-DAT shows (Figure 12) that the number of climate-related disasters is increasing far faster than the number of geological disasters, particularly since the late 1970s. At the same time, EM-DAT also indicates that the number of small and medium-scale disasters is growing much faster than large-scale disasters[47]. These figures are consistent with the fact that, if the mortality from large-scale disasters is excluded (Figure 13), mortality in climatic disasters related to an increasing number of small-scale events is rising far faster than in geological disasters albeit from a low baseline.

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 climate-related hazards such as landslides, flash floods, localized storms and coastal flooding, 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 and large-scale disasters.

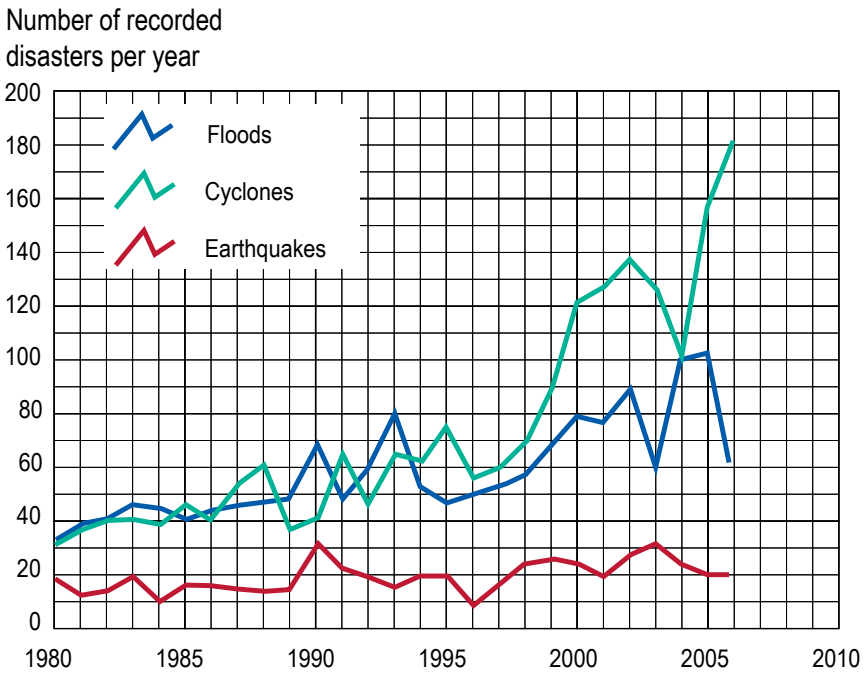
It is likely that these emerging patterns of extensive risk are being driven by concurrent processes of urbanization, population growth, environmental degradation and the productive transformation of new territories. The combined effects of this process generates an increase in the extent, the frequency and magnitude of localized flooding, flash flood, landslide and wildland fire events, create new climate-related hazards in previously hazard-free areas due to

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

Figure 12

Trends of events by hazard types

The number of recorded disasters per year is steady for earthquakes. However, one can see an increase in recorded tropical cyclones and flood disasters. There are two possible hypotheses (which are not exclusive): either access to information on climatic hazards has increased (e.g. due to development of new satellites) or climatic hazards are increasing due to climate change and other factors.



Data sources: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net

environmental change and increase in the population and economic activities exposed. For example, forests are currently being reduced by 130,000 km2 per year[48] globally, while increases in landslide frequency in deforested areas are likely.

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 threshold[49] does not exist. However, a number of countries in Asia and Latin America have made significant progress in developing disaster databases using the DesInventar (Inventario de Desastres - Disaster Inventory)[50] methodology with a national level of observation and a local scale of resolution[51]. These databases show that extensive risk probably does not make a significant global contribution to disaster mortality. However, in specific countries, in particular those that are not exposed to or have not recently experienced a large-scale catastrophe, the small-scale disasters that characterize extensive risk may make up a very significant part of total mortality[52]. For example, in the case of Panama, Chile and Jamaica, small-scale disasters below the EM-DAT threshold represented 74 per cent, 53 per cent and 43 per cent of the total mortality registered in the national

[48] UNEP, Billion Tree Campaign: www.unep.org/billiontreecampaign

[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 Annex 1 (Technical Annex): Note 12 – National Disaster Databases; and visit DesInventar website at:www.desenredando.org

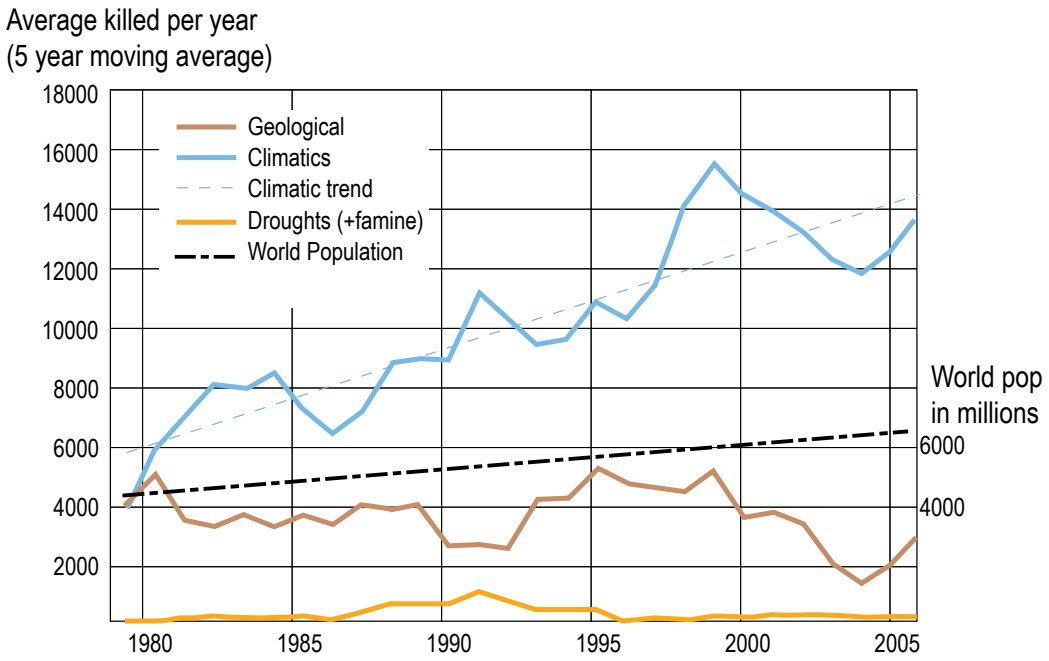
[51] National databases containing usually 30 years of disaster data currently exist for 14 Latin American and Caribbean countries as well as for Sri Lanka, Nepal and a number of States in India. Databases in Indonesia, Thailand, Maldives and the Islamic Republic of Iran are in various stages of completion.

[52] See Annex 1 (Technical Annex): Note 13 – Mortality in Extensive Risk Scenarios.

Figure 13

Average killed per hazard per year without "mega events"

If 'mega-disasters', with over 10,000 deaths, are excluded (since they mark the trends) mortality in climatic disasters is increasing far faster than those in geological disasters, and at a faster rate than world population growth.



Data sources: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net

databases respectively. In the case of Colombia by contrast, that figure was only 4 per cent, given the large mortality associated with a single large-scale disaster – the eruption of the Ruiz Volcano in 1985.

While the absolute mortality that characterizes extensive risk may be relatively low, damage to housing, infrastructure and agriculture may be very significant, with serious consequences for local livelihoods. According to the national disaster loss database of Chile, while small-scale disasters in Chile accounted for less than 1,000 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 highlight a significant under-reporting of local economic loss related to livelihood disruption in marginal rural and urban communities. As with mortality, it is likely that the economic value of the assets lost may not be globally significant if compared to the massive value of losses in large-scale catastrophes in developed countries but may be significant in the context of specific local economies. Unfortunately, no systematic measurement of the economic loss associated with extensive risk scenarios has been attempted. In the national databases, the panorama is nebulous because very little reliable economic data is reported.

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 risk. Figure 14 examines

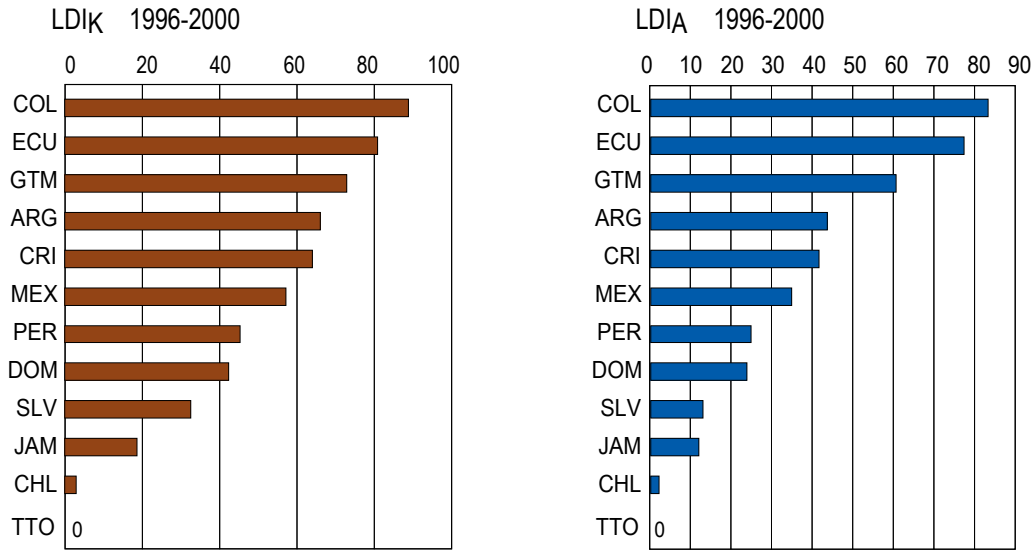
the distribution of mortality (Local Disaster Index for People Killed, LDIK)[53], which represents the most robust variable in the source data. Countries like Colombia, Ecuador and Guatemala showed an extensive distribution across the national territory in contrast to Chile which showed a very low level of uniformity. The processes that are driving extensive, localized climate-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 unfolds over extensive areas, through urbanization, population growth, environmental change and the productive transformation of new territories, new intensive 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. The large-scale losses associated with Hurricane Mitch in Central America in 1998 revealed the emergence of an intensive risk scenario from a very complex pattern of extensive risk.

Figure 14

Local Disaster Index for People Killed and Affected (LDIK and LDIA)

This graph shows the extensiveness of risk in 12 Latin American and Caribbean countries, with respect to both people killed and affected. Higher values indicate an extensive distribution of risk over a country's territory, lower values indicate a concentration of risk in particular areas.



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

[53] 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.

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2.4 How Will Climate Change Affect Global Risk Patterns?

The unfolding of intensive and extensive disaster risk as outlined above is being driven by development processes including urbanization, economic globalization, poverty and environmental degradation. A factor which underpins development impacts to create further conditions of risk to human development is climate change. 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, human settlements and society, health, labour mobility and local economies. Climate change in itself is perhaps the ultimate hazard. It not only magnifies existing patterns of disaster risk but is now producing dramatic changes to the planet's ecosystems, which in turn threaten the continued social and economic viability of entire regions. The global nature of climate change implies that climatic risk, wherever it occurs, must increasingly be considered as a global public responsibility and not just a problem specific to a particular locality or country.

Climate change will alter patterns of climatic hazard as well as increase physical, social and economic vulnerability in many regions. The combination of increasing climatic hazard with declining resilience may conspire against the continued effectiveness of those factors (such as social development and enhanced preparedness and early warning) which would appear to have contributed to a decline in mortality rates in climatic disasters in developed as well as some developing countries. The 34,947 deaths attributed to the 2003 heat wave in Western Europe – across countries with sound national health systems, is an indication of how mortality rates can easily rebound due to extreme climatic events that exceed expected parameters.

At the same time, other processes that drive disaster risk, such as urbanization and environmental degradation, will contribute to an increased exposure and vulnerability to climate hazard. The increasing concentration of population and economic activities in flood and cyclone-prone coastal areas is such an example, which, when combined with stronger and more frequent floods and cyclones, will magnify the risk associated with climate change.

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 fact, climate change might have unforeseen impacts that cannot be predicted by the current models, which could lead to accelerated modification of climate patterns and therefore to major crisis in ecological and socio-economic systems.

The Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC)[54] indicates that climate change is likely to alter risk patterns in several ways:

- Increase the frequency and intensity, reduce the predictability and change the spatial distribution of extreme climatic hazards, such as temperature extremes, storms, floods and droughts. As the water cycle becomes more intense, many climate-related hazards will become more severe, including floods, droughts, heat waves, wildland fires and storms with a range of effects in different regions. Some impacts will occur in regions with no history of a given hazard.
- Increase the vulnerability of particular social groups and economic sectors, as existing vulnerabilities are compounded by climate change-related processes, such as sea level rise, glacier melt and ecosystem stress. The increase in vulnerability in regions dependent on subsistence agriculture may be particularly drastic, due to food and water shortages, in small island developing states and coastal zones due to sea level rise and in regions depending on water from glacier melt for agriculture and human consumption.

In the context of this Review, it is only possible to provide an indicative description of some of these linkages.

[54] Intergovernmental Panel on Climate Change, op. cit.

Drought

Drought is a particular concern in Africa, given its existing high level of mortality risk due to hazard exposure and already existing vulnerabilities. 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 suffer greater water stress due to climate change in the region. Agricultural production and access to food in many African countries and regions is therefore projected to be severely compromised by climate variability and change. Increased drought hazard and decreasing availability of food and water could lead to scenarios of greatly increased risk that could stretch existing humanitarian response systems and lead to a rebound in mortality.

Flood

The IPCC confirmed that it was very likely that heavy precipitation events would become more frequent. Small island developing states face flooding, storm surge, erosion and other coastal hazards, which threaten infrastructure, livelihoods and settlements. Heavily populated mega-deltas in South, East and South-East Asia will be at greatest risk of flooding associated with sea level rise and in some mega-deltas 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, rising sea levels will affect low-lying coastal areas with large populations.

To the extent that more flooding events, exceeding historical parameters, affect areas without developed early warning, preparedness and response systems, mortality risk may increase, while a generalized increase in economic loss risk in all regions could be foreseen.

Tropical cyclone

Higher sea temperatures are likely to lead to more intense tropical and extra-tropical cyclones (Table 4). 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 to tropical storms could increase in regions that historically have not suffered cyclones, creating new hotspots. The 2004 Catarina hurricane, the first ever in the South Atlantic, hit the coast of Santa Catarina, Brazil, causing severe damage. In such regions, vulnerability will be higher than in regions that historically suffer cyclones, given that the development of settlements, buildings and social systems has not taken cyclone hazard into account.

The year 2005 acted as a strong warning – it was the warmest year in the northern hemisphere and it had the highest number of tropical cyclones (26), of which 14 became tropical cyclones and seven super-cyclones. The previous record was 21 tropical cyclones in 1933. 2005 saw the highest economic losses from climatic events: USD 200 billion losses, mostly as a result of

Table 4
Change in number and percentage of hurricanes (categories 4 and 5): 1975-1989 and 1990-2004 for different ocean basins

	1975 – 1989		1990 - 2004	
Basin	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.

Katrina (USD 125 billion). 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].

Glacier melt: flood and drought hazard to increase across regions

There is evidence from across regions to project the likelihood that increased glacier melt in the Himalayas will lead to the formation of larger glacier lakes. This phenomenon is likely to lead to increased flooding in many river systems in South Asia, including potentially catastrophic glacial lake outburst floods (GLOFs), rock avalanches from destabilized slopes, overflow floods and natural dam rupture. Previous experience from Peru - where the surface of Lake Safuna Alta in the Cordillera Blanca, increased spectacularly between 1975 (7.4 ha) and 2000 (37.8 ha)[56] is perhaps an indication of the kind of impacts the Himalayan glacial lakes will have on the Indian, Nepalese, Bhutanese and Bangladeshi population.

These changes are likely to increase hazard exposure, associated first with flood and landslide and eventually with drought in large areas around the Andes and Himalayas. Water stress will increase for agriculture, power generation, industry and human consumption, increasing both social and economic vulnerability, 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 impacts, 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 be concentrated in coastal areas (Table 5).

Table 5
Impacts of sea level rise in 84 developing countries

	1m	2m	3m	4m	5m
Area of 84 countries (Total = 63,332,530 km²)					
Impacted area in km²	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 million)					
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 km²)					
Impacted urban area in km²	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 km²)					
Impacted agricultural area in km²	70,671	124,247	196,834	285,172	377,930
% total agricultural area	0.39	0.69	1.09	1.59	2.10
Wetlands area (Total = 4,744,149 km²)					
Impacted area in km²	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: Dasgupta et. al., (under publication, 2007)

[55] NASA Earth Observatory: http://earthobservatory.nasa.gov/Newsroom/NasaNews/2006/2006021321735.html

[56] Silverio, Jaquet, (2002), Land Cover Changes in Cordillera Blanca (Perú) : 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

Many areas where population and economic activities are concentrated may become uninhabitable or non-productive for agriculture in the future if catastrophic sea level rise occurs. Agricultural land may be lost to the sea and coastal soils become saline. The potential large-scale displacement of people due to sea level rise could lead to a drastic and non-linear realignment of disaster risk patterns, which Governments and international organizations need to look into as a priority. Rising sea levels damaging coastal regions through flooding and erosion, desertification and shrinking freshwater supplies, displaced up to 10 million people in 2006, and will create up to 50 million environmental refugees by the end of the decade[57].

