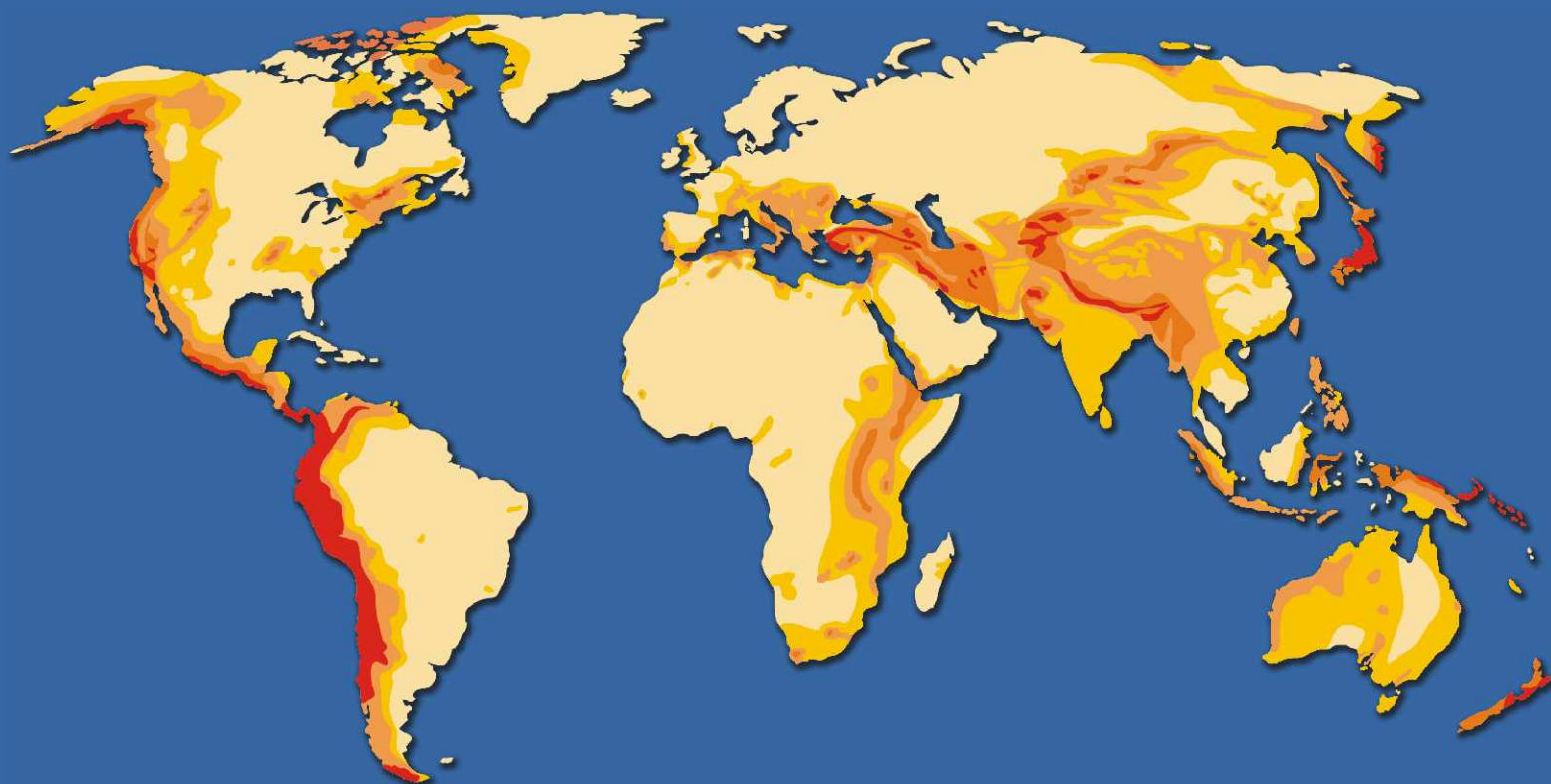


Living with Risk

A global review of disaster
reduction initiatives



Preliminary version

Geneva, July 2002

Prepared as an inter-agency effort coordinated by the ISDR Secretariat with special support from the Government of Japan, the World Meteorological Organization and the Asian Disaster Reduction Center (Kobe, Japan)

International Strategy
ISDR
for Disaster Reduction



United Nations



WMO



NOTE

This edition of "Living with Risk. A global review of disaster reduction initiatives" is a preliminary version of a final publication, which will be published early 2003. The final revised version will consider comments received and will track further developments in risk and disaster reduction thinking. It will also elaborate more on those regions not fully addressed in this preliminary issue. It will propose a systematic and continuing process to monitor progress in this field. Comments, corrections and additional information are all welcomed and can be sent to the ISDR Secretariat by 30 September, 2002, for them to be considered. Related information is available on a reference database maintained by the ISDR Secretariat, and soon available online at: www.unisdr.org

The final version will contain a full thematic index, yet not available.