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. Women are often at greater risk, due to gendered divisions of labour which affect livelihoods and resource use differently. In Africa, food insecurity is likely to increase and access to safe water is projected to 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, compounding the above causes. All these increases in vulnerability may result in a reversal of the trend towards reducing mortality risks for climatic hazards, both in the case of intensive risk hotspots as well as in areas of extensive risk. Migration due to deterioration of livelihoods in rural areas may also contribute to increasing intensive risk in urban centres, one of many non-linear effects of climate change that are possible but which are difficult to model and predict.

[57] Institute for Environment and Human Security (IEHS) at the United Nations University (UNU) in Bonn, Germany.

Chapter 3

Progress in Reducing Disaster Risk

This Review identifies broad global trends in national action to reduce disaster risk, illustrated by examples from countries and regions that have prepared progress reports on achieving the strategic goals of the Hyogo Framework.

While the Hyogo Framework provides overall guidance on the possible range of measures that a country could implement to reduce disaster risk, the actual measures required will depend on the country's specific risk profile and socio-economic development scenarios. Ultimately, progress in implementing the Hyogo Framework in a country can only be measured with respect to its disaster risk. Without identifying and understanding the risk, any judgment on the relevance or effectiveness of disaster risk reduction would be premature. While current knowledge permits a broad characterization of global risk, disaster risk information in many regions and countries is still heterogeneous in quality and incomplete in coverage. General lack of gender-specific data and monitoring is apparent and has an impact on the analysis presented herein. It is also to be noted that where gender-disaggregated data does exist, there is very limited analysis on its application in disaster risk reduction planning and implementation.

Similarly, countries are implementing the Hyogo Framework from very different starting points. Some have been strengthening their capacities to reduce disaster risk for 30 years or more, others have only recently been motivated due to the political impetus provided by the 2005 Second World Conference on Disaster Reduction and the obligations under the Hyogo Framework. The different starting points are also reflected in the nature of progress reported: while many countries have no doubt adopted the language of 'mainstreaming risk reduction concerns into development policies and national frameworks', few national reports contain evidence to show that risk reduction approaches have been integrated into institutional practices at national and local levels.

Disaster risk reduction requires concerted action by a wide range of stakeholders including national and local authorities, civil society and non-governmental organizations (NGOs), scientific, technical and academic organisations and the private sector. Systematic progress reporting by the private sector, NGOs, regional and international organizations is not yet available, meaning that this Review fundamentally reflects state action and not that of other stakeholders.

The Review recognises that progress in disaster risk reduction hinges on the political commitment of Governments, and the constantly negotiated terms of cooperation for intergovernmental regional bodies with respect to addressing transboundary risks. While these dynamics are rarely captured in official reports, they do impact on whether and how risk reduction imperatives are sufficiently addressed across countries and regions. Such dynamics also influence political will to sustain interest in risk reduction nationally and regionally.

While noting these reporting limitations, the Review does provide an insight into the nature of Member States' commitments to the Hyogo Framework and their understanding and visualization of the challenges of disaster risk reduction. It therefore provides a useful starting point to inform the formulation of work plans and other activities by the ISDR System as a whole to support the implementation of the Hyogo Framework in areas which need system-wide attention.

A number of overall trends are visible in the country reports analysed:

- There is a clear and growing global momentum in favour of disaster risk reduction, due to a number of factors already mentioned in the introduction: the series of extraordinary disasters that affected millions in the two-year period between late 2003 and late 2005; the increasing political commitment manifest in the adoption of the Hyogo Framework at the Second World Conference on Disaster Reduction in January 2005; the growing evidence that climate change is radically altering patterns of disaster risk; and widespread recognition that risk-sensitive development planning can actively contribute to reducing disaster risk and addressing persistent poverty trends.
- Most countries are approaching the HFA through the development of specific national capacities for disaster risk reduction. A great deal of the progress reported refers to HFA Priority for Action 1 and deals with the development of legislation and institutional frameworks and plans. In contrast, the reporting seems to indicate that other possible vehicles for implementing the HFA such as working through the private sector or NGOs or using existing national mechanisms for planning and regulating development receive far less emphasis. It is possible that these are not yet viewed as main 'drivers' for achieving progress under the HFA.

- Progress being made by many countries in different areas of development, such as the achievement of greater social equality and gender equity or better quality buildings and urban development which may contribute to the reduction of disaster risk, are not emphasised in the reporting. In contrast, most of the reporting relates to improvements in areas such as disaster response, preparedness, early warning and education. This is perhaps an indication of where most countries locate responsibility and current activities for addressing disaster risk – often, in response-centric institutions, with a focus on saving lives, without necessarily complementing this with protecting development. This trend will be discussed in more detail later in the chapter.

The sections below identify a number of global trends with respect to each of the five Hyogo Framework priorities for action. The sections also illustrate these trends from the regional and country reports made available.

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3.1 HFA Priority 1:

Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation

Analysis of key trends

Country reporting under Hyogo Framework Priority 1 broadly indicates four key areas of focus in the past years:

- Legislative and institutional mechanisms for reducing disaster risks developed and strengthened at national and local levels;
- National action plans, policies and frameworks developed – often, with the objective of ensuring integration of risk reduction into national development priorities;
- Regional cooperation/frameworks developed and strengthened - to address transboundary risks; and
- Donor emphasis on mainstreaming risk reduction into institutional policies and aid disbursement heightened.

Legislative and institutional mechanisms developed and strengthened at national and local levels

Reports from across all regions show that the occurrence of large-scale catastrophes has generally acted as a strong catalyst for increased policy commitment and investment in disaster risk reduction at national level. Following a major disaster, most countries review their existing legislative and institutional mechanisms in order to identify gaps, and opportunities for improvement in disaster risk management and risk reduction practices.

The impact of the Armero volcanic eruption in Colombia in 1985 and the combined impact of the Lattur earthquake (1993), the Orissa super cyclone (1999) and the Gujarat earthquake (2001) in India are examples of large-scale disaster impacts leading to a redesign of national legislative and institutional arrangements. In other cases, it may be a fundamental political change, such as the end of apartheid in South Africa, which provides the catalyst to address disaster risk.

More recently, following the 2003 earthquake in Bam, Iran began putting in place a comprehensive system of inter-ministerial working groups and task forces to address the multiple risks the Iranian population is exposed to. Algeria and Morocco in North Africa, which were affected by earthquakes and floods between 2002 and 2004, are currently making major efforts to improve their legislative and institutional systems and develop planning frameworks which integrate risk reduction concerns, as described in Box 1.

Following the 2004 Indian Ocean tsunami and the 2005 Kashmir earthquake, most Asian countries are also enhancing their legislative and institutional arrangements for disaster risk reduction. The case of Sri Lanka is particularly interesting because it illustrates how a major disaster can provide the impetus to approve and enforce legislation that had

Box 1
Legislative arrangements for disaster risk reduction: Algeria

Algeria has adopted a series of laws on disaster risk reduction. It has adopted Law 04-20 (25 December 2004) regarding the prevention and management of disaster risks as part of efforts toward sustainable development. The Law 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 (August 2004) improves on a previous legislative arrangement (Law 90-29 of 1990) that deals with urban planning and introduces stricter building codes and building permit requirements. Other legislative changes include one on insurance against disasters (August 2003) and another which deals specifically with earthquake preparedness and response.

already been prepared but was not enacted because it was not considered with urgency. Following the 2005 earthquake, Pakistan 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 national, provincial and district levels.

While highlighting this trend, however, the motivating factors should not be generalized for all countries that experienced major disasters in the past. Evidence from other countries seems to indicate that the ability to build on disaster impacts as a catalyst for strengthening institutional capacities depends on minimum conditions of political and economic stability, governance and peace. It is unclear, for example, whether the impact of the 2003 volcanic disaster in Goma in the Democratic Republic of Congo led to significant upgrading of national institutional capacities to address disaster risk, although significant progress was made at the local level. 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.

Similarly, experience across Asia, Africa and Latin America and the Caribbean shows that political commitment can be promoted by sustained engagement with national counterparts and effective advocacy measures – nationally and internationally – where real disaster impacts are in fact not the trigger. Nepal and Bhutan's disaster risk reduction policy formulations are key instances of such efforts at planning for 'prospective' or 'anticipatory' risk reduction.

Increased political commitment to risk reduction generated after the Second World Conference on Disaster Reduction of 2005, is a key instance of how awareness and political advocacy at the international level can generate consensus on national priorities for risk reduction across regions. But systematic documentation and analysis are still needed on exactly what political, social and economic conditions enable countries to take advantage of the momentum produced by a major disaster, or what motivates or impedes policy commitment from national Governments.

The institutional mechanisms set up in the previous decades mainly consisted of 'stand alone' disaster management offices or civil defence/protection institutions, with a focus on emergency preparedness and response. In contrast, many countries have now moved from single-institution mechanisms to more complex, integrated legislative and institutional systems that coordinate actions by a range of sector departments and ministries at different territorial scales and that contemplate other dimensions of disaster risk reduction.

For instance, across eastern, western and southern Africa, many countries which developed disaster management legislations and institutions in the 1990s, have established national disaster management offices with a focus on emergency preparedness for response and civil protection. This applies to Ethiopia, Lesotho, Malawi and Nigeria which have all had legislation in place for a number of years. In contrast, other countries in Africa are currently moving to realign their legislation and institutions to adopt an integrated 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 the United Republic of Tanzania includes the incorporation of disaster risk concerns into national poverty reduction and development strategies and plans.

In Asia, Latin America and the Caribbean, there is also a tendency to move from single-institution civil defence/protection organizations towards more complex institutional systems that coordinate actions by a range of sector departments and ministries and at different territorial levels.

For example, Honduras has been working through 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. Ten CDERA (Caribbean Disaster Emergency Response Agency) participating states have enacted disaster legislation and four others prepared drafts. Mitigation policies and programmes have been adopted in Jamaica, Saint Lucia, Grenada, Belize and the British Virgin Islands. El Salvador has adopted a new Law for Civil Defence, Prevention and Disaster Mitigation and established a Civil Defence, Prevention and Disaster Mitigation Fund, in addition to a set of government monitoring indicators developed by the National Land Use

Survey. In Haiti, a draft decree for a new legal disaster risk reduction framework has been submitted to the parliament while Saint Lucia has updated its disaster management policy.

In Asia, most recent institutional and legislative developments have also adopted a systems approach and there are indications that legislative frameworks and institutional mechanisms may be starting to adopt a stronger focus on reducing risk and on linking disaster reduction to broader concerns in social, economic and territorial development.

While this serves as a useful indicator of possible changes in institutional trends and priorities for 'mainstreaming' disaster risk reduction concerns into development frameworks, it is important however to not overstate the trend. More detailed analysis of the reporting indicates that often the development of institutional systems for disaster risk reduction is still primarily focused on saving lives and reducing mortality risk. Developing new systems apparently involving development sectors often consists of the extension of a preparedness focus outwards from response organizations to a wider range of governmental actors. This may be due to the fact that the traditional institutional location of responsibilities for disaster risk reduction within Governments has not changed, since in most country reporting the coordination of systems still rests with the organization responsible for disaster response. The nature of progress being reported often reflects their organisational mandates, philosophy and perspectives.

There are some regional variations in this trend. In West and Central Africa, national legislations and institutions were weak or non-existent before the impulse provided by the development of an 'Africa Regional Strategy'. Many countries in these two sub-regions are now reporting the development of new institutions and legislation. These are mainly civil defence/protection offices with a focus on response and preparedness. Although a number of these organizations refer to prevention or risk management in their institutional profiles or nomenclatures, these terms are mainly used to refer to response preparedness rather than to a broader definition of disaster risk reduction. Likewise, in the Middle East and North Africa, disaster risk reduction is a relatively new topic of concern and existing legislation and institutional arrangements are dominated by traditional civil defence/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 general lack of government policies, organizational structures and legislative frameworks to underpin disaster risk reduction in an integral, coordinated and programmatic manner.

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 of decentralization of political authority and fiscal resources. Moreover due to the above challenges, it is interesting to note that there have been comparatively more countries reporting progress in disaster preparedness at the local level than achieving well-integrated institutional mechanisms at the local level. 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.

Few countries reported on local-level disaster risk reduction activities that go beyond building capacities for early warning preparedness and response. One of the exceptions is 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 quite likely that these activities have been under-reported in national reporting to date.

Addressing disaster risk reduction through national action plans, policies and frameworks

Overall, country reports from across regions indicate the importance attached to preparing systematic national action plans, policies and frameworks for disaster risk reduction. Most substantial activity has been reported from Asia and Africa but nonetheless efforts have been consistently reported from across all regions.

The process of developing legislation on one hand, and policies and plans on the other, does not proceed in a linear fashion. Enacting a disaster management bill does not appear to have a particularly strong bearing on whether a country is able to implement a national policy on disaster risk management. In Africa, Ethiopia established a disaster management policy and plan before enacting its disaster management legislation. In contrast, Malawi enacted the legislation in 1991 but is still to fully develop a national plan. In other cases, enacting legislation can be quite effectively followed up by the preparation of a national framework of action – such as in Sri Lanka where a 'road map' for disaster risk management (see Box 2) was prepared shortly after a Disaster Management Act was passed in 2005.

From such instances, it can be derived that countries tend to put in place elements of the institutional framework selectively, depending upon the national politico-economic circumstances amongst other influencing factors. The Pacific's example provides an interesting case (see Box 3) of how National Action Plans can propel selective changes in institutional structures and mechanisms for disaster risk management.

In the past couple of years, four southern African countries (Lesotho, Namibia, Swaziland and Zimbabwe) have also developed national action plans for capacity development in the five priority areas described by the Hyogo Framework, with a particular emphasis on strengthening institutional and legislative systems for disaster risk management.

As mentioned in the introduction to this chapter, most national plans and policies are principally focused on addressing mortality risk and relate to improvements in disaster response, preparedness, early warning and education. There is far less emphasis on reduction of underlying risk factors through measures implemented at the national and local level.

Box 2
Road map for disaster risk management: towards a safer Sri Lanka

Following the 2004 Indian Ocean tsunami disaster, Sri Lanka passed a new Disaster Management Act and established a National Council for Disaster Management as the leading body for disaster risk management in Sri Lanka with the Disaster Management Centre as the executing agency. The Council comprises 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 concerned 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 Road Map 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; and public awareness, education and training.

The Road Map was prepared with UNDP support, technical support from the Asian Disaster Preparedness Center (ADPC) and the World Meteorological Organization (WMO) through the National Meteorological Service. A total of 109 projects within the seven 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 the Government, UNDP and donors.

Box 3
Pacific Islands: the Vanuatu Disaster Risk Management National Action Plan

As part of governance programmes in the Pacific Region, an interesting example is the Vanuatu Disaster Risk Management National Action Plan. In the Vanuatu situation analysis for the development of National Action Plan, it is 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 coordinated and effective disaster risk management. Main activities include: defining and adopting organizational, decision-making, monitoring, reporting and accountability arrangements for disaster risk management; reviewing the Disaster Management Act of 2000 to give effect to disaster risk management principles and strategies contained in this National Action Plan; and formulating and implementing national legislation and policies for rationalizing monitoring and reporting of all natural hazards (geo-hazards, hydrological and meteorological).

In Asia and Latin America and the Caribbean, there are indications that institutional frameworks and mechanisms may be starting to adopt a stronger focus on reducing risks and on linking disaster reduction to broader concerns in social, economic and environmental development. Integrating risk reduction considerations into national policy frameworks such as the Poverty Reduction Strategy in Bangladesh, and the United Nations Development Assistance Framework (UNDAF) in India, Bhutan and Nepal, are such key instances. The Governments of Nepal and Bhutan have also been recently engaged in the development of "National Integrated Frameworks for Disaster Risk Management" with which UN frameworks of action are well aligned. In Guatemala, disaster risk reduction has been incorporated into the national public pre-investment system. Indonesia, with its new legislative framework, has moved from a responsive approach to a more preventive one and is working to incorporate disaster risk reduction into government plans and legislation. Similarly, Pakistan, through its focus on institutional and legal arrangements for disaster risk reduction, has established provincial and regional disaster management commissions and authorities, as well as 50 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. Iran's case is an interesting example to consider when assessing how national platforms for disaster risk reduction can effectively operationalize institutional investments in reducing disaster risks (see Box 4).

However, as will be emphasised below it is often 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.

Regional cooperation frameworks developed and strengthened

In some regions, such as Central America and the Caribbean, regional mechanisms like the Coordination Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC) and the Caribbean Disaster Emergency Response Agency (CDERA) are well developed, with mature regional planning processes and strong linkages to national planning institutional frameworks (see Box 5 and 6).