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Based on the World Map of Natural Hazards, by MünchenRe

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Additional specific reference are available at the www.unisdr.org website, including the Yokohama Strategy and Plan of Action and the ISDR background paper for the World Summit on Sustainable Development: *Disaster Reduction and Sustainable Development: understanding the links between vulnerability and risk related to development and environment*



ACKNOWLEDGEMENTS

The ISDR Secretariat gratefully acknowledges the many individual and institutional contributions for the global review of disaster reduction initiatives received from around the world.

The material in this review was drawn from special ISDR studies carried out by regional partner organizations, solicited inputs from UN agencies, experts and individuals, and from publicly available information. In addition, a questionnaire was circulated by the Secretariat to all countries for self-assessment of their institutional and policy development, risk assessments and planning for disaster risk reduction. Valuable contributions were also made by members of the Inter-Agency Task Force on Disaster Reduction. Additional contributions have been provided by participants in the on-line debate, held in preparation for the World Summit on Sustainable Development, organized by the NGO network Multi Stakeholder Forum for Our Common Future and the ISDR Secretariat during May, 2002 (see: www.earthsummit2002.org).

An Advisory Panel comprising experts from around the world (see below) met twice to provide guidance for the preparation of the report.

Funding

Special appreciation is extended to the Government of Japan, the Asian Disaster Reduction Center (ADRC) and the World Meteorological Organization (WMO) who kindly contributed funds and resources for the realisation of this project. Additional ISDR resources were drawn from contributions received from the Governments of Austria, Cyprus, Denmark, Finland, Germany, Iceland, the Philippines, Sweden, Switzerland and the United Kingdom, and from the World Bank.

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- Central America: *Coordination Center for the Prevention of Natural Disasters in Central America (CEPREDENAC)*, with supplementary input from North America
- Andean nations: *Andean Development Corporation (CAF) Disaster Prevention Programme (PREANDINO)*, with supplementary input from South America
- Caribbean: *Caribbean Disaster and Emergency Response Agency (CDERA)*
- Asia: *Asian Disaster Preparedness Center (ADPC)* with supplementary input from ADRC, Japan, Iran and Kazakhstan
- Pacific island states: *South Pacific Applied Geoscience Commission (SOPAC)*
- Southern Africa: *Disaster Mitigation for Sustainable Livelihoods Programme (DiMP)*, *University of Cape Town*, with supplementary input on the Horn of Africa and North Africa
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- Europe: *European Directorate General Joint Research Centre (JRC)* with additional contributions from Germany and Switzerland.

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The ISDR Secretariat thanks all those individuals, country and agency representatives who have provided contributions or comments and who have helped in reviewing the current preliminary text of this review. The list is long and not all are mentioned by name. Special thanks are extended to Kenzo Oshima, UN Under-Secretary-General for Humanitarian Affairs, whose encouragement and support throughout the process have been very valuable, and to Professor Denis Martin Benn, former interim Director of the ISDR Secretariat, who launched the idea of a global review on disaster reduction initiatives in 2001.

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Replies to the ISDR questionnaire on disaster reduction were received from:

Angola, Armenia, Bangladesh, Bahrain, Bolivia, Burkina Faso, Cape Verde, Cambodia, Canada, Chile, China, Colombia, Cook Islands, Czech Republic, Denmark, Ecuador, Egypt, Federated States of Micronesia, Fiji, Finland, France, Georgia, Germany, Guam, Honduras, India, Ireland, Israel, Japan, Jordan, Kazakhstan, Kiribati, Laos, Lebanon, Lithuania, Madagascar, Maldives, Mali, Marshall Islands, Mexico, Monaco, Mongolia, Nauru, Niue, Papua New Guinea, Poland, Portugal, Romania, Russian Federation, Salomon Islands, Samoa, Sri Lanka, Sweden, Switzerland, Tajikistan, Thailand, Tonga, Tunisia, Turkey, Tuvalu, Vanuatu, Viet Nam, Zimbabwe.

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Photos: ADRC, ISDR Secretariat, MünchenRe, PAHO, GFMC



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FOREWORD

In recent years the world has witnessed an interminable succession of disasters -- floods, storms, earthquakes, landslides, volcanic eruptions and wildfires that have claimed many thousands of lives, caused material losses in the tens of billions of dollars, and inflicted a terrible toll on developing countries in particular, where disasters divert attention and resources needed desperately to escape poverty.

Communities will always face natural hazards, but today's disasters are often generated by, or at least exacerbated by, human activities. At the most dramatic level, human activities are changing the natural balance of the earth, interfering as never before with the atmosphere, the oceans, the polar ice caps, the forest cover and the natural pillars that make our world a livable home. But we are also putting ourselves in harm's way in less visible ways. At no time in human history have so many people lived in cities clustered around seismically active areas. Destitution and demographic pressure have led more people than ever before to live in flood plains or in areas prone to landslides. Poor land-use planning; environmental mismanagement; and a lack of regulatory mechanisms both increase the risk and exacerbate the effects of disasters.

Living with risk: a global review of disaster reduction is the first comprehensive effort by the United Nations system to take stock of disaster reduction initiatives throughout the world. Coordinated by the secretariat of the International Strategy for Disaster Reduction (ISDR), the report discusses current disaster trends, assesses policies aimed at mitigating the impact of disasters, and offers examples of successful initiatives. It also recommends that risk reduction be integrated into sustainable development at all levels - global, national and local.

Most of all, Living with risk shows that we are far from helpless in the face of natural hazards. Early warning and risk reduction measures have been important factors in helping to reduce significantly the number of people who lose their lives to disasters. New planning and forecasting tools are helping to mitigate the devastation regularly wrought by floods. We can and must build a world of resilient communities and nations. I hope that this publication reaches the widest possible readership and rouses the international community to do its utmost to better equip people everywhere for life in our hazard-filled planet.

A handwritten signature in black ink, appearing to read 'K. Annan'.

Kofi A. Annan
Secretary-General
July, 2002



Introduction

This is a preliminary version of *Living with Risk - a global review of disaster reduction* circulated for consultation. It includes a compilation of initiatives and reference information. It focuses on disaster risk reduction as envisioned in the International Strategy for Disaster Reduction. Therefore, it does not discuss specific experiences of disaster preparedness, response or recovery. It is intended for practitioners in disaster management, environmental and sustainable development, to provide guidance, policy orientation and inspiration.

It is a first effort to collect and systematise information on disaster risk reduction initiatives, by illustrating the full range of activities and some of the many actors involved. While it is still limited geographically, it has the goal to reach common understanding of the issues.

The review is based on examples of activities and various applications, identifying trends where possible. It starts with the important contexts of sustainable development surrounding disaster risk reduction, followed by a chapter on risk trends and assessment. Sections then describe some of the different elements of disaster risk reduction illustrated from global, regional and national examples. Policy and institutional frameworks; knowledge and information management; and the application of specific measures, such as environmental management, land use planning, engineering protection of critical facilities, financial tools and early warning systems are highlighted elements. A section on relevant international agendas and the role of the different parts of the United Nations involved with disaster risk reduction provides for fuller understanding of the links between them. Finally, the report outlines some of the challenges for the future by suggesting the need for setting specific targets and monitoring progress. The report provides users with reference material and a directory of many international, national and educational organizations dedicated to risk reduction.

In recent years, there has been a major conceptual shift in how people seek to cope with disasters from natural hazards. While humanitarian response capacities are vital and need continued attention, the focus on addressing risk underlines the recognition that human intervention designed to reduce the vulnerability of communities and assets can reduce the impact of disasters. Gradually environmental and development stakeholders are becoming more involved in the management of risk and vulnerability reduction due to its close interaction with natural resources management.

Some development organizations have published reports and adopted policies to address disaster risk in the context of development. These are valuable tools and help increase public and political interest in risk reduction and the objectives of ISDR. For example, in 2001, UNDP prepared a vulnerability risk index for least developed countries and is currently preparing a *World Vulnerability Report*, which focuses on the links between development and disasters. UNEP has released the *Global Environmental Outlook, GEO3*, in 2002 prior to the World Summit for Sustainable Development, which includes a thorough analysis of environmental change and vulnerability with a special section on disasters. In its reports for 2001 and 2002, the World Bank analysed the relations between environment, poverty and natural disasters. The International Federation of Red Cross and Red Crescent Societies publishes its *World Disasters Report* annually. This year 2002, the focus is on reducing risk.

Yet, a comprehensive and systematic review of ongoing initiatives is still lacking. The elaboration of a comprehensive framework to measure disaster risk reduction efforts over time, which could set the ground for developing specific risk reduction targets and thereby contribute to enhancing capacities in governments and communities is also needed. This review is a step in that direction, inviting consultation and partnership.



Preface

A journey to a safer world

Living with risk – disaster reduction strategy

A disaster reduction strategy is a global challenge today and for the future. It involves every human community, and almost every human endeavour. It also involves almost every physical phenomenon on the planet, from the high stratosphere to the abyssal depths.