The Andean region is making similar efforts through the Andean Committee for Disaster Prevention and Attention (CAPRADE) and regional projects such as PREDECAN (Project to Support Disaster Prevention in the Andean Community – funded by European Union and the Andean Community). For further details on the Andean Region Strategic Plan (see Box 7).

In many other regions, particularly outside of the intensive risk hotspots, there was little urgency prior to 2005 to include disaster risk reduction in governmental development agendas - with few large-scale disasters and little exposure to international humanitarian concerns. Due to the factors mentioned in the introduction to this chapter, this has now changed. In regions such as Central and West Africa and in parts of North Africa and the Middle East, as well as in some individual countries in Asia, Latin

Box 4
Institutional investment in disaster risk reduction: case of Iran

The Islamic Republic of Iran has made a considerable investment in its institutions and its national platform for disaster risk reduction. An Executive Secretariat of the Hyogo Framework was set up under the overall supervision of the Interior Ministry's Natural Disaster Task Force. The work of the Secretariat includes:

1. Strengthening 23 Preparedness Working Groups. Iran has strengthened the activities and enhanced the role of Preparedness Working Groups established in 2003 within the framework of the National Relief and Rescue Comprehensive Plan approved by the cabinet, and based on Article 44 of the Third National Development Programme. Preparedness activities include data collection, research, planning, establishing management structure, training, and securing resources. The Preparedness Working Groups operate at three levels - local, provincial and national – with three categories of sub-groups on operations, prevention and training, which support the Preparedness Working Groups.

2. Creating a National Working Committee in 2005. Members of the Committee are: Ministry of Interior, Iranian Red Crescent, NGOs, Municipality of Tehran, President's Office, Social Committee of the Parliament, National Disaster Research Institute of Iran, National Iranian Broadcasting Organization, Disciplinary Forces, Ministry of Energy, Basij Organization, Housing Foundation, Meteorological Organization, International Institute of Earthquake Engineering and Seismology (IIEES), Tehran Disaster Mitigation and Management Organization, 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 for Disaster Risk Reduction, consisting of more than 30 members including line ministries, academic and research institutions, implementing agencies and NGOs.

4. Creating a High Level Council on Disaster Management. The chair of the Council is the President of the Republic and the Council is responsible for risk reduction issues at the time of disaster response, recovery and reconstruction.

5. Establishing nine specialized working groups in 2005 within the Ministry of Interior and on different aspects of disaster risk reduction, including: earthquake and landslide; rangeland revival and coping with drought; flood prevention; reducing air pollution; storm and hurricane hazards; rescue and relief; loss compensation; and health care.

6. Preparation of a 10-year plan for implementing the Hyogo Framework.

America and the Caribbean, where there was previously little interest in disaster risk reduction prior to 2005, there is now a growing political commitment to addressing disaster risk through developing institutions, legislative frameworks, policies and strategies.

Disaster risk reduction has been gaining momentum in Africa at a significantly fast pace over the past few years. In 2004, the African Union (AU) and the New Partnership for Africa's Development (NEPAD) approved an Africa Regional Strategy for Disaster Risk Reduction[58]. While a number of regional economic commissions such as the 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 the 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. 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 in Brazzaville, the African Ministerial Conference on Environment (AMCEN) mainstreamed the Africa Regional Strategy into its next five-year

[58] With the support of the UN/ISDR secretariat and UNDP

Box 5
Regional frameworks in Central America

Established in 1988, CEPREDENAC (http://www.cepredenac.org) is the specialized institution of the Central American Integration System 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 intersectoral agenda is harmonized with other specialized regional entities in such areas as hydrological resources, agriculture, and nutrition and food security. A Regional Disaster Reduction Plan (PRRD) has been developed with the aim of contributing to disaster risk reduction as an integral part of the sustainability of Central American societies. The strategic objectives of the PRRD include: (1) promoting the incorporation of disaster risk reduction into 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 into the design and implementation of prevention, mitigation, response, recovery and reconstruction measures 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 Disaster Reduction Plan (PRRD) 2006-2015. The PRRD 2006-2015 is based on Presidential Mandates and the Hyogo Framework and proposed improvements to the Plan were the result of a wide participatory 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 CEPRDENAC, allowing for the incorporation and ownership of more stakeholders in the multisectoral composition of the Commissions.

programme. At the sub-regional level, IGAD has developed a sub-regional strategy for disaster reduction. An Africa Regional Platform for Disaster Risk Reduction was also developed (further details in Box 8).

In south-eastern Europe, interest in addressing disaster risk reduction issues has grown since the adoption of the Hyogo Framework, evolving from a purely preparedness and response centred approach. A number of legislative initiatives on disaster risk reduction are being presently 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 Arab League countries as well as individual countries in other regions, such as Bhutan in Asia. In other regions, where significant experience already existed at the national level, consensus for regional cooperation is increasing. In South Asia, the creation of the South Asian Association for Regional Cooperation (SAARC) Disaster Management Centre in 2006, builds on progress being made at the national level and will provide

Box 6
The Caribbean Disaster Emergency Response Agency (CDERA)

The Caribbean Disaster Emergency Response Agency (CDERA) is the main specialized body for disaster risk management in the Caribbean, with 16 participating States and headquarters in Barbados. CDERA focuses on capacity building and policy formulation in disaster risk reduction. It is the broker of the Comprehensive Disaster Management Strategy and Results Framework adopted in 2001 by regional disaster management stakeholders, including civil society and the private sector. The Regional Strategy, aligned with the Hyogo Framework and emphasizing regional priorities, was adopted by the Caribbean Community in 2005 with a Programme of Work for 2005-2015.

The Regional Strategy was further enhanced in 2006 to make it more outcome focused. A monitoring and evaluation mechanism is also being developed as part of this programme-based approach to disaster risk reduction. The Regional Comprehensive Disaster Management Strategy is intended to emphasize disaster loss reduction through risk management, and to follow a more programme-based approach with an emphasis on results-based management.

additional support to partnerships and "solution exchanges" between ongoing national efforts.

While there is substantial progress being made in addressing disaster risk as transboundary concerns under regional frameworks of cooperation, it is worth noting that often real achievements on such a scale are bound with constantly negotiated requirements of a region vis-à-vis national priorities. Defining the middle point between the national requirement for mitigating and reducing risk and the realistic scope of what regional cooperation frameworks can address due to various political, territorial and economic imperatives, often seems to be the challenge at hand.

Box 7
The Andean Strategic Plan 2005-2010

The Andean Committee for Disaster Prevention and Relief (CAPRADE) is the specialized body for disaster reduction in the countries belonging to the Andean Cooperation (CAN) and was created in 2002. CAPRADE's objective is to contribute to the reduction of risk and impact of natural and man-made disasters in the Andean sub-region through: political coordination and lobbying; strategy and planning; the promotion of disaster prevention; mitigation, preparedness relief and reconstruction; and facilitating cooperation, mutual assistance and exchange of experience in the 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 secretariat have supported CAPRADE during this process. The Andean Strategy for Disaster Prevention and Relief 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 multisectoral and multistakeholder nature of these mechanisms. Another strategic action is the design and application of a new monitoring and evaluation system that will include the development of a structured group of indicators and protocols for data gathering and compilation.

For further information see: http://www.caprade.org/plan_trab.htm

Donor emphasis on mainstreaming risk reduction into institutional policies and aid disbursement heightened

As mentioned earlier in this section, there has been some progress reported in mainstreaming disaster risk reduction considerations into national development policies and frameworks through Asia and the Pacific, Africa and Latin America and the Caribbean.

Some donor countries, particularly in Europe, have made substantial progress in developing dedicated disaster risk reduction policies in their external cooperation instruments for development and

Box 8
Africa Regional Platform for Disaster Risk Reduction

The first "Africa Regional Platform for Disaster Risk Reduction Meeting" took place on 26 and 27 April 2007 in Nairobi, Kenya, followed by the first "West Africa Sub-Regional Platform Meeting" in Abidjan, Côte d'Ivoire, on 17 and 18 May 2007. These positive developments have been underpinned by growing cooperation between the UN/ISDR secretariat and the Commission of the African Union (AU) and Regional Economic Commissions, resulting in the UN/ISDR secretariat providing technical assistance staff to enhance the capacity of the AU to implement the Africa Regional Strategy. Establishing new national platforms and strengthening existing ones to enhance reporting on implementation of the Hyogo Framework will be the focus and priority for the coming years. Finally, awareness campaigns for school safety and disaster-safe hospitals will also get considerable focus in the implementation of the Hyogo Framework. These initiatives address the community level to help close some gaps in the implementation of all Hyogo Framework priorities for action at community level.

humanitarian assistance, with concomitant budgetary allocation.

In the United Kingdom of Great Britain and Northern Ireland, for example, various studies were commissioned by the Department for International Development (DFID), targeting the need for integrating disaster risk reduction strategies in European Union (EU) development policies. DFID also earmarked a part of its humanitarian aid budget for disaster reduction activities. The Swedish International Development Agency (SIDA) and Danish International Development Agency (DANIDA) are engaged in ongoing discussions on how to integrate disaster reduction into their aid programmes. During the German presidency of the European Union, the European Commission DG ECHO (Directorate-General for European Commission Humanitarian aid Office) and the German Federal Foreign Office led a discussion on the integration of disaster reduction into the humanitarian assistance provided by the European Commission and Member States. DG ECHO is fast approaching the threshold of 10 per cent of its humanitarian budget spending on disaster risk reduction, with other services (notably DG Development and DG RELEX – External Relations) exploring practical mechanisms for integrating disaster risk reduction. An inter-service coordinating group is developing what is intended to be a European consensus on disaster risk reduction. The Swiss Development Cooperation (SDC) is preparing a strategy for integrating disaster reduction into the country's development assistance. There are also attempts by some donors to work with the private sector in integrating disaster risk reduction as a partnership priority, with corporate social responsibility being increasingly important for the issue.

However, mainstreaming disaster risk reduction into donor institutional policies and development assistance also faces a number of challenges:

i. 'Mainstreaming fatigue' – disaster risk reduction ends up being another cross-cutting issue to be integrated into donor policy, in addition to governance, conflict, gender, HIV/AIDS and the environment;

ii. Lack of mechanisms for aid coordination and monitoring of progress among stakeholders. This has implications on institutional capacities for monitoring what inputs mainstreaming disaster risk reduction activities require, and regularly assess progress made. Although lack of indicators and benchmarks for assessing progress of mainstreaming risk reduction into national priorities is an apparent gap, it has not been explicitly mentioned in the reports received.

iii. Personnel and capacities: European countries also report a general lack of personnel and capacities for operationalizing mainstreaming disaster risk reduction in a meaningful manner. Often this means disaster risk reduction remains 'mainstreamed' at policy and strategy levels – i.e. in principle, but is not operationalized in practice, due to lack of awareness of the 'how and when' amongst existing personnel capacities.

The recent release of the ISDR/Tearfund report on "Institutional Donor Progress with Mainstreaming Disaster Risk Reduction" (2007) concluded that a more detailed self-assessment by donors on their progress with mainstreaming disaster risk reduction, is desirable. Such progress amongst donors will have obvious implications on setting benchmarks and defining more precise indicators to assess progress with mainstreaming disaster risk reduction across the policy–practice continuum.

Analysis of key challenges and gaps

Overall, a key challenge highlighted in most reports is that while political momentum may exist to create new institutional systems and legislation for reducing risks, lack of dedicated resources from national budgets and of trained personnel to implement plans, may inhibit the operation of existing systems.

i. Many countries, particularly in Africa, highlight lack of resources earmarked for disaster risk reduction as one of the key constraints on implementing the Hyogo Framework priority areas, in particular Priority 1. In Africa, there is little evidence of nationally based financial mechanisms to support disaster risk reduction or of budgetary allocations from governments, although Madagascar is an exception along with a few others. The Malagasy Government allocates an annual budget to the National Office for Risk and Disaster Management as the main disaster risk reduction activities' coordinating structure. This budget is dedicated to finance post-disaster

response and risk reduction activities. Further, after the adoption of a National Strategy for Disaster Risk Management, each ministry is required to allocate a certain amount of its annual budget for risk reduction and post-disaster response activity respectively.

In the Pacific region, such budgetary allocations are reported as being strikingly inadequate. A significant part of the disaster risk reduction progress described in the reporting is dependent on resources and assistance provided through international channels. In contrast, however, a number of developing countries, such as India and Iran in Asia, now allocate lines from national budgets to their disaster risk reduction efforts. In the Caribbean, Governments of the CDERA system have been increasing budgetary contributions for disaster management organizations and programmes. This has been especially evident after the eventful 2004. Many countries report the setting up of national emergency or relief funds. But as implied by their names, 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 immediately clear from the national reporting how many countries under such conditions really provide resources for disaster risk reduction purposes.

ii. Many countries have reported difficulties in operationalizing the legislative and institutional mechanisms for disaster risk management due to lack of buy-in on the part of line ministries and sectoral departments, into whose work disaster risk considerations are to be eventually 'mainstreamed'. While many countries report the formulation of national policies and plans, these are not necessarily followed up, for instance by assigning specific responsibilities and resources, and by developing plans for implementation at the local level or in each sector. In part, this relates to lack of adequate financial and human resources for integrating disaster risk reduction concerns into competing national development priorities. However, it is also related to the way political power is centralized or not in each country. For example, a large number of countries have established policies to decentralize the implementation of disaster risk reduction interventions. However, the devolution of responsibilities, authority and competencies, including resources, to lower administrative levels, is often limited, questioning the viability of the policy.

It is observable that in countries where the coordinating office for disaster risk reduction is overseen by the highest level of political power, there seems to be a better chance of influencing line ministries and ensuring coherence. Across regions, the lack of buy-in has a two way implication. One, this implies there is general lack of 'evidence' for national ministries dealing with other development priorities on how integrating risk reduction will impact development gains in real terms, over medium and long term periods. A second implication is of course on the lack of resources and trained personnel to carry out advocacy-related measures - for risk reduction to become a core development concern of all sectors.

iii. The capacity to engage and sustain political support for disaster risk reduction over the medium to longer term is another challenge. Many countries have gone through time-consuming processes to create or update legislation, policies and plans, sometimes with active support and participation of highly positioned political figures. Implementing laws and plans is still an ongoing task in many countries, affected by decreasing political support and, in some cases, interrupted by conflict and political instability. Political commitment to disaster risk reduction in most countries seems to be cyclical, and driven by the occurrence of large-scale disasters that require a political response.

iv. In spite of recent legislative and institutional reforms, there is little evidence of enforcement or accountability for risk reduction. In Africa, much of the disaster risk reduction legislation is still scattered across different laws in different sectors and often 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, without coherence between the governing areas of each. Where legislations have been in place for nearly a decade, there are no reports on whether these are fully enforceable measures. In countries where legislative mechanisms for disaster risk management have been recently addressed, it is perhaps too soon to

comment on the extent to which they are already being enforced. Also, there are no reports on whether enforcement of such legislations is built into institutional accountability for risk reduction.

v. The engagement of civil society and private actors seems to be another gap in reporting. It is apparent that across many countries particularly in Asia, Pacific and Latin America and the Caribbean, partnerships with NGOs are key to delivering risk reduction outcomes, especially in the awareness, knowledge, advocacy and capacity spheres. However, there has been little mention of such partnerships at national or local level in the country reports. Bangladesh's report on "building public-private partnership approach" for implementing community risk projects and research initiatives on climate change is an exception to this gap in reporting. Interestingly, a regional review of progress in disaster risk reduction in Sub-Saharan Africa[59] reveals that most of the national disaster management programmes in Africa recognize the role of key non-state entities and communities in disaster management. In addition, the regional report from the Middle East and North Africa reports that international aid and humanitarian organizations, such as Oxfam, the International Federation of Red Cross and Red Crescent Societies (IFRC), Muslim Aid and Islamic Relief, play a part in immediate relief provision and are increasingly focusing on disaster risk reduction as a theme for their own activities. From the national and regional reports, there is no strong evidence that the private sector is involved in a definite way, other than developing specific business continuity plans.

vi. Continued pre-eminence of emergency response institutions/actors across all regions: The basic approach to dealing with disaster risks remains response-centric even in countries which have adopted the language of disaster risk reduction in institutional and policy terms. A contributing factor could be that personnel staffing such national and local disaster risk management systems have previously served in emergency response situations, but are not necessarily aware of or sensitive to processes and mechanisms that might reduce risks.

vii. Lack of commonly accepted and widely utilized tools for tracking progress in risk reduction: National-level institutions, especially those set up after major disasters, are under tremendous pressure to show quick results. This is commonly interpreted as being visibly efficient in the aftermath of disasters. Greater collaboration with planning agencies and well accepted indicators of success are necessary to gauge to what extent progress is really being made in reducing risks.

[59] For the list of all regional reports received refer to Annex 5

3.2 HFA Priority 2:

Identify, assess and monitor disaster risks and enhance early warning

Under HFA Priority 2, country submissions centre around reporting results achieved with conducting risk assessments and developing early warning systems.