The challenge of a disaster reduction strategy – and the theme of this review – is to find a way to live with these phenomena, rather than die from them. The earthly powers are not just a fact of life, but one side of the coin of a good life and a “natural” disaster is only a disaster because people happened to be in the way – or had no other choice – and were caught unawares when it happened.

The UN International Decade for Natural Disaster Reduction (IDNDR), 1990-99, was a decade dedicated to promoting solutions to reduce risk from natural hazards. At the doorstep of the new millennium, the decade ended with more deaths from more disasters, involving greater economic losses and more human dislocation and suffering than when it began. But could dedicating one decade to the topic be expected to solve the consequences of centuries of mismanagement and of passive fatalism before the vagaries of nature?

What the IDNDR put in motion was an irreversible and beneficial political and social process. That is what this review and the International Strategy for Disaster Reduction will build upon: foster more awareness, more public commitment, more knowledge and partnerships to implement risk reduction measures of all kinds, at all levels.

Earthly powers that offer wealth – and hazard

This is the paradox of a living planet: The earthly powers that create wealth and fuel human security can also destroy it, depending on the ability of humankind to cope and to live with risk.

The subterranean violence beneath the famous Pacific “ring of fire” also created the sublime landscapes of Japan and Kamchatka, Sumatra and New Zealand, from Alaska, Seattle and Puget Sound to San Francisco, Valparaiso and Tierra del Fuego.

The heat of the sun evaporates the top metre or more of all the oceans of the world, every year. It also drives powerful winds, and clouds that carry torrential rain. At intervals the swollen rivers flood and deposit rich silt on what geographers call flood plains and farmers call fertile soil. In time, such wind and rain will erode all mountains, and remove the differences that drive regional climates. Fortunately, the process of mountain building goes on, accompanied, of course, by earthquakes that lift bedrock towards the skies and volcanic discharges that deliver new minerals to the soil and new moisture to the air.

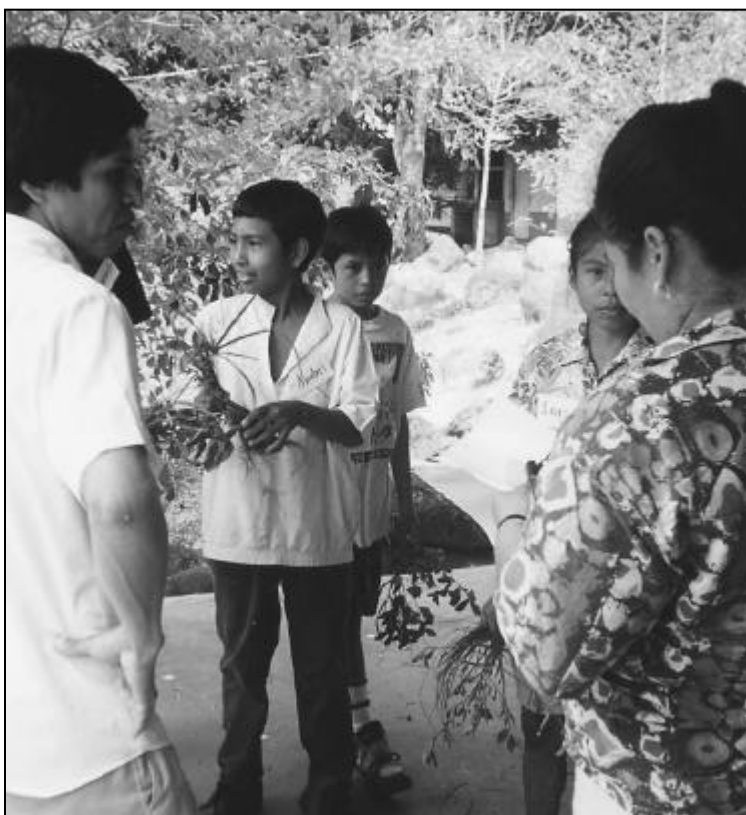
A more vulnerable world

The trend shows increasing losses from disasters (*see chapter 2*). The reason is both simple and complex – it has to do with how people and societies are becoming more vulnerable. Although the frequency of dramatic natural events may be constant, human activities contribute to their increased intensity. It depends on development practices, environmental protection, regulated growth of cities, distribution of people and wealth in the safest places, and government structures. Human activity also has an impact on the planet's climate, which will result in increased sea levels and potential disasters.

The number of people at risk has been growing by 70 to 80 million per year. More than 90 per cent of population growth is in the developing world, among people with the smallest share of resources and the biggest burden of exposure to disasters.