Risk identification and assessment

As mentioned in an earlier section of this report, risk identification at an appropriate scale provides key baseline 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 – deriving from the DesInventar methodology. 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 provide a vision of risk in both intensive hotspots and over extensive areas at a high resolution. For a full picture of risk, gender and age-specific data would be needed.

The Sustainable Cities Programme in Peru, implemented in partnership with Peruvian universities, has assisted 121 cities (including three in neighbouring Ecuador) to develop hazard maps (in all 121 cities) and land-use and mitigation plans (67 cities). This is an excellent example of an effort to mainstream disaster risk concerns into city planning and development.

Colombia has also advanced in detailed studies of disaster risk in many of its principal cities, particularly Bogota and Manizales, and is working with the National Planning System to incorporate risk considerations into all municipal-level land-use plans from October 2007 onwards.

The Government of Tajikistan established an Information-Analytical Center at the Committee for Emergencies and Civil Defence to build up a national network for ensuring reliable collection, analysis and storage of information on natural and technological disasters, to provide an opportunity for research in vulnerable areas, developing hazard, vulnerability and risk maps of dangerous processes, and forecasting the possibility of their origin and their consequences.

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[60] 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. 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.

Bangladesh has reported the application of "participatory approaches for community vulnerability and risk assessments in disaster management" by developing a uniform methodology called "Community Risk Assessment" and "Risk Reduction Action Planning Procedure". In sub-Saharan Africa, a number of countries have a long experience in developing vulnerability and capacity assessments to address food security concerns.

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 (IDB). In Africa, the United Republic of Tanzania and Sierra Leone report a comprehensive national risk assessment. In addition, Sierra Leone reports that the National Red Cross Society have also conducted a vulnerability and capacity assessment of the different regions in the country to complement the national hazard profiling. Other countries such as Ethiopia, Eritrea and Nigeria report partial assessments.

[60] For further information see: Vulnerability Atlas of India: State-Wise Hazard Maps and District-Wise Risk Tables, 2007, 2nd Edition. www.bmtpc.org/disaster.htm

Box 9
Achievements and status of the Indian Ocean Tsunami 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 organizations. 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 material have been generated and translated into the many different languages of the region. Today, the Indian Ocean Tsunami Warning System (IOTWS) 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 28) 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 IOTWS participating countries 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. The Platform for the Promotion of Early Warning (PPEW) is coordinating the work of a consortium of seven UN/ISDR System partners which are assisting with advisory and implementation support at the national level. This provides an example of a concerted and integrated apparatus for supporting the implementation of the Hyogo Framework.

Source: 2007 Report of Indian Ocean Consortium partners to the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWS): http://ioc3.unesco.org/icg/ and http://www.unisdr.org/ppew/iewp/pdf/IEWP(I)-3.pdf

Early warning systems

Many countries report good progress in developing early warning systems. National meteorological and hydrological services in 188 countries systematically monitor, and provide forecasts and warnings of potentially hazardous hydro-meteorological events such as heavy rains, drought, snow and hail storms, floods, avalanches, heat waves and cold waves, tornadoes, lightning, smoke haze, tropical cyclones, marine and aviation hazards and volcanic ash plumes.

Many national meteorological and hydrological services 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, wildland 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. Exchange of data and warnings, international coordination and capacity building are coordinated by the World Meteorological Organization (WMO), building on strong regional cooperation. 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, six regions are covered by related committees, two of which are also supported by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The UN/ISDR secretariat contributes to these initiatives by promoting interactions with disaster management sectors. A tsunami warning system has long existed in the Pacific Ocean, overseen by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Intergovernmental Oceanographic Commission (IOC). The 2004 Indian Ocean tsunami triggered the establishment of similar systems in other oceans and seas, most notably the Indian Ocean, but also in northern Atlantic Ocean, the Caribbean Sea, the Mediterranean and Black Sea.

Bangladesh was a regional pioneer in developing an effective early warning system through its cyclone preparedness programme and has demonstrated in practice how this could help reduce loss of life significantly. 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 are linking early warning to an estimation of storm surge impact modelling. In Africa, Kenya, for example, reports multisectoral 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

systems in 28 arid and semi-arid districts, providing timely and credible early warning information for response. Further, WMO is working with GRIP (Global Risk Identification Programme) on major projects for standardizing flood and drought risk assessment methodologies and they are together initiating 10 national flood and drought risk assessment projects in 2007–2008.

The development of early warning systems received an enormous boost from the efforts following the 2004 tsunami to promote comprehensive early warning systems in Indian Ocean countries, focusing not only on future tsunamis but also on regularly occurring events such as cyclones and floods (See Box 9). 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 latter's 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.

Under a CDERA-implemented Caribbean Disaster Management project funded by the Japan International Cooperation Agency (JICA), Barbados, Saint Vincent and the Grenadines, and Trinidad and Tobago developed integrated flood management programmes which involved bringing together the technical resources of the University of the West Indies, the Caribbean Institute of Meteorology and Hydrology and the knowledge of local communities. A key outcome of combining scientific and local knowledge is a low-cost community early flood warning device (See Box 10).

Telephonic Community-based Flood Early Warning
In the Pacific, 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 existing organizational framework for disaster risk management, which implies a poor articulation between hazard monitoring and warning, risk identification and analysis, and disaster preparedness and response.

Most importantly, risk-prone communities often lack capacities in disaster preparedness and response that can be utilised when a warning is issued. The Symposium on Multi-Hazard Early Warning Systems convened by WMO in May 2006 identified challenges along four components of

Box 10
Early Warning System for the Caribbean

The Caribbean Disaster Management (CADM) regional team that comprises academic staff from the University of the West Indies and the Caribbean Institute for Meteorology and Hydrology has designed and built a "Telephonic Community Flood Early Warning System".

The System is designed to mitigate the impact of flash floods in the Caribbean. The Caribbean is particularly vulnerable to flash floods, as a result of its topography and rugged terrain. Flash floods have had very serious impacts on the social and economic sectors and claimed lives in many part of the Caribbean. Recognizing this critical need, Governments of the Caribbean through a Caribbean Community (CARICOM)/Japan Technical Cooperation Agreement, established the CADM Project. The main focus of the Project was to build regional capacity for flood hazard mapping and developing community-based approaches to flood hazard mitigation.

The early warning system has been introduced to six Caribbean countries, including Barbados, St Vincent and the Grenadines, Trinidad and Tobago, Saint Lucia, Grenada and Dominica, as part of flood hazard mapping systems.

Thirty-six units of the System will be installed in the upper catchment of a watershed where they will be used to monitor rainfall regimes and instantaneously inform responsible agencies of the potential for flooding in lower catchments. The Telephonic Community Flood Early Warning System provides a simple yet cost-effective measure to assist disaster mitigation and response.

The Units are designed to alert a central monitoring station by placing calls from a dedicated landline telephone network, which will transmit tone sequences that indicate the level of rain water in the collecting container. Residents in flood-prone areas could be set at ease when the Units are installed, as they will now be able to receive early warnings about impending hazards and therefore improve their resilience and be able to evacuate in advance of impending flood waters.

For further information, contact CDERA at: http://www.cdera.org/

Box 11
Multi-hazard Early Warning Systems with global coverage

In 2005, at the request of the United Nations Secretary-General, a global survey of early warning systems was undertaken and coordinated by PPEW (Platform for the Promotion of Early Warning) with a view to advancing the development of a multi-hazard early warning system for all natural hazards. The survey report concluded that while some warning systems were well advanced, there were 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. These ideas were developed further by the Third International Early Warning Conference held in Bonn from 27 to 29 March 2006, and the WMO Symposium on Multi-Hazard Early Warning Systems for Integrated Disaster Risk Management on 23 and 24 May 2006. The Advisory Group of the International Early Warning Programme (IEWP) noted that the multi-hazard early warning system required long-term sustained action by diverse players and a strong political commitment to engender public action and make early warning a core task of national policy and disaster risk reduction strategy.

Source: http://www.unisdr.org/ppew/inforesources/ ewc3/Global-Survey-of-Early-Warning- Systems.pdf ; www.ewc3.org,; http://www.wmo.int/pages/prog/dpm/latestNews.html#ews_symposium

early warning systems. It clearly demonstrated the need for enhanced coordination among agencies involved in different aspects of disaster risk management - such as risk identification, hazard monitoring and warning dissemination, disaster preparedness and response. Better coordination and end-to-end planning among agencies involved in these different components is being addressed through the establishment of an Early Warning Systems Cluster as part of the ISDR System (See Box 11 and 12).

As many countries develop disaster databases, prepare hazards maps, undertake comprehensive risk assessments, and establish early warning systems, national reporting still does not reflect gender aspects. The fact that women's and men's, girls' and boys' daily routines and physiological and social conditions place them differently at risk, and engage them in different networks of communication, needs to be emphasised. No doubt, gender and age-disaggregated data are important to collect and analyze so that the needs of the most vulnerable can be addressed in an appropriate and effective manner.

Analysis of key challenges and gaps

Risk Identification and Assessment

i. Few countries report the completion of comprehensive risk assessments and even less report on the use of risk information in the development of disaster risk reduction policies, strategies and plans. For instance, in the Pacific, it is reported that decision making processes at 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.

ii. As in other areas, many African countries have identified risk assessment as a priority but are unable to move forward due to a lack of the necessary technical, financial and human resources. This challenge in implementing HFA Priority 2 seems to be similar to the one on lack of resources reported under HFA Priority 1.

Early Warning Systems

i. Country reports provide evidence of the many obstacles that remain in achieving early warning as a priority area. In a number of countries, in Africa in particular, 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 receive and use early warning to save lives.

ii. As demonstrated by the Pacific's example above, there is an overall poor articulation between hazard monitoring and warning, risk identification and analysis, and disaster preparedness and response. This remains a more institutional challenge – to be highlighted for action under integrating systems for disaster risk reduction, under HFA Priority 1.

iii. In addition to country reports on the creation of early warning systems, it is important to note from past experiences that warnings which do not lead to appropriate action contribute little, and action in response to warnings is only partly dependent on technical alerts or technology. How families and communities perceive threats, understand warnings, and know what actions to take, constitute only a few of the factors that influence whether life-saving action is ultimately taken. Thus, local knowledge and traditional warning systems can play vital roles, underlining the importance of engaging the most vulnerable groups, including children. Taken together, the effectiveness of preparedness and early warning can be significantly improved through better understanding and integration of the social factors that influence decision making at all levels.

Box 12
The International Early Warning Programme (IEWP) and the Platform for the Promotion of Early Warning (PPEW)

The PPEW was established with the support of the Government of Germany to promote the recommendations of the 2003 Second International Early Warning Conference (EWC II) and to facilitate the IEWP. PPEW became operational in early 2004 and takes strategic direction for its work from the IEWP Advisory Group. Considering the wide partnership of the IEWP network, PPEW plays a central role in coordinating the work of the IEWP as well as in maintaining the vitality of the network and in ensuring that partners are connected with each other and can contribute effectively to and benefit from the work of the IEWP. As a fundamental principle, the IEWP advocates that the key elements of "people-centred" early warning will be duly reflected in the international agenda and dialogue on early warning, including the IEWP strategic plan.

The EWC II in 2003 defined the IEWP's five areas of work. The outcome and the recommendations of the EWC II were endorsed by the UN General Assembly, and were brought to the 2005 Second World Conference on Disaster Reduction (WCDR II) to advance discussion on early warning. The IEWP's five strategic areas of work include: (1) better integration of early warning (and related disaster risk reduction and management) into development processes and public policies; (2) improved data availability for investigating, forecasting/predicting and managing risks on different time scales; (3) improved capacities and strengthened early warning systems, particularly in developing countries; (4) the development of people-centred warning systems; and (5) mechanisms for sustaining the early warning dialogue and supporting the development and implementation of a programme.

The role of the IEWP Advisory Group is to provide policy guidance to ensure that the IEWP's structure and programmes duly reflect the outcomes of the major global dialogues on early warning and the recommendations of the Global Survey of the Early Warning Systems[61]. The Advisory Group identifies priorities, expected outputs, gaps and opportunities for the IEWP, and advises on the operational matters of the IEWP, including planning and reporting of the programme and opportunities for mobilizing additional resources. The Advisory Group was formed as a result of an Early Warning Stakeholder Consultation Meeting at the Third International Early Warning Conference (EWC III) in March 2006, building on the preceding consultation mechanism of the UN Inter-Agency Task Force on Disaster Reduction (IATF/DR). The first meeting of the Advisory Group took place in March 2007.

For further information, see: http://www.unisdr.org/ppew/iewp/media.html

[61] Global Survey of Early Warning Systems - An assessment of capacities, gaps and opportunities towards building a comprehensive global early warning system for all natural hazards at:http://www.unisdr.org/ppew/info-resources/ewc3/Global-Survey-of-Early-Warning-Systems.pdf

3.3 HFA Priority 3:

Use knowledge, innovation and education to build a culture of safety and resilience at all levels

School curriculum and public awareness

An area in which considerable progress would appear to have been made is increasing public awareness, particularly by including disaster risk reduction in school curricula and in the production and dissemination of public information material. The UN Decade for Education and Sustainable Development 2005-2014, led by UNESCO, and continuing work by Governments and other actors toward the achievement of the MDGs, continue to provide the context for both disaster-proofing development, and ensuring that Education for All Children is carried out in safe schools[62].

There is enough experience in the fields of knowledge and education to reiterate that central to stimulating action is the need to raise awareness, engender wide engagement in preparedness from all parts of society, and translate an assessment of local risks into protective measures. To achieve these goals, preparedness and risk reduction programmes require priority support through better advocacy, increased investments and strong national efforts to translate preparedness principles to practical action.

A large number of countries report very encouraging progress in developing school-based programmes in particular. In Panama, for example, the programme "Rain is the Source of Life" consists of the placement of 10 rain gauges in schools affected by floods. The activity aims to develop a more holistic understanding of the environment, and for young children to appreciate the interconnectedness between them and the natural world around. The British Virgin Islands Department of Disaster Management has worked with a local community college to offer an online Certificate in Disaster Management and a safer building course is now also part of the curriculum of this institution. Also, disaster Management is formally included in all school curricula in the British Virgin Islands. Workbooks on geological hazards and hurricanes were designed for and introduced into pre-primary schools. A disaster management workbook has already been developed for primary schools and texts are now being designed for secondary schools.

In 2005, Haiti launched 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. The British Virgin Islands Public Information and Education arm of the Department of Disaster Management prepares and disseminates handbooks, brochures, handouts, and broadcast their awareness raising measures via radio and television.

All countries in South Asia report efforts to introduce disaster risk reduction into school curriculum and to launch school education

[62] Information on the "Disaster Risk Reduction Begins at School" 2006-2007 World Disaster Reduction Campaign is available at the UN/ISDR website at: http://www.unisdr.org/wdrc-2006-2007

Box 13
Pakistan educational and curriculum change

Pakistan has developed a programme to integrate disaster risk reduction into educational curricula and support awareness-raising in educational institutions. The initiative has developed curricula on disaster risk management for schools, colleges and universities. The objectives are to raise the awareness of students and to promote overall preparedness in educational institutions through conducting drills and reducing structural vulnerability. In addition, orientation programmes will be run to raise awareness amongst educational authorities and teachers.

The National Disaster Management Authority has also 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 the 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 high-impact hazard events. 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.

programmes at different levels. Nepal, for example, reports an earthquake safety programme for schools being implemented in 20 schools within Kathmandu Valley. In India, "Disaster Management" has been introduced as a compulsory theme in school curricula at national and state levels through the adoption of an educational text series entitled "Towards a Safer India". In addition, training in developing school safety plans is a crucial disaster risk management component being adopted in schools across India (For details on the Pakistan initiative, see Box 13).

The Governments of all Central Asian countries are also paying more and more attention to the development and inclusion of disaster response programmes and courses in secondary school and university curricula. Similarly, a wide range of training initiatives have been reported. The youth NGO from Tajikistan "For the Earth" has achieved considerable progress in child education in disaster preparedness and mitigation through training of trainers for children, parents and school teachers, applying the peer-to-peer methodology, and publishing relevant child literature in local languages.

The content of such programmes may often mirror the overall focus on disaster preparedness and response that characterizes the national 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 how they influence disaster risk reduction planning and decision making. Nor is it clear to what extent knowledge and education building measures consider gender aspects which should be based on gender and age-disaggregated data. For details on how the Platform on Knowledge and Education seeks to address some of these challenges, see Box 14.

Information management and portals

A significant number of countries are also developing information portals to ensure that information on all aspects of disaster reduction is widely available. For example, the Department of Disaster Management and Emergencies of the Turks 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 the Turks and Caicos Islands.

[63] Let the Children Teach Us: http://www.unisdr.org/let-our-children-teach-us

Box 14
Platform on Knowledge and Education

Knowledge, education and public awareness are three essential pillars of disaster risk reduction. 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. Challenges include the fact that educational programmes dedicated to risk reduction remain the exception rather that the norm in most countries. Most programmes remain 'pilot' projects conducted on a small scale; and institutionalization requires long-term commitment.

The ISDR Thematic Cluster/Platform on Knowledge and Education seeks to overcome some of these challenges through its system-wide involvement. The Platform includes representatives of Members States, civil society, international and non-governmental organizations, including: Bangladesh, Spain, France, UNESCO, United Nations Children's Fund (UNICEF), WMO, Council of Europe, International Federation of Red Cross and Red Crescent Societies (IFRC), ADRC (Asian Disaster Reduction Center) and many others (for an exhaustive list, please see the website: www.un.isdr.org). An interim organizing committee of the Cluster/Platform has been established to coordinate the efforts of the Cluster/Platform. It is formed by UNESCO, Council of Europe, ActionAid, 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, the Arab League, Asia and the Pacific, Europe and North America and Latin America and the Caribbean have contributed so far. Most material have been developed over the past five years, and there is evidence of growing commitment to forging the links between knowledge and action. The multilingual collection is a compilation of hard-copy documents and electronic resources (books, brochures, manuals, books for children, toys, games, toolkits, posters, DVDs, and CD-ROMs) and useful websites covering disaster risk reduction material for both formal and informal education. Physical libraries at UNESCO and UN/ISDR headquarters provide resource material for a substantial database prepared in conjunction with the Coalition for Global School Safety and Risk RED (Reduction Education for Disasters). An overview of existing tools and options was published in 2006 in the publication "Let the Children Teach Us"[63].

In Latin America, the Regional Disaster Information Center (CRID)[64] developed a virtual library which provides free access to over 10,900 electronic documents, and ensures the compilation and dissemination of disaster-related information in Latin America and the Caribbean. 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 prevention. A new collaborative effort between the UN/ISDR secretariat and the University for Peace, located in Costa Rica, includes the incorporation of a new course focused on disaster risk reduction into the University's' ongoing Master's programmes in environment, peace and security. (For details on the Andean System of 'Information for Disaster Prevention and Relief' refer to Box 15).

A number of sub-regional initiatives on developing information management systems through community-based measures such as newsletters and updates, as well as online 'communities of practice' for disaster risk management exist across Asia and the Pacific, in particular. These networks and information portals have not been necessarily reported in national authority submissions, but represent important work organised by NGOs and UN agencies in developing information partnerships with civil society and local organizations involved in disaster risk reduction activities.

Analysis of key challenges and gaps

i. Not many national authorities reported on progress made with capturing and utilizing local knowledge under this section. It is evident that local knowledge often plays an important role in the management of natural hazards and for the conservation of environmental resources. There are some ongoing attempts to address the issue. UNEP launched a programme to capture 'indigenous knowledge' in Kenya, South Africa, Swaziland and the United Republic of Tanzania. A project was also initiated in partnership with the Russian Association of Indigenous People of the North in the Nenets Autonomous Okrug and Kamchatka regions of the Russian Federation to document indigenous warning signs of natural hazards and how to cope with and mitigate their impacts.

ii. In the context of encouraging local discourse on 'knowing risk', it will perhaps be useful to explore how contextual awareness of the local environment needs to be encouraged through education and public awareness campaigns - instead of simply providing generic solutions through the mass generation and circulation of standardized curriculum or awareness material.

iii. It is well recognized from previous programme experiences across Asia, and Latin America and the Caribbean in particular, that schools' structural safety is paramount to ensuring risk reduction and sustainable development gains. Very few countries reported activity on strengthening the structural safety of schools directly, although this point will be further discussed below, under HFA Priority 4.

Box 15
The Andean System of Information for Disaster Prevention and Relief

In the framework of the Andean Strategy for Disaster Prevention and Relief - promoted and led by CAPRADE (Andean Committee for Disaster Prevention and Relief), activities related to the creation of an Andean System of Information for Disaster Prevention and Relief (SIAPAD) are in the process of being finalized. This initiative is supported by PREDECAN (Project to Support Disaster Prevention in the Andean Community).

SIAPAD is conceived of as a web portal specialized in relevant information on disaster risk management. The portal will help visualize information distributed and available in different institutions of the Andean countries and international organizations in an integrated manner.

SIAPAD seeks to: (1) offer a solution for the search and diffusion of information about subjects related to disaster risk management; (2) offer tools for general and specific visualization of geographic information related to disaster risk management; and (3) function as a navigation guide for web knowledge and information resources on disaster risk management.

For further information, see: http://www.comunidadandina.org/predecan or http://www.siapad.net

[64] CRID: Centro Regional de Información sobre Desastres (Regional Disaster Information Center): http://www.crid.or.cr/crid/ing/index_ing.html

3.4 HFA Priority 4:

Reduce the underlying risk factors

Land-use planning and house building

Progress reported on reducing underlying risk factors is more limited, with a smaller number of countries across regions emphasizing results relevant to this priority area.

Amongst countries reporting on this area, a substantial number 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. The Islamic Republic of Iran, for instance, reports efforts to reduce flood risk by retrofitting a large number of houses and to strengthen key buildings and facilities subject to earthquake risk.

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 the United Republic of 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, protect coastlines through natural vegetation barriers, reduce drought vulnerability through introducing rainwater harvesting, and 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. As a result of joint efforts of Tajikistan's academic circles, NGOs and the donor community, much progress has been achieved in the last few years in support of safer building strategies and the installation of state-of-the-art digital seismic stations, risk mapping and risk reduction techniques. To unite efforts, an inventory of residential buildings and social facilities (schools and hospitals) was developed in Tajikistan to create earthquake scenarios and develop recommendations for the authorities of the capital city, Dushanbe, aimed at helping implement measures that will substantially reduce seismic risk. Similar activities have been conducted in Bishkek (Kyrgyzstan) and Tashkent (Uzbekistan) under the UN RADIUS Project[65].

The Bahamas "Land Use Policy and Administration Project" signals an effort to address three aspects of land-use considered crucial to reducing underlying risks for the island nation, including: (1) efforts to modernize land administration, including initial steps to improve the legal framework for modernizing the real property rights registration system and securing land tenure; (2) preparing a geographical information system database for vulnerable islands; and (3) addressing national land issues and developing policy guidelines which consider legal, technical, institutional, economic, environmental and social aspects.

In contrast, land-use planning and regulation of building codes for both rural and urban areas is a challenge to enforce in most southern African and Asian countries.

However, many of the above-mentioned measures for addressing underlying risks are in the planning stage and it is too early to assess their impact on disaster risk levels. National reports carry little mention of efforts to retrofit risk-prone schools or hospitals (with exceptions in Latin America) nor lifeline infrastructure such as water and electricity networks. Evidence of the allocation of national budget lines to efforts of this kind is unavailable in the national reports. Only a few countries such as Maldives report the application of strategic national planning efforts to reduce disaster risks.

There is also little mention of successfully reducing risk through sustainable natural resource management and the incorporation of disaster risk reduction measures into environment planning and management.

[65] RADIUS: Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters. www.geohaz.org/contents/projects/radius.html

Climate change and adaptation

Another apparent trend is that few countries report on efforts to directly address climate change impacts, through the development of National Adaptation Plans of Action (NAPAs) - in the case of less developed countries - or through other means. 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. In many countries, this reflects a separation 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, few countries report 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. The United Kingdom of Great Britain and Northern Ireland is quite progressive in terms of mainstreaming climate change in public policy and developing local action plans that link into the national strategy on climate change.

In a number of countries, for instance Switzerland, France, Germany and Scandinavian countries, national platforms for disaster reduction and Hyogo Framework focal points are actively 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.

The example of Maldives (see Box 16) is pertinent to how small island developing states could manage vulnerability through strategic planning for climate change adaptation.

Risk insurance and private sector involvement

Overall, the involvement of other governmental sectors, financial institutions and the private sector in disaster risk reduction activities is reported only sporadically in national 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 ongoing activity involving utility companies, environment and planning ministries, the insurance and banking sectors, the transportation sector, large corporations, the tourism industry and others that is simply not being captured in government 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.

An interesting case of building public-private partnerships for reducing underlying risks was reported by Bangladesh. In the past two years, the Ministry of Food and Disaster Management in Bangladesh

Box 16
Managing vulnerability through strategic planning: Maldives

It became painfully clear after the December 2004 tsunami how vulnerable the Maldives were, facing risks that include low elevation above sea level, perennial beach erosion, dispersion of population across small islands, remoteness and inaccessibility of islands, concentration of economic activities around tourism, and 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 a programme called “Safe Islands Programme”.

The Safe Islands Programme focuses on the development of the larger islands with better economic opportunities, and environmental resilience. It also includes providing remote island populations with incentives for voluntary migration to main ‘hub’ islands. In addition, to mitigate future risk from disasters, land-use plans have been developed, incorporating features of high resilience. The Programme activities include a wider environmental protection zone, elevated areas for vertical evacuation in case of floods, the establishment of alternative modes of communication and detailed disaster management plans. Currently five islands have been identified for the Programme and development plans are being prepared in consultation with local populations.

Box 17
The World Bank's Catastrophe Insurance Pool

Catastrophe insurance pools can help countries increase insurance penetration when the domestic insurance markets are under-developed. They allow the Governments to transfer some of its contingent liability on private assets to the private insurance market, since in the absence of such a market Governments have a legal or moral obligation to finance reconstruction/replacement of assets destroyed by a disaster.

The Turkish Catastrophe Insurance Pool (TCIP) is such an example, which insures registered housing against earthquake risk. The key objectives for the TCIP defined by the Government of Turkey were to:

- Ensure that all property tax paying domestic dwellings have earthquake insurance coverage;
- Reduce government fiscal exposure to recurrent earthquake;
- Transfer catastrophic risk to the international reinsurance market; and
- Encourage risk mitigation through the insurance mechanism.

The TCIP's earthquake insurance is legally compulsory for many urban Turkish homeowners, although the compulsion is not well enforced. Local insurers act as distributors of the TCIP (they do not currently retain any fraction of TCIP's earthquake risk), in exchange of a commission (15-20 per cent of written premium) and provide additional coverage in excess of that offered by the Pool. Since its inception in 2000, the TCIP's penetration ratio has averaged 17 per cent but is now in excess of 20 per cent, with some 2.5 million policies sold in 2006.

The World Bank's Livestock Insurance Indemnity Pool
The Livelihood Insurance Indemnity Pool in Mongolia is another illustration where the World Bank helps the Government of Mongolia to protect herders against excessive livestock mortality caused by harsh winters, while limiting the Government's fiscal exposure to natural disasters. While catastrophe pools can be used to create proxy direct markets, increase domestic insurance penetration and ultimately transfer catastrophic risks from the Government and/or households to the private insurance industry, they can also help Governments manage the fiscal impact of natural disasters.

has given much emphasis on establishing a holistic partnership framework to integrate the programmes, policies and resources of the Government, NGOs and the private sector in one comprehensive risk reduction programme. This includes signing letters of agreements and memorandums of understanding with entities to implement small-scale risk reduction projects at community level.

In the World Bank's experience of working with Governments in the aftermath of disasters, as a consequence of the limited domestic insurance coverage for catastrophic risks provided by local markets and the lack of risk awareness or economic incentives to engage in ex-ante risk management, national authorities generally respond to disasters after the event, as opposed to preventing cumulative risks. In responding to the aftermath, Governments – especially in countries with low human development gains - rely on domestic budgets and on extensive financing from international donors.

The approach advocated by the World Bank and its partner institutions such as WMO and the World Food Programme (WFP), is to provide countries with strong economic incentives to engage in active risk management and thus over time achieve significant reduction in their growing vulnerabilities. On the whole, there are a number of un-reported key regional initiatives now under way to strengthen risk transfer as a risk reduction measure. The World Bank's Caribbean Catastrophe Risk Insurance Facility and catastrophe insurance pools in Turkey, Mongolia and the Caribbean Basin (see Box 17), and contingent credit facilities in Turkey, Mongolia and Colombia, or efforts to insure farmers against crop losses due to climate variability in Africa, are good examples of ongoing initiatives. There are also partner initiatives between WMO, WFP the World Bank and the private sector to facilitate the development of catastrophe insurance and weather risk management markets targeting the agriculture, energy and other sectors.

Analysis of key challenges and gaps

i. 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 is in the informal sector. However, a small number of 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 enforcement of building codes and regulations.

ii. Also, past experience has shown that school safety is important to emphasize both as a sound preparedness measure against exposure to recurrent or pervasive hazards, and also as a risk reduction measure to ensure that all communities are resilient and self-sufficient to consider immediate recovery measures with secure lives, livestock and food supplies. Safe structures, especially in remote areas vulnerable to floods, cyclones, rising sea levels, and earthquakes, can provide a whole community and their livestock with multi-purpose shelter to mitigate risks associated with a range of frequency and severity of hazards.

iii. There is still little reflection in the government 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.

iv. Few countries have reported on the implementation of psycho-social training programmes, especially in post-disaster recovery scenarios, which are important for all sections of an affected community, in particular children. This gap in addressing the issue via country reporting is perhaps due to the insufficient scale of such programmes and general lack of capacities to respond to the psycho-social needs of populations. The issue is discussed further elsewhere in this Review.

3.5 Hyogo Framework Priority 5:

Strengthen disaster preparedness for effective response at all levels

Efforts at national and local levels

All disaster events reveal that even nations that have applied risk reduction measures for decades still face considerable residual risks that cannot be managed and that will still cause major disaster situations. Since such risks cannot be eliminated, there is a need to mitigate losses associated with them when they manifest as disasters. Preparedness can be defined in different ways: response preparedness usually refers to actions to prepare for and plan an effective emergency response; but in a broader sense, preparedness can refer to a wider range of actions that can help mitigate losses in disasters. For example, communities and businesses can formulate preparedness plans to identify and minimize potential losses associated with existing or likely future risks.

Most countries report progress in response preparedness, however a growing number are strengthening preparedness capacities in a broader sense, linked to education, risk identification, early warning and investments in mitigation.

It is important to note that all countries, across regions, reporting activities on the five HFA priority areas, have perhaps achieved the most 'success' under Priority 5 – for strengthening disaster preparedness. Evidence of this reported success can perhaps also be found in the fact that recent climatic disasters have in fact shown a spectacular reduction in mortality losses – in both developed and developing country contexts. This reduction can be attributed to the recent and ongoing preparedness activities adopted by national authorities and humanitarian organizations across the world.

Effective 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.

Box 18
Philippines: Multi-pronged approach to disaster risk reduction

In the Philippines, disaster risk reduction is being dealt with in a variety of complementary ways under the implementation of the National Disaster Coordinating Council's four-point Plan of Action for Disaster Preparedness. These include:

- 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 and 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 training; and

- Strengthening mechanisms for Government and private sector partnership in relief and rehabilitation through the development of a 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 and trauma management, provision of houses to communities affected by typhoons, and harmonization of hazard mapping.

Philippenes provides an interesting example for adopting a multi-pronged approcah to disaster risk reduction. See Box 18 for details.

A significant number of countries across regions are now taking action to strengthen local capacities for disaster preparedness. Since 2001, India, has been implementing a local-level disaster preparedness programme which covers most hazard-prone districts of the country - with an impact on some 600 million people living in these districts. Many other countries report pilot projects in a number of local administrative areas. The Indian local level disaster preparedness programme demonstrates the potential for up-scaling local-level disaster risk reduction to the national scale and achieving self-reliant preparedness and response capabilities.

Central Asian states too have mechanisms and systems in place for disaster response, mitigation and rehabilitation to mobilize and coordinate the use of the central and local governments' resources. In Tajikistan, a Rapid Emergency Assessment and Coordination Team has been formed for coordination, interaction and cooperation among national authorities, UN agencies, donors, international and non-governmental humanitarian organizations.

In September 2004, the Australian Government announced the "Working Together to Manage Emergencies" initiative with the intention to build Australia's national preparedness for emergencies. The initiative works through establishing local grant schemes to assist local authorities to develop and implement emergency risk management initiatives, identify vulnerabilities with a view to enhancing protective measures for critical infrastructure, and provide emergency management and security awareness training for local government staff. Norway's municipal level disaster risk reduction efforts are worth highlighting (see Box 19).

Regional reports received for southern African countries reveal that detailed and well-integrated emergency response structures – mainly in the form of disaster management committees or units – have been established at national, provincial and district levels. Such committees coordinate and lead responses during emergencies. In some countries such as Namibia and Zimbabwe, flood contingency plans have been developed for flood-prone districts or regions.

Institutional efforts – UN and international agencies

At the international level, the UN Office for the Coordination of Humanitarian Affairs (OCHA) has led a group of agencies and NGOs also engaged in the Inter-Agency Standing Committee (IASC) to develop indicators and common principles for preparedness. OCHA has, over the past few years, assisted countries with the UN Disaster Assessment and Coordination (UNDAC) system. At the request of Governments, it has sent UNDAC teams of multi-sectoral experts on disaster response preparedness missions to assist in evaluating national disaster response structures, capacities and plans, and suggest areas requiring development and improvement . Through the International Search and Rescue Advisory

Box 19
Norway: Municipal-level disaster risk reduction

In Norway, it is the 431 municipalities that are the local foci for 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 proximity, the main responsibility for preventive planning and disaster management within 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, until now, no trans-sectoral judicial obligation regulating cross-sectoral preparedness and disaster risk reduction at the local level, is in place.