In theory, natural hazards, including earthquakes, floods, drought, storms, tropical cyclones and hurricanes, storm, wildfire, tsunami, volcanic eruptions and avalanches, can threaten everyone. In practice, proportionally, they tend to hurt the poor most of all. This is because the poor outnumber the rich, and live in greater density in more poorly built housing on land most at risk.

The price of life, like the price of liberty, is constant vigilance. Natural hazards are constant threats. But every year the potential loss to life and livelihood soars as people converge in cities, where now half of the people of the planet live. With the growth of the cities, and population, come changes in the landscape – and the disruption of natural ecosystems.



Hillsides are cleared of trees for building materials and firewood, but not replanted. Wetlands are drained to make space for new housing or workplaces. Rivers are engineered to follow unnatural routes. But with no trees, there is more erosion, and more silt to clog the rivers. All of these things make landslides, floods or drought more likely – and when they happen, more devastating.

People who have to struggle every day just to survive do not have the time or the strength to worry about more distant environmental and natural hazards. So a disaster reduction strategy is inseparable from social and economic development, and from thoughtful environmental management. These three things are at the heart of sustainable development.

A disaster reduction strategy must therefore be built on sustainable development policies, which take into account the potential risks for disasters and plan to reduce these risks, involving everyone and providing not just help but hope.

“Imagine all the people...”

It would be quite possible to imagine a community or even a nation that lived with a regard for nature, despite its hazards, thanks to a coherent disaster risk reduction strategy in place.

Housing would be built out of appropriate materials, adapted to local conditions and according to building codes. Its houses, hospitals, schools, markets, factories, government offices, power supplies and other critical services would be on the sites least exposed to risk.

Inhabitants would maintain forested or wetland areas as a form of natural flood control, as sources of local renewable revenue, and as security against other threats such as erosion and landslide.

People and government officials would be aware that a hazard that threatened one family or settlement would also be a threat to all. They would maintain a network of early warning and watchfulness, linked to the experts who monitored weather signals or seismic instruments.

Elected or traditional leaders would have regular dialogue not just with local, regional or national government officials and citizens, but also with the government agencies and scientists. Village councils would have ensured structures that serve as safe shelters in a cyclone, or ground safe for livestock in the event of flood. Schools would teach children what to do when the river rises, or the earth begins to shake. Farmers would have granaries or fodder stores safe from storm and above any likely flood level.

Health facilities would be safe, and health centres would work with communities to reduce risk from disaster. Householders would have small but secure savings to help them through disruption caused by storm or inundation.

These communities would accept that information and communication were the most important elements of all. People would routinely listen to daily weather reports, and follow local political and economic debate through radio, newspapers or television. Such communities would be more likely to shore up their own flood defences, maintain their drainage or secure their own housing against destruction, by communal action. Legislators would understand that public safety was part of their obligation and administrators, of course, would be expected to police such legislation.

It is possible...

Safer communities, living with acceptable risk, do exist in, among other places, New Zealand, California, Japan, along the Gulf of Mexico and among the low-lying coastal regions of western Europe. All these regions are potentially vulnerable to natural hazard. All have suffered from the impacts of major natural disasters but have met them with lower loss of life and greater economic resilience. The difference is that these places belong to richer nations – rich enough to believe that life can and will always improve. Economic wealth is not the only factor in reducing risk. Political will and a communal sense of hope are part of the collective protection against calamity.

Chile and Colombia have local disaster risk management committees watching for future trouble. Bangladesh long ago established a local early warning system to alert the millions at risk when floods and tropical cyclones threaten. Safer from the hazards of weather or tectonic forces, people can begin to build more economically secure lives for themselves and their children.

Journey to a safer world

This review, aimed mainly at practitioners as a guide and reference, is about how we can continue to develop a “culture of prevention”. It is a voyage of both discovery and rediscovery, about how human decisions increase or reduce vulnerability to natural hazards. It illustrates lessons and experiences in disaster risk reduction. It explores the way in which the understanding of disaster management and risk has evolved over recent years. It takes account of the technologies of the future – the satellite sensors that might read telltale signs of volcanic activity, seismic shift or collapsing hillsides days or weeks before any catastrophe occurs, or telemetry that can monitor the build up of soil moisture in a watershed that could serve as a warning of sudden flooding downstream.

Most of all, it looks at how societies organize themselves, how communities interact with each other, how civic and national authorities respond to the challenges of natural hazard. It will explore the mosaic of interests, the kaleidoscope of attitudes and the network of actors that must be mobilised towards risk reduction and disaster prevention, rather than assessing the need for disaster relief.