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

Group (INSARAG) Secretariat, OCHA also conducts numerous activities to improve international urban search and rescue capacity and systems to respond to earthquakes.

The International Federation of Red Cross and Red Crescent Societies (IFRC) have also made considerable efforts to promote International Disaster Response Laws, Rules and Principles . The related programme seeks to reduce the vulnerability and suffering of people affected by non-armed conflicts by raising awareness and promoting the implementation and strengthening of the laws, rules and principles that ensure a timely, adequate and efficient international response to disasters, where international involvement is needed.

Analysis of key challenges and gaps

i. The challenge faced by existing contingency plans across various countries is that they do not include recovery and rehabilitation elements. In some cases, where such elements have been included in the plans, capacities to apply them in post-disaster recovery scenarios are not entirely adequate.

ii. To strengthen disaster preparedness for effective response at all levels requires promoting the inclusion of women in disaster-related professions where they are still under-represented. Past experience across regions shows how active engagement with grassroots women's groups could help enhance resilience in families and communities.

iii. A key challenge that emerges from an analysis of country reporting under this Hyogo Framework Priority, and despite the progress mentioned above, is mismatch between national-level efforts to strengthen (and build capacities for) institutional and legislative systems for preparedness, and similar efforts at the intermediate and local levels. There seems to be a significant advocacy and political lobbying role undertaken by institutions at the national and international levels, for adopting risk reduction as a priority at the national level. However, such efforts are often not adequately matched by awareness or capacities to translate commitments at the local and intermediate levels – where the real 'action' often has to be supported.

Chapter 4

Integrating Disaster Risk Reduction into Development

This concluding chapter summarizes each of the broad disaster risk scenarios identified and characterized in Chapter 2. It also relates this risk analysis to the progress reported by countries and regions in addressing disaster risk reduction – as presented in Chapter 3. On the basis of these conclusions, this section identifies a number of 'cross-cutting' challenges for the ISDR System and the objectives of the Global Platform for Disaster Risk Reduction. It is expected that these challenges will inform ISDR System planning and work programming at all levels by influencing the formulation of appropriate goals, targets, plans and monitoring indicators by ISDR partners across all levels.

Chapter 2 revealed important differences in the risk patterns and trends emerging in intensive risk hotspots characterized by high impact geological hazards (e.g. earthquakes, volcanic eruptions and tsunamis) and climatic hazards (cyclones, floods, droughts). These trends were in contrast to those observed in areas of extensive disaster risk, mainly characterized by large numbers of highly localized climatic hazards (e.g. flash floods, landslides, mudslides, wildland fires). The 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.

It could be argued that this three-fold categorization of risk scenarios is far too broad to be useful for analytical purposes at country and regional levels. For instance, 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 purpose of the analysis presented here is to identify and compare broad global trends in risk and in disaster risk reduction, rather than specific regional and national characteristics of manifest risk. From that perspective, the three scenarios examined, aim to provide a useful starting point for analysis of risk trends.

4.1 Earthquake Risk Hotspots

This Review indicates that a substantial and growing proportion of future disaster mortality will occur in large-scale catastrophes in earthquake risk hotspots, if current trends in both disaster risk and its reduction continue. Both hazard exposure and relative vulnerability are increasing in countries located in highly seismic regions that experience rapid urban growth. A number of key patterns and trends in global earthquake risk have been identified in this Review.

Disaster risk trends and impacts

Patterns and models of economic and urban development

The patterns and models of economic and urban development that characterize countries experiencing exponential urban growth, are leading to increased earthquake risk, both in terms of mortality as well as economic loss.

Earthquake mortality risk is increasing at a particularly alarming rate in rapidly expanding large cities and mega-cities, where a significant proportion of urban development may be unregulated or informal and where the application of seismic-resistant building and planning standards is uneven.

An earthquake in such contexts may also exceed the financial capacity of a country to absorb the loss and recover. Some major cities concentrate a substantial proportion of national GDP and may play important roles in both the regional and even the global economy. Many earthquake risk hotspots therefore increasingly pose threats in terms of both growing mortality risk as well as significant direct and indirect economic loss with global implications.

In contrast, earthquake mortality risk is far lower in cities in highly developed countries, with regulated urban growth incorporating seismic-resistant building and planning standards, even though the economic loss risk may be very high.

In rural and remote mountainous areas in less developed countries, earthquake mortality risk is particularly high and may be accentuated by remoteness and lack of health facilities, food supplies, communication and infrastructure. However, given the tendency towards urbanization in most countries, it is unlikely that mortality risk in rural areas is increasing at the same rate as in rapidly expanding cities. Absolute economic loss risk is less in such areas because the monetary value of the assets exposed is far less, although the relative value of local lost assets such as housing, infrastructure and livelihoods may be very high for populations affected.

Early warning for earthquakes

In contrast to climatic hazards, early warning for earthquakes is still a scientific challenge. While cases of successful earthquake early warning have been reported in China, Iran and elsewhere, these experiences are at an experimental stage and have yet to be validated for mainstream use. Until earthquake early warning is validated and mainstreamed into development planning, mortality risk will be only partially sensitive to a reduction through improvements in disaster preparedness and response.

Infrequency of major earthquakes

The relative infrequency of major earthquakes in many countries conspires against public awareness of risk, political will and commitment to reduce risk and maintaining levels of effective disaster preparedness. Risk is undoubtedly highest in cities that have not experienced a major earthquake in decades or even centuries and where significant urban growth and area development plans have not taken earthquake risk into account.

Preparedness and response only partially reduces earthquake mortality

It is important to highlight that improvements in disaster preparedness and response contribute only partially to reduced earthquake mortality. Given that most earthquake mortality is often directly related to structural failure, even well developed disaster preparedness and response systems may not result in a significant reduction in earthquake mortality risk.

Earthquake risk for women, children and the elderly
Earthquakes pose particular risks to women, children and the elderly, given their daytime presence in unsafe houses, schools and community facilities. While

global data on earthquake risk is not disaggregated by gender or age, many case studies have shown a disproportionate impact on these groups.

Disaster risk reduction progress

Taking into account these earthquake risk patterns in the context of varied development trends, the progress reported by countries in earthquake risk hotspots is unlikely to have more than a marginal impact on increasing mortality and economic loss risks.

Building codes, retrofitting and regulation

A number of countries do report important progress in terms of enhancing building codes and planning regulations and in the retrofitting of important buildings including schools and hospitals, and these efforts should certainly be highlighted. Unfortunately, the progress reported is still in terms of isolated efforts in specific countries and is not proportional to the scale of the problem. Similarly, country reporting on broader efforts to reduce risk through addressing the underlying patterns of economic and urban development is scarce.

Risk transfer facilities

A few countries report efforts to reduce economic loss risk through introducing risk transfer or contingency financing facilities but again there is no evidence of a major trend in this direction.

Public awareness and preparedness for response

Most of the progress being reported 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 or economic loss risk in earthquake risk hotspots. It is not clear from the reporting whether these efforts take into account the needs of specific vulnerable groups such as women, children and the elderly.

There may be far more progress at the country level than has been reported. In some countries, the modernisation of the urban sector may be leading to an improvement in building standards, which though not linked to disaster risk reduction efforts, over time reduces earthquake risk. At the same time, considerable progress has been made in the identification of earthquake risk in many hotspots, with support from international initiatives[68]. However, the country reports give few indications that this risk information has been mainstreamed into urban planning, building and management and there is even less evidence of effective implementation. Similarly, there is already a strong body of good practices on all aspects of earthquake risk reduction from countries around the world. The challenge, therefore, would appear to be one of adoption and mainstreaming, rather than of lack of know-how per se.

[68] 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 non-profit organization 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

Challenges and opportunities

To conclude, therefore, if current development trends continue, both mortality and economic loss risk will continue to increase. Given this scenario, major reductions in earthquake risk will only be possible through a drastic realignment of disaster risk reduction priorities in the countries concerned. Some of the challenges to be addressed in achieving such realignment, and for which many 'good practice' examples already exist, are:

- Rapid urbanization per se does not have to lead to increased earthquake risk and, on the contrary, can bring substantial economic and social benefits to a country. Nevertheless, 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. This implies an increased application of risk-sensitive planning for land-use and infrastructure development and an effective application of appropriate building standards, through improving codes and norms to ensure that new additional risks are not generated.

- 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 unplanned villages and unsafe structures, where the impact of conventional planning and building regulation is very limited. In many countries, therefore, it is necessary to complement regulation with innovative approaches to planning and building, such as through strengthening the capacities of informal sector builders and participative settlement planning.

- To be sustainable, reduction in earthquake risk will have to be supported by policies to address the kind of structural urban processes that can generate physical vulnerability in the first place. Land tenure, insecure livelihoods, access to transport and infrastructure and urban poverty trends are instances. To be effective, technical measures need to be accompanied by legal and financial mechanisms, addressing issues such as property rights, rent laws and financial incentives.

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

- Strengthening preparedness and response capacities should include the strengthening of local search and rescue capabilities, recognizing that most success in rescuing victims occurs in the hours immediately after an earthquake. Vulnerable women and children should be empowered to lead the strengthening of preparedness capacities in homes, neighbourhoods and schools.

- Economic loss risk can be significantly reduced by wider application of risk transfer measures such as insurance and the development of contingent financial facilities for both Governments and the private sector, particularly in those countries where the likely impact of a major earthquake would exceed economic resilience capacity.

4.2 Climatic Risk Hotspots

This Review indicates that an increasing proportion of future disaster economic loss will occur in climatic risk hotspots, particularly in developed countries, if current risk trends and risk reduction efforts continue. In contrast, mortality rates are very sensitive to improved development conditions and to enhanced early warning, disaster preparedness and response, and have been reduced in most developed and some developing countries. However, climate change is increasing both climatic hazard and vulnerability and may reverse the trend to reducing mortality. A number of key patterns and trends in climatic risk have been identified in this Review.

Climatic risk trends

Mortality risk decreasing

Mortality risk in climatic risk hotspots in developed countries has so far been minimized 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.

High climatic mortality risk is now associated primarily with poor, predominantly rural countries, with low levels of human development. In these countries, mortality rates are still at a high level but are stable, with a tendency to decrease. Enhanced early warning, preparedness and response can minimize mortality in climatic disasters – for instance, through the orderly evacuation of people to safe areas, the application of cyclone shelters, emergency water and sanitation and improved health care, food distribution and others. A number of developing countries have achieved very substantial reductions in mortality risk in this way.

Economic loss risk increasing, particularly in developed countries

Economic loss risk will become increasingly concentrated in climatic risk hotspots particularly in developed regions, due to increased exposure of economic assets, for example as a result of urbanization of coastal areas. In other words, the same patterns and models of economic and urban development that are contributing to reduced mortality risk are actually leading to increased economic loss risk.

Economic loss risk is only partially sensitive to reduction through enhanced early warning, preparedness and response. Reduced loss and destruction of economic and livelihood assets are sometimes possible through the interim protection or removal of transportable assets to safe places, or, in the case of drought, through decisions in agricultural planning. Yet, considerable volumes of assets cannot be protected in these ways.

In climatic hotspots in poor rural areas, while the absolute economic value of asset loss may be low, the disruption of livelihood assets can be devastating and, due to factors such as environmental degradation and rural poverty, overall risk levels may increase.

The impact of climate change on mortality risk

The trend towards reduced mortality may be reversed due to increased climatic hazard and vulnerability due to global climate change. This could reverse the trend towards reduced mortality even in developed countries, particularly when existing warning, preparedness and response capacities do not evolve to address newly emerging risks - as demonstrated by the 2003 heat wave in Western Europe, or in scenarios whereby capacities have been allowed to lapse, as demonstrated by the impact of Hurricane Katrina in the United States of America in 2005.

In developing countries, such a possible reversal in the trend could be far more dramatic. For example, while reduction in drought mortality in Sub-Saharan Africa, in particular, has been impressive over recent decades, this tendency may be unsustainable if increased vulnerability, associated with food and water stress and HIV/AIDS prevalence, coincides with more extreme drought events.

Increasing economic loss risk due to climate change
More frequent, stronger and less predictable cyclones, floods and droughts due to climate change, when they coincide with the increasing exposure and vulnerability of economic assets, will also accentuate the trend towards increasing economic loss risk particularly in developed countries.

The impact of climate change in specific hotspots may be devastating, especially in low-lying, heavily populated coastal areas, small island developing

states (SIDS), semi-arid areas and areas that depend on glacier melt for their water supply, leading to unsustainable levels of risk.

Climate risk management progress in countries

Taking into account these noticeable climatic risk trends and projected impacts across climatic risk hotspots, the following measures reported by countries will perhaps be 'first steps' towards addressing global impacts by unfolding climate-related risks.

Institutional and legislative mechanisms for early warning and preparedness strengthened

Many countries exposed to climatic risks 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 are leading to a significant and continued reduction of climate-related mortality risk in a large number of countries.

Improved risk identification and analysis

Improved scientific knowledge has enabled increasingly accurate modelling of patterns of weather and climate variability, such as tropical cyclones and the El Niño Southern Oscillation, as well as the likely consequences of global climate change on existing climate variability in different regions.

There is little evidence, however, that these models have been translated into hazard scenarios at the country level, although 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 of mortality and economic loss.

Even less progress is reported in identifying the specific risks associated with these hazard scenarios in a way that can usefully inform development planning and investment decisions. Analogous to the situation in earthquake hotspots, little progress is reported in addressing climatic risks through measures such as risk sensitive land-use planning or the introduction of drought-resistant agriculture, underlying processes of urbanization, environmental change and rural poverty which can reduce exposure and vulnerability.

Risk transfer mechanisms

A number of countries report efforts to reduce economic loss risk through risk transfer or contingency financing facilities but these, as examined under the previous analysis on earthquake risk hotspots, remain isolated cases rather than a generalized trend.

Adaptation to climate change and disaster risk reduction

Only a handful of countries reported linkages between efforts to adapt to climate change, to reduce disaster risk and to manage environmental change due to emerging (and often quite severe) impacts on livelihood options and poverty trends. There would appear to be little synergy among institutions responsible for disaster reduction and those responsible for climate change, environment or other areas such as social development.

There may be far more progress at the country level than has been described here. Many specific programmes and projects, in areas such as environmental protection and increased community resilience, may significantly reduce disaster risk but are generally not reported here, for example, community environmental management projects implemented by NGOs.

From the evidence examined, and if current trends in disaster risk reduction continue, economic losses continue to increase in climatic risk hotspots, while due to climate change future potential reductions in mortality will be challenged.

Challenges and opportunities

As in the case of earthquake risk hotspots, if these conclusions are approximate to the unfolding realities, there is a need to revise and reorient approaches to disaster risk reduction, for which a number of broad parameters can be outlined. A number of 'good practices' exist for these parameters – some of which have been highlighted in Chapter 3, under analysis of country progress made with the HFA priorities.

- Major reductions in climatic mortality risk are possible through a more generalized application of effective preparedness, early warning and response systems. 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.

- Improved climatic risk information can make ongoing investments in early warning, disaster preparedness and response more focused and could lead to greater reduction in mortality risk. A first step 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 increase in frequency of hazards due to global climate change.

- Economic losses in the agricultural sector can also be reduced by the implementation of early warning systems and the application of early warning information to agricultural planning. If combined with a greater application of risk transfer mechanisms, such as catastrophe insurance for farmers, this could lead to significant reduction in the exposure and vulnerability of the agricultural sector.

- On the basis of improved climatic risk identification, factoring the likely impact of climate change (where this can be modelled), increased investment in environmental protection measures and sustainable livelihoods can reduce hazard exposure and vulnerability in many areas, particularly when this fully involves community and informal sector capacities. Such measures include improved water and river management, the promotion of sustainable agriculture and livelihood diversification, as well as mechanisms such as conserving and extending natural coastline protection, reforestation and recharging groundwater reserves.

- As in the case of earthquake risk hotspots, new urban and infrastructure development must be guided through planning, regulation and incentives towards increased resistance and resilience. This implies a comprehensive application of risk sensitive planning for land-use and infrastructure development, accompanied by the effective application of appropriate building standards, through improving codes and norms to ensure that new risk is not generated. In particular, approaches to planning and building should be made applicable to unregulated and informal settlements.

- Given the potentially catastrophic impact of global climate change on both mortality and economic loss risk, there is an urgent need to achieve greater synergy and explicit links among international protocols and national policy frameworks. In addition, it will be important to decentralize institutional arrangements with a view to mitigating existing risks, enabling communities to adapt to climate change and reducing underlying factors of risk through to the local level.

- Although increased disaster risk is only one outcome of climate change, global efforts to mitigate climate change through reducing emissions are now an essential part of any global strategy to reduce disaster risk. There is need to address the issue of global responsibility for climatic disaster risks.

- Similarly, if efforts to adapt to climate change include investments to reduce climatic disaster risks, the benefits will outweigh the costs of climate-related disasters. However, the economic feasibility of reducing extreme climate risks in some areas, particularly in the case of low-lying small island developing states vulnerable to sea level rise, will be challenging.