It is, at bottom, about foreseeing danger and averting it. It will consider how warnings proceed from the work of technical specialists to the government authorities and from these to the people at risk. It will consider the political short-sightedness and the errors of thinking – the increasing vulnerabilities and the unmet challenges – that turn environmental degradation, natural and technological hazards into social and economic disasters in different cultures and societies.

It will begin to explore the different strategies demanded by different kinds of human and environmental conditions. But it will also address a set of universal truths. Any disaster reduction strategy demands first of all political will to recognise and address the issues of risk. This calls for statesmanship rather than political shrewdness. This commitment must then be linked to national and local development planning and sustainable action.

It builds on an understanding that risk reduction and disaster prevention always make better economic sense than reliance on disaster relief. Although small groups cooperate spontaneously because of immediate shared danger, larger societies need coherent legal obligations and responsibilities that foster the involvement of the community, and the participation of its people to face long term risks.

None of these things can happen without some form of public debate and education at every level of society. It will require shared thinking at both international and regional levels because nations often share a forested terrain, or a river, or two sides of a mountain chain. Inevitably, they have a common interest in disaster prevention. It will also require new ways of looking at the landscape, with an eye not just to how it might be exploited but also at the price it might exact for the wrong kind of exploitation.

Secure societies are those that have learned to live with their land, as well as from it. Disaster reduction strategies will have succeeded when people – governments, specialists, leaders and citizens – understand that a “natural disaster” is more a failure of foresight or evidence of their own neglected responsibility rather than the presumed consequence of natural forces or some other-worldly act of god.

A faint, light blue world map is visible in the background of the top half of the page.

Chapter

1

Living with risk - focus on disaster risk reduction

- 1.1 Setting the scene - understanding disaster risk reduction
- 1.2 Contexts and processes linked to disaster risk reduction: sustainable development



Eruption of Mount Agung, Bali, Indonesia

Ink painting by Ida Bagus Nyoman Rai (1915-1999)

Mount Agung is Bali's highest and most sacred mountain. In 1963 it erupted for the first time in living memory. Entire villages and temples were toppled or burned under the lava. Those more prepared saved their lives and escaped with only a few possessions.

1.1. Setting the scene – understanding disaster risk reduction

The power and drama associated with natural disasters have always fascinated people. Prior to the widespread use of global communications, disasters seldom had the possibility to influence decisions and events beyond the area of immediate impact. The initial reaction of people who were not immediately affected by the tragedy was to organize urgent specialized services or other forms of help to respond to the needs of the victims.

This chapter intends to set the scene and discuss the strategic shift from disaster management practices towards an integrated disaster risk reduction approach in the context of sustainable development. Further discussion on trends in disaster impact, hazard and vulnerability is developed in chapter two.

- Natural disasters shaping the agenda
- The shift towards disaster reduction
- Reducing the impact of disasters in practice
- International Decade for Natural Disaster Reduction, Yokohama Strategy and Plan of Action
- International Strategy for Disaster Reduction
- Disaster risk reduction - a shared responsibility
- Understanding the meaning of disaster risk reduction
- The disaster risk reduction framework

Natural disasters shaping the agenda

During the final years of the 1990s, several powerful natural disasters occurred in different parts of the world, in countries large and small, industrialized or agrarian, technologically sophisticated or traditionally focused. The types of natural hazards that triggered these disasters varied from the seemingly unexpected occurrence of earthquakes, to more predictable seasonal floods and periodic storms.

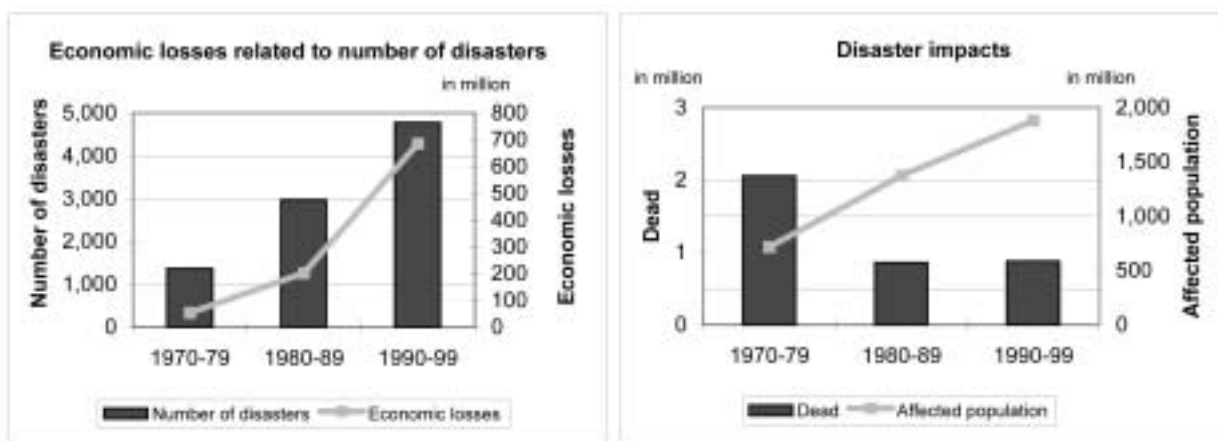
Other less immediate and slowly evolving hazards such as drought and environmental degradation affected even more people with potentially greater costs for their future. More than anything else, the media images of natural disasters at the close of the twentieth century underscored the human consequences and social dimensions of these events.

One need only recall the power of hurricane Mitch that damaged up to 70 per cent of the infrastructure in Honduras and Nicaragua in 1998, devastating the economies of all of the

Central American countries that are yet to recover fully. This was followed one year later by the worst cyclone in 100 years to hit the Indian state of Orissa, which affected ten times as many people as Mitch, destroying 18,000 villages in one night. The powerful typhoon Lingling caused extensive damage and over 500 fatalities in the Philippines and Viet Nam at the end of 2001.

Floods of a previously unremembered scale occurred several times in the past 10 years; in China, Bangladesh and Southern Africa, where people had no recourse but to escape to safety in trees. In 1999, Mexico experienced its worst floods since 1600. Almost 300,000 people were made homeless.

The trend during the last three decades shows an increase in the number of natural hazard events and of affected populations. Even though the number of disasters has more than tripled since the 1970s, the reported death toll has decreased to less than half (see graphics next page).



Source: OFDA/CRED International disaster database, 2002

Includes: drought, earthquake, epidemic, extreme temperature, famine, flood, industrial accident, insect infestation, miscellaneous accident, slide, transport accident, volcano, wave/surge, wild fire, wind storm

Despite losses of US\$ 30 billion in 2000, an amount that must, unfortunately, be termed moderate in comparison to the average of annual losses during the past decade, both the number of major natural disasters and their costs have increased rapidly in recent years.

In 2000, the insurance industry recorded 850 major loss events in the world, one hundred more than the previous record year in 1999. While the losses recorded in 2000 were lower than the US\$ 100 billion incurred in 1999, they provide little comfort to the overall trend during the past decade. Overall the 84 great natural disasters recorded in the 1990s were three times as many as those that occurred in the 1960s, whereas the combined economic losses of US\$ 591 billion were eight times greater than those of the 1960s.

Ten thousand people died in natural disasters in 2000, compared to more than 70,000 in the previous year, or over 500,000 in the previous ten years. These figures must be treated with caution, as the social and economic cost of disasters is difficult to estimate. By and large, insurance claims tend to be misleading as an estimate of the economic impact of disasters. Considering insured damage claims for the 1999 floods in Austria, Germany and Switzerland, at least 42.5 per cent of damage was covered by disaster insurance. But in Venezuela the same year, only four per cent of flood dam-

age was covered. For more information on trends in disaster impact, see chapter two.

Generally, disaster statistics tend to be more precise on a smaller scale; in particular on the national and regional level where the evaluation of damages is undertaken in a more systematic manner, based on agreed methodologies. However, this is not the case in all regions and notably in Africa, where the lack of coherent disaster-related figures means the impact of disasters is highly underestimated. In addition, mega-disasters receive much media attention and the setbacks that these events create in the development process are well noted, while some experts estimate that if the pernicious economic impact of the smaller, but recurrent, disasters were assessed, all of these figures would be much higher.

Not appropriately reflected in these statistics are the millions of poor people who have seen their lives indirectly shattered by the economic impact of the natural disasters, their ability to raise a modest income reduced or annihilated and the prospect to escape poverty postponed indefinitely. These losses, modest in absolute economic terms, are devastating at a social and sometimes political level.

There is a demand for reliable and systematic data on disasters by the development sector to assess their socio-economic impact in the short



Effects of hurricane Mitch in Tegucigalpa, Honduras, 1998

term and, even more importantly, in the long term, if the consequences of the many smaller and unrecorded disasters could be taken into account. While attempted in limited areas, a pressing need remains to consistently document these incremental and often recurrent losses that are continuously eroding the capacities of communities to grow and develop.