4.3 Extensive Disaster Risk

This Review indicates that the greatest threat to livelihoods and human development in less developed countries is due to the increasing impact of frequently occurring but highly localized climatic hazards, such as flash floods, landslides, wildland fires and storms over extensive areas, affecting the rural poor as well as urban marginal communities and households. A number of trends and patterns in what has been classified in this Review as 'extensive risk' have been identified.

Extensive disaster risk trends

Increasing manifestations of extensive risk

The rapid increase in disaster occurrence reported in global databases in recent years is associated with frequently occurring, highly localized mainly climatic hazards, such as flash floods, wildland fires, landslides and storms, which affect small concentrations of people and livelihoods over extensive areas as well as within intensive risk hotspots.

Rapidly growing mortality and livelihood risk associated with climatic hazards

The mortality associated with localised risk is not globally significant but accounts for a substantial proportion of total disaster mortality in many countries. For localised risks, the mortality associated with climatic hazard is growing rapidly while that associated with geological hazards is decreasing.

Direct economic losses associated with extensive risk are likely to be low in global terms, given the impact in poor rural and marginal urban communities. Nonetheless, in relative terms, they may be huge in particular localities and regions.

The most significant impacts of localised risks over extensive areas is associated with physical losses of livelihoods assets, houses, local infrastructure and public facilities, which have a devastating effect on poor rural and marginal urban households and which represent a serious threat to human development and to the achievement of the MDGs. Frequently occurring small-scale losses have a cumulative negative impact on already vulnerable livelihoods, eroding development gains and failing human development.

The 'drivers' of extensive risk

The key drivers of highly localized, frequent risks are concurrent processes of urbanization, environmental change and the economic development of new territories occurring in regions of low human development and high social and economic vulnerability. When regions are subject to these processes, the extent, frequency and magnitude of highly localized flooding, drought, flash flood, landslide and wildland fire 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 intensive risk hotspots.

The impact of climate change

Global climate change will ratchet up current patterns of extensive risk with rapidly increasing climatic hazard levels in degraded environments, affecting increasingly vulnerable and fragile livelihoods and living conditions, increasing poverty and stretching coping capacities with evidently negative impacts on nutrition, health, education and income. The rural and urban poor that experience extensive risk are particularly sensitive and susceptible to the impacts of global climate change and in many ways are on the 'front line' where even small changes can have devastating consequences.

Country progress in addressing extensive disaster risk

Taking into account these patterns and trends, the progress on disaster risk reduction reported by countries has the potential to stabilize and reduce the mortality associated with extensive risk. In contrast, other impacts of extensive risk such as livelihood disruption and development setbacks are not being addressed.

Extensive risk is 'invisible' risk

Given low mortality rates and direct economic losses, extensive risk is ignored by the international humanitarian community. The scale of the impacts and the diffuse nature of the losses do not have the political

and humanitarian impact of a single large event, even though the accumulated impact of losses on human development may be considerable. Similarly, most small disasters are essentially local in character and affect rural and urban communities rather than strategic economic interests.

Strengthened local-level disaster preparedness reduces mortality but does not necessarily protect livelihoods
A relatively large number of countries report efforts to strengthen the capacities of local governments and vulnerable communities to manage disaster risk. This includes the development of local early warning systems and preparedness and response capacities and for strengthening public awareness and education. It has been shown that these efforts can dramatically reduce mortality in risk-prone localities. Although this is not often highlighted by Governments, large-scale programmes implemented by non-governmental actors are contributing substantially to strengthening local and community capacities.

Little progress is reported in the strengthening of local capacities for other aspects of disaster risk reduction, particularly in areas such as livelihood diversification, environmental management, safe building practices, risk-sensitive planning, hazard mitigation and vulnerability reduction. There is likewise little evidence of links between efforts to strengthen local disaster risk reduction capacities and efforts to adapt local economies to the impacts of climate variability.

There may be far more progress at the county level than is currently being reported - driven by local governments and communities themselves, by non-governmental actors and by other governmental sectors. Nevertheless, if the above trends continue, reductions in mortality may be achieved through improvements in early warning, preparedness and response. However, unless the underlying risk factors are addressed, economic and livelihood losses will increase - particularly among poor rural and urban communities - with extremely negative effects on economic indicators of poverty, health, nutrition, education and human development in general. If extensive risk continues to accumulate in many regions, new intensive risk hotspots may form.

The deterioration in human development associated with extensive risk will be magnified by climate change impacts on the resilience of vulnerable social groups, in particular that of women-headed households and girl children in rural and urban areas.

Challenges and opportunities

The problem of extensive risk, therefore, calls for a radical change in approach, for which a number of broad parameters can be outlined.

- To address extensive risk requires a new vision by the international disaster risk reduction community. The current emphasis on saving lives needs to be complemented with a vision of protecting and strengthening livelihoods and human development. Addressing localized, recurrent exposure to risk is the most effective way of protecting the livelihoods of vulnerable communities and realistically meeting the MDGs.
- A greater decentralization of national disaster risk reduction efforts to the local level is essential. To be sustainable, local efforts by communities, local governments and NGOs require support through national-level programmes. Such a strategy offer greater possibilities of success and sustainability in 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 local capacities on a sustainable basis is far more challenging.
- Alongside efforts to strengthen preparedness and response, local disaster risk reduction strategies should also address underlying risk factors through measures such as livelihood diversification and protection, environmental management, safe building and risk sensitive planning. Such measures require both local involvement and ownership as well as public and private investment.
- Disaster risk reduction and adaptation to global climate change should be seen as mutually supportive goals at the local level. Strengthening the social, economic and environmental resilience of communities and reducing exposure to local hazards are effective ways of reducing risk to existing climatic variability. Strengthening capacities to reduce risks associated with the climate as it is today is the most effective way of dealing with changes in climatic hazards of the future.

4.4 Cross-Cutting Challenges

The Hyogo Framework outlines five priorities for action to reduce disaster risk and, within each priority for action, identifies a range of specific themes. All these priorities are relevant to achieving the strategic goals and objectives of the Hyogo Framework. Taking into account the Hyogo Framework as an overall framework for guiding the ISDR System, the present Review, through the analysis presented above, has highlighted a number of key cross-cutting challenges which should receive particular attention.

The challenges are outlined in substantive and indicative terms, with analysis around some of the key reasons why these issues should be addressed with urgency by members of the ISDR System. This Review does not attempt to identify how these categories of issues could be addressed by ISDR System partners.

For some issues such as institutional and legislative arrangements, risk identification, early warnings, climatic risk reduction and adaptation, public-private partnerships and mainstreaming disaster risk reduction, amongst others, while progressive efforts have been initiated, more concerted action is urgently required if the world's commitment to the Hyogo Framework and the Millennium Declaration are to be respected.

The challenges are derived from the comparative analysis of current risk trends, coupled with country progress reported until 2007 vis-à-vis the commitments endorsed by the Hyogo Framework in principle. The analysis below must not be read as recommendations to national authorities on behalf of the ISDR System. Attention, in this case, is drawn back to the ISDR guidance document entitled Words into Action: Implementing the Hyogo Framework for Action[69], which provides practical guidance on how to start addressing some of these issues for activities undertaken under each of the five priorities for action of the Hyogo Framework.

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 within the National Government, their degree of decentralization and multi-sectoral 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 a perspective focused solely on emergency management approaches and skills, rather than a complementary developmental risk reduction perspective. Where development sectors and line ministries are engaged, it is also often from an emergency response perspective rather than with a focus on mainstreaming development concerns.

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. They must engage with and be integrated into institutions which address climate change, environmental degradation, risk transfer, urban planning and gender, with the necessary political authority and resources. The benefit of regional approaches in supporting assisting national capacity development in disaster risk reduction, especially in framing model policies, instruments and programmes, need to be further utilized.

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 is to ensure that existing programmes of local-level disaster risk reduction that are primarily focused on strengthening capacities for preparedness and response, begin embracing capacities for reducing underlying risks 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.

[69] Words into Action: Implementing the Hyogo Framework for Action to download at: http://www.unisdr.org/words-into-action

Mainstreaming disaster risk reduction into development

The Hyogo Framework recognizes risk reduction as both a humanitarian and development issue – in the context of attaining sustainable development. The Hyogo Framework endorses three strategic goals in the context of achieving the above outcome: (1) the integration of disaster risk reduction into sustainable development policies and plans; (2) development and strengthening of institutions, mechanisms and capacities to build resilience to hazards; and (3) the systematic incorporation of disaster risk reduction approaches into the implementation of emergency preparedness, response and recovery programmes. To achieve these strategic goals, efforts at mainstreaming disaster risk reduction would have to cut across the five priorities for action identified in the Hyogo Framework.

As has been recognized across the chapters of this Review, efforts at mainstreaming disaster risk reduction have often been piecemeal by Governments and international institutions alike. A concerted understanding of what constitutes mainstreaming activity, and how this is to be practically achieved remain 'blockages' at the national and international level. While such gaps in knowledge and practice of mainstreaming disaster risk reduction institutionally and into development practices at large do exist, there have been some considerably successful experiences with mainstreaming disaster risk reduction into particular strategic goals of the Hyogo Framework. The challenge now is of course to be able to integrate efforts made across the Hyogo Framework strategic goals and priorities for action, so that mainstreaming disaster risk reduction into one priority sphere of activity may have an equally meaningful impact on other spheres of required activity.

Disparate and isolated efforts at addressing risk management issues at the national and local level are not sufficient to truly address the underlying causes of risk, and realize the potential of both forward looking and corrective risk-sensitive development planning, which could change current and projected risk trends for millions of people.

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 reducing existing risks. At present, the country reports indicate that some progress is being made in hazard identification and mapping. Insufficient progress is 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. And the issues of risk perception based on gender, gender and age-disaggregated data and the use of vulnerability analysis - especially for women, children, the elderly and care givers – are not addressed.

Therefore, greater emphasis is required in 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 present risks.

Early warning

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

While this progress is encouraging, a number of challenges have been identified. These include improving institutional linkages between hydrological and meteorological services and the organizations responsible for disaster risk management at the national level. This is necessary to ensure vertical linkages between the national and local levels so that local communities have access to understandable warning information and local capabilities to use warning information are 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. There is also a greater focus needed on 'soft issues' of early warning, including the communication of early warning and information to people of different communities, gender and age.

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 is to introduce disaster risk reduction as an investment item in public sector budgets, with a specific focus on identifying and reducing 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 risks, for example in 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 greater engagement of both the municipal authorities of urban areas and the national agencies responsible for land-use planning and urban development in governance arrangements for disaster risk reduction.

Another 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 and urban poverty and wider application of risk transfer mechanisms and others.

Climatic risk reduction

This Review identifies the need for 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 already has on patterns of climatic risk, a key challenge is to strengthen national and local capacities to manage and reduce risks associated with existing climate variability. 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 recognized as a primary tool to achieve the adaptation goals of the UN Framework Convention on Climate Change (UNFCCC). In addition, monitoring and analyzing trends, including the way in which communities are coping with adverse circumstances linked to climate change and other crisis settings (such as conflict and HIV/AIDS) in the case of both slow-onset and sudden-onset hazards, will be important.

The issue of environmental or risk-induced migration has not been discussed in this Review. However, the likelihood of increasing internal and external migration due to worsening climatic risk is real and will have to be addressed by the international community in the near future.

Post-disaster recovery

Given the inevitability of future large-scale catastrophes, post-disaster recovery will continue to offer a major entry point for disaster risk reduction in many countries. National authorities, the UN System and NGOs at national and local levels have made use of recent major disasters to encourage a culture of 'building back better' so that previous risks are not re-built in a post disaster scenario. Instead, emphasis has been on developing new structures and mechanisms to ensure that new buildings, cities and village communities are better prepared to reduce future risks and respond to frequent hazards more effectively.

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.

Other cross-cutting challenges

There are also other issues, such as recognizing the psycho-social needs of communities, gender inequities, NGO involvement, and human security and rights,

which have still to be sufficiently acknowledged in risk reduction priorities for action at the national level. While these issues were only marginally addressed and analyzed in the national reports, they have been addressed in this Review as challenges and a reflection of major gaps in current practice.

Mental health and psycho-social issues

Including mental health and psycho-social issues in disaster risk reduction remains a challenge to be addressed. While some countries recognize this important issue, few progress reports discuss the topic. The protection and promotion of psychosocial well-being and the prevention and treatment of physical and mental disorder is recognized as integral to humanitarian efforts and social development, and as essential to building resilient communities for disaster risk reduction. As a result, psychological issues should be integrated into all policies, plans and programmes in the ISDR System, in the implementation of the Hyogo Framework, and in all sectors (e.g. health, education, security, shelter, sanitation, organizational management and systems) through inter-agency collaboration and training of personnel. Specifically, these policies, plans and programmes should assess and monitor mental health needs, build community capacity, provide resources for interventions, and develop education and training programmes to increase psycho-social preparedness in community and institutional settings, and provide for the psychological care of all disaster workers and humanitarian aid workers involved in disaster response.

At present however, assessing from the country reports reviewed, very few countries have mechanisms and structures in place to systematically incorporate mental health and psychosocial issues in disaster planning. Notably, few professionals are trained in countries to deal with these issues, as has been shown in the case of recent disasters. For example, when the Indian Ocean tsunami hit, there was only one psychiatrist in the entire northeast coast of Sri Lanka, and only a small team of psychosocial support aides (many of whom dealt with alcoholism problems) to cover an entire coastal region of disaster-affected people.

Structural safety of schools

Barring a few countries, attending to the structural safety of schools has been given insufficient attention by national, and previously international, planning for preparedness or reducing underlying risks. In Chapter 3, reference is made to the gap in addressing schools' structural safety, whereby past experiences across Asia and Latin America and the Caribbean are cited where ensuring school shelter safety has been paramount to ensuring risk reduction gains – and to meeting the MDGs. School safety is important to emphasize both as a sound preparedness measure against exposure to recurrent or pervasive hazards, and also as a risk reduction measure to ensure that all communities are resilient and self-sufficient to consider immediate recovery measures with secure lives, livestock and food supplies. Experiences have shown how safe structures, especially in remote areas vulnerable to floods, cyclones, rising sea levels, and earthquakes, can provide a whole community and their livestock with multi-purpose shelter, to mitigate risks associated with a range of frequency and severity of hazards.

While anecdotal reports of such experiences have been collected from Algeria, Bangladesh, Cambodia, Canada, Colombia, Fiji, India, Indonesia, the Islamic Republic of Iran, Italy, the Lao People's Democratic, Nepal, New Zealand, Pakistan, the Philippines, Peru, Sri Lanka, Turkey, the United Kingdom of Great Britain and Northern Ireland, the United States of America, Uzbekistan, their approaches, scale and impact have not been fully documented.[70]

Gender equity and related issues

Although there has been a history of engagement in the subject of gender and disaster risk management and recovery - on behalf of international agencies, NGOs and even some ministries in select countries, serious efforts to incorporate the issue into risk reduction and recovery practices is conspicuously absent. The country reports analyzed in Chapter 3 are a stark pointer to the lack of gender-sensitive planning, institutions and practices for risk reduction and recovery.

[70] Good practices in school disaster risk reduction - both in disaster-resistant construction and retrofitting of school buildings and in education of children and local communities in disaster risk reduction - are currently being solicited by the UN/ISDR secretariat Advocacy and Outreach Unit, using a simple but comprehensive case study template. These practices will serve as a touchstone for a plan to develop guidelines for ministries, departments and boards of education in Member States for the many ways that disaster risk reduction can be successfully integrated into school curricula.

The irony is that gender remains one of the most important underpinning factors influencing who does risk reduction at the local level, and who can access its benefits. If disaster risk reduction is to be realistically addressed across communities, gender equity issues, gender-disaggregated data and gender roles need to be understood by context, and incorporated into risk reduction and recovery practices. If disaster risk reduction internationally and locally have to have any meaningful impact on human development and well-being in the light of the MDGs, gender roles and realities have to be a key consideration.

Human security and social equity issues in disaster risk management

There have been some recent and ongoing attempts to explore the links between human rights, social equity and disaster risk management issues, especially in recent post-disaster contexts of the 2004 tsunami and the 2005 Kashmir earthquake. The Indian National Institute of Disaster Management hosted a working seminar on the subject in August 2007, as the first of its kind in Asia. The UN System in the Pacific also attempted – through a consultative workshop - to integrate the issue of human rights into disaster risk reduction practices earlier in 2007. However, the issue is still only tentatively approached by national institutions and international agencies working on risk reduction and recovery across all regions. The challenges posed pertain to the different kinds of governance contexts which support discussions around how social equity can be objectively ensured in the face of disaster risks and different socio-political vulnerability contexts.

While the issue remains of academic concern at present, it will be vital to operationalize international standards – such as produced by the Inter Agency Standing Committee (IASC) in 2006[71], for addressing basic minimum claims for assistance and social insurance which poor communities at risk worldwide would be in principle entitled to.

[71] IASC Operational Guidelines on Human Rights and Natural Disasters (2006)

Annexes

Annex 1: Technical Annex

Note 1 – Hazard

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 are characterized by location, duration, magnitude and timing. They 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 of occurrence. 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 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 per se resulting from its strength, frequency and predictability. Their impacts vary in terms of the areas affected and 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 wildland fires. Cyclones may cause coastal flooding. Climatic events such as El Niño 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 over time. At the local level, hazard is modified through processes such as urbanization, population growth and environmental change. Globally, there is now a critical mass of evidence which shows that climate change is drastically altering patterns of climate-related hazard.