While hazards may induce a crisis, it is now widely understood that prevailing conditions within any group of people in a society can determine the extent of their susceptibility or resilience to loss or damage. There is insight across a growing number of professional fields and in some governments that different population segments can be exposed to greater relative risks because of their socio-economic conditions of vulnerability. Because of this, disaster reduction has become increasingly associated with practices that define efforts to achieve sustainable development. Equally, as the possibility of human-induced influences on climate change are better understood, the detrimental effects of forestry exploitation become evident, or the effectiveness of earlier engineering solutions for controlling natural phenomena are questioned, the relationships between human actions, environmental stewardship and disaster risks are becoming ever more crucial.

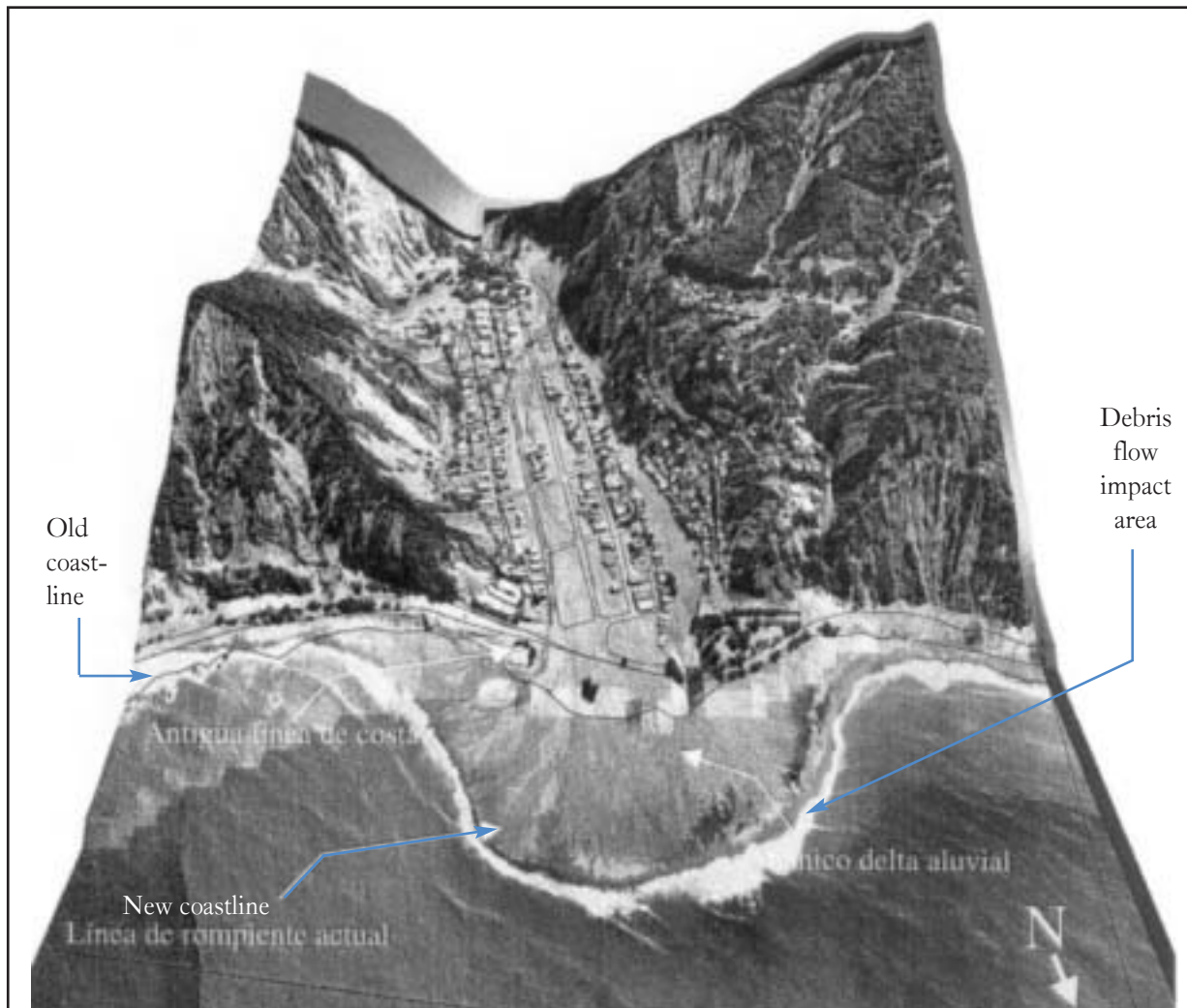
It is remarkable that disasters not only affect the poor and traditionally vulnerable countries but also those thought well protected: Canada,

the Czech Republic, France, Germany, Poland, the United Kingdom and the United States experienced record-setting floods in recent years of such magnitude that previously accepted procedures for protection and thinking about the utility of structural barriers have to be re-evaluated