Note 2 - EM-DAT international disaster database

By analysing the EM-DAT (Emergency Events Database) international disaster database, it is possible to reveal patterns and trends in disaster occurrence and loss globally, comparing countries, time periods and 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, affect 100 or more people, or where a situation 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, the IFRC, insurance sources, the media and others, and is maintained by CRED (Centre for Research on the Epidemiology of Disasters). EM-DAT has a number of data fields including numbers killed and affected and economic losses. It does not include gender and age-disaggregated loss data given that the source data, in general, does not include this either. By definition, most disaster loss associated with extensive risk scenarios is below the loss thresholds defined by EM-DAT and is therefore not documented in the database

Note 3 - Disaster risk

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 (e.g. earthquakes, volcanic eruptions, tsunamis) or those related to climate (e.g. floods, droughts, cyclones, mudslides). For the sake of simplicity in the rest of this Review, 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 Review, they have been included with climatic hazards as, unlike other geological hazards, they are sensitive to patterns of environmental and climatic change.

Disaster risk can be expressed in various ways according to the context. Examples might include expected mortality due to earthquakes over the next 10 years in India, the probability of the GDP of Jamaica being reduced by hurricanes in the next year, or 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 4 – Hazard exposure

A UNDP publication (2004) entitled "Reducing Disaster Risk: A Challenge for Development", together with the World Bank Op. Cit. 2004, and additional work carried out by UNEP-GRID (Global Resource Information Database), 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 – Vulnerability

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 interplay 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.

Vulnerability is heavily conditioned by gender and age and, from context to context, 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 often overlays vulnerability to everyday 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 everyday 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 – Disaster Risk Index

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 manifest risk (average number of people killed by a hazard type annually in a country over a 20-year period: 1980-2000) and hazard exposure for the same period and country. In other words:
Vulnerability = Risk / Hazard Exposure.

Put simply, if in both country X and Y, one million people were 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 lost their lives, the human vulnerability for earthquakes would be 100 times greater in country X than in country Y.

Manifest risk, as derived from loss data, nevertheless 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 – Disaster Risk Hotspots

World Bank, op. cit. 2005. 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 some problems. Most of the variance in EM-DAT mortality between countries is explained by hazard exposure and not by vulnerability factors (90 per cent for earthquakes, 82 per cent for tropical cyclones and 86 per cent for floods). The classified vulnerability coefficients may therefore tend to reflect differences in hazard levels 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 is EM-DAT economic loss data is also explained by hazard exposure.

Note 8 – Disaster Deficit Index

An Inter-American Development Bank (IDB) study compared the likely economic loss attributed to a major disaster in a given time period with the economic coping capacity of a country, resulting in an indicator known as the Disaster Deficit Index (DDI). Seven criteria were used to calculate a country's economic coping capacity including: (1) insurance and reinsurance payments for insured government-owned goods and infrastructure; (2) disaster reserve funds; (3) public, private, national and international aid and donations; (4) new taxes; (5) budgetary reallocations, which usually correspond to the margin of discretional expenses available to the Government; (6) external credit that the country could obtain from multilateral organizations and the external capital market; and (7) internal credit the country may obtain from commercial banks as well as the central bank. The DDI can therefore be considered as an indicator of a country's economic vulnerability to natural hazards. 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 loss

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 (e.g. number of mortalities and injuries, number of displaced people) and in terms of physical impact (e.g. number of houses damaged or destroyed, number of hectares of crops lost, hospitals and schools damaged).

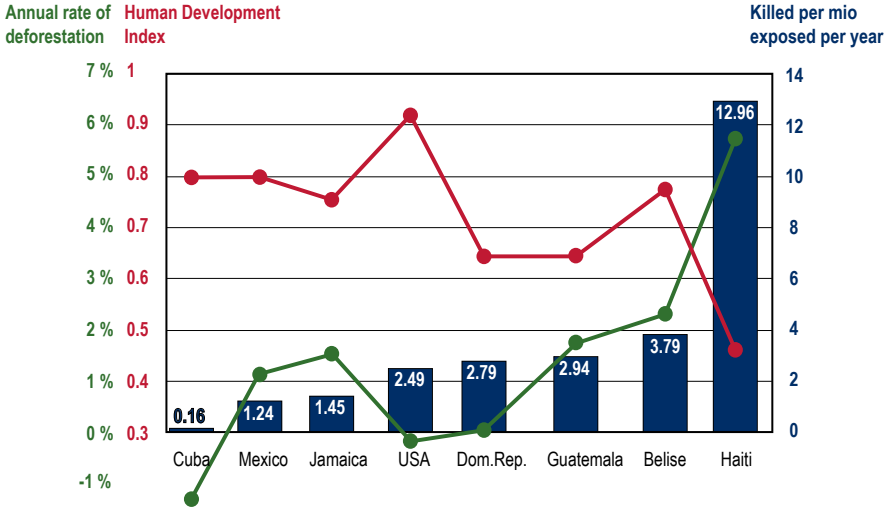
Disasters can be measured in terms of economic loss: direct loss, which is the monetary cost of damage and destruction; and indirect loss, which refers to the wider disruption of trade and economic activities. Absolute economic loss is usually greater in regions with a large concentration of high asset value infrastructure and economic activities, than in poorer or peripheral regions. However, relative economic loss may be far greater in poorer areas when losses are measured as a proportion of the total economic wealth.

Note 10 – Vulnerability factors

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)[72]. 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.

Tropical Cyclone impacts and environment quality

This graph shows the number of killed per inhabitant exposed to tropical cyclones (in blue). Such ratio is a proxy of vulnerability, Cuba showing the lowest vulnerabilty and Haiti the highest. Although level of development is correlated, the most developped country (USA) is not the country with the lowest vulnerability. The level of deforestation (in green) provides higher correlation (89%) with vulnerability. Dominican republic (0% deforestation) has the same exposure as Haiti, (5.6% of deforestation), but 4.6 less killed per exposed. Relation between environment quality and risk should be better studied.



Source: Adapted from Peduzzi, Environment & Poverty Times, #3, p.3, UNEP 2005

[72] UNDP op. cit.

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 vulnerability indicator most closely correlated with risk. In many rapidly growing cities, earthquake risk considerations are not factored into the building and planning processes and the sheer rapidity of urban growth conspires against the regulation of buildings and 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

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 regional development banks, using a methodology developed by the UN Economic Commission for Latin America and the Caribbean (ECLAC). The ECLAC methodology is usually applied in the aftermath of a major disaster 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.

Although the results of all existing applications of the ECLAC methodology are recorded in EM-DAT, this database contains economic loss entries for less than a third of the disasters registered. So while EM-DAT probably provides the best public domain data on the global economic cost of disasters, it is still a less than perfect sample. Due to lack of standardized methods for recording and calculating economic cost, except for those cases where the ECLAC methodology has been applied, economic cost estimates for individual disasters are not necessarily accurate.

Note 12 - National disaster databases

Most of these databases have been produced by a variety of governmental, non-governmental and academic organizations using the DesInventar (Disaster Inventory) methodology originally developed by the Network for Social Studies in Disaster Prevention in Latin America (LA RED) 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 in principle provide a more complete picture of absolute disaster loss at the national level, as well as permitting sub-national comparisons and analysis.

Note 13 – Mortality in extensive risk scenarios

In a study that compared the EM-DAT database with four national disaster databases for Chile, Colombia, Jamaica and Panama[73], two thirds of the total number of persons 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 Nevado 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 per cent of the total mortality registered in the national databases corresponded to medium-scale events apparently not reported in EM-DAT. Due to the methodological complexities of comparing 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 captured internationally.

Another 18 per cent 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 manifestations of extensive risk represent 7 per cent of the total mortality in the four countries.

[73] 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.

Annex 2: List of Acronyms

ADPC	Asian Disaster Preparedness Centre
ADRC	Asian Disaster Reduction Center
AMCEN	African Ministerial Conference on Environment
AU	African Union
BCPR	Bureau for Crisis Prevention and Recovery (UNDP)
BOND	British Overseas NGOs for Development
CADM	Caribbean Disaster Management
CAPRADE	Andean Committee for Disaster Prevention and Relief
CARICOM	Caribbean Community
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 (Coordination Centre for the Prevention of Natural Disasters in Central America)
CIIFEN	International Research Center on El Niño
CRED	Centre for Research on the Epidemiology of Disasters
CRID	Regional Disaster Information Center
DANIDA	Danish International Development Agency
DDI	Disaster Deficit Index
DesInventar	Inventario de Desastres (Disaster Inventory)
DFID	UK Department for International Development
DKKV	German Committee for Disaster Reduction
DRI	Disaster Risk Index
ECCAS	Economic Community of Central African States
ECLAC	Economic Commission for Latin America and the Caribbean (UN)
ECOSOC	Economic and Social Council (UN)
ECOWAS	Economic Community of West African States
EM-DAT	Emergency Events Database
EWC (II)	(Second) Early Warning Conference
GDP	Gross domestic product
GFDRR	Global Facility for Disaster Reduction and Recovery
GFMC	Global Fire Monitoring Center
GLOF	Glacial Lake Outburst Flood
GRID	Global Resource Information Database
GRIP	Global Risk Identification Programme
HDI	Human Development Index
HFA	Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters
IASC	Inter-Agency Standing Committee
ICPAC	IGAD Climate Prediction and Applications Centre
IDB	Inter-American Development Bank
IDNDR	International Decade for Natural Disaster Reduction
IEHS	Institute for Environment and Human Security (UNU – United Nations University)
IEWP	International Early Warning Programme
IFRC	International Federation of Red Cross and Red Crescent Societies
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
IGNOU	Indira Gandhi National Open University
IIEES	International Institute of Earthquake Engineering and Seismology (Iran)
IOTWS	Indian Ocean Tsunami Warning System
IPCC	Intergovernmental 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
LA RED	Network for Social Studies in Disaster Prevention in Latin America
MDG(s)	Millennium Development Goal(s)
NAPA(s)	National Adaptation Plan(s) of Action
NASA	National Aeronautics and Space Administration (USA)
NEPAD	New Partnership for Africa's Development
NGI	Norwegian Geotechnical Institute
NGO	Non-governmental organization
OCHA	Office for the Coordination of Humanitarian Affairs
OFDA	Office for Foreign Disaster Assistance (USAID)
PPEW	Platform for the Promotion of Early Warning
PREDECAN	Project to Support Disaster Prevention in the Andean Community
SAARC	South Asian Association for Regional Cooperation
SADC	Southern Africa Development Community
SDC	Swiss Development Cooperation
SIDA	Swedish International Development Cooperation Agency
SOPAC	Secretariat of the South Pacific Applied Geoscience Commission
UN	United Nations
UN/ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UN/ISDR	Inter-Agency Secretariat of the International Strategy for Disaster Reduction
UNDAC	United Nations Disaster Assessment and Coordination
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO/IOC	UNESCO/Intergovernmental Oceanographic Commission
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNV	United Nations Volunteers
WCDR (II)	(Second) World Conference on Disaster Reduction.
WFP	World Food Programme
WMO	World Meteorological Organization

Annex 3: List of Tables, Figures and Boxes

Annex 4: References

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Global Risk Identification Programme (GRIP): http.www.gri-p.net GRID-Arendal: http://www.grida.no/

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International Strategy for Disaster Reduction: http://www.isdr.org

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Annex 5: List of Reports Received

From countries or territories

Africa:
Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Comoros, Republic of Congo, Djibouti, Eritrea, Gabon, Gambia, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Niger, Nigeria, Central African Republic, Rwanda, Senegal, Seychelles, Sierra Leone, United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe.

East Asia and Pacific:
Australia, Republic of Korea, Mongolia, the Philippines, Singapore, Thailand, Vietnam.

Europe and Central Asia:
Armenia, Cyprus, Finland, France, Georgia, Germany, Hungary, Kazakhstan , Norway, Sweden, Switzerland, Tajikistan, United Kingdom of Great Britain and Northern Ireland.

Latin America and the Caribbean:
Argentina, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Saint Lucia, Saint Kitts and Nevis, Bahamas, Turks and Caicos Islands, United States of America.

Middle East and North Africa:
Algeria, Egypt, Iran (Islamic Republic of), Iraq, Morocco, Yemen.

South Asia:
Bangladesh, India, Nepal, Pakistan, Sri Lanka.

From regions

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.

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From organizations and ISDR thematic platforms

Climate Change and Disaster Risk Reduction, Global Fire Monitoring Center (GFMC), International Early Warning Programme (IEWP), International Recovery Platform (IRP), International Research Center on El Niño (CIIFEN), ISDR Thematic Cluster/Platform on Knowledge and Education.

Annex 6: Reporting on Disaster Risks and Progress in Disaster Risk Reduction

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 paragraph 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 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, identify gaps in implementation and prepare periodic reviews of progress, in the context of the General Assembly and related processes.

2. Reporting process in 2007

The ISDR secretariat has initiated the reporting process with a request issued on 26 January 2007 to the nationally nominated focal points for the Hyogo Framework (and to Member States' Permanent Missions to the United Nations Office in Geneva), accompanied by a guidance document entitled "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 members of the IATF/DR (Inter-Agency Task Force on Disaster Reduction) and to the leaders of ISDR-associated thematic platforms. The requested report 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. Report on progress to the Global Platform for Disaster Risk Reduction (the first meeting of which was held from 5 to 7 June 2007).
ii. UN Secretary-General reports on the ISDR and on other related topics to the UN General Assembly (usually prepared in 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 was very compressed, which presented difficulties to reporting agencies in responding to the requests for reporting and to the UN/ISDR secretariat in summarizing the available information in time for the June 2007 First Session of the Global Platform for Disaster Risk Reduction. A Draft Report of 65 pages was made available in English at the Session. Feedback and inputs provided during the Session were incorporated into the Report.

As of August 2007, 62 member 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 generation of regionally aggregated reports for four regions - Africa, Asia, Latin America and the Caribbean, and Middle East and North Africa - which provided a regionally informed foundation to the report to the Global Platform.

The report to the Global Platform covers the period 2005-2006, with a view to updating on progress since the last major reporting exercise associated with the Second World Conference on Disaster Reduction in January 2005. It covers, 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 (GRIP) and by the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, and secondly, the progress being made by countries and organizations to reduce risks and to implement the Hyogo Framework. Because the information available covers a limited number of countries, the Report necessarily provides 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 in the USA, while the following year was less extreme with relatively few major events. Nevertheless in 2006 there were 426 reported natural disasters that killed more then 23,000 people, affected 143 million others, and were the cause of more then USD 34.6 billion in economic damage. Asia remained the most affected continent, and floods and windstorms continued to be the two major causes of economic impact[75].

Evidence from risk assessments indicates two broad global trends:

i. 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.
ii. 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 publicized and typically do not lead to any major changes in policy or behaviour.

[75] http://www.em-dat.net/documents/CRED%20CRUNCH%208%20-%20March%2020071.pdf

It is clear however that many Governments and organizations recognized the need to raise the priority of disaster risk reduction in 2005 and 2006, 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 111 countries and five subsidiary territories.
ii. National platforms for Disaster Risk Reduction have been launched in 39 countries.
iii. Ministerial-level regional agreements and strategies have been agreed or are being developed in several regions and sub-regions, (Africa, Asia, Pacific Islands, Latin America and the Caribbean).
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 Assessment Report on Disaster Risk Reduction, 2009 (GAR/DRR)

The Hyogo Framework calls on the ISDR secretariat and partners 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 developed to prepare a major global stocktaking on trends in disaster risks and progress on disaster risk reduction. This stocktaking will be presented in the form of ISDR system wide biennial global assessment reports on disaster risk reduction. The first ISDR biennial report is being currently prepared for release in 2009. It aims to be a landmark assessment based on thorough analysis of achievements and gaps in implementing the Hyogo Framework, 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 for these activities being specifically identified in the Hyogo Framework.

The 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 ISDR annual reports and reviews. 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 ISDR secretariat overview. A senior expert has been seconded from UNDP to lead the production of the Report. The project is also supported through the World Bank partnership with the ISDR secretariat.

5. Guidance on indicators

The Hyogo Framework requests the ISDR System, supported by the ISDR secretariat, to coordinate the development of "generic, realistic and measurable indicators" for disaster risk reduction. It encourages 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 MDGs 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 policy makers, with a strong focus on practicality and effectiveness in 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. 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 UN/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 UN/ISDR secretariat to develop a matrix of commitments and initiatives in support of follow-up to the Hyogo Framework. Information for the matrix has been gathered principally for international and regional levels, and is structured 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 Hyogo Framework's five priorities for 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 UN/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 online 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 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 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. MDGs), procedures for reviewing progress and to develop or refine indicators at national level, or to undertake regional assessments.

The UN/ISDR secretariat will continue to seek close linkages between the reporting activities and other ISDR System activities, including the development of guidance material 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". The secretariat 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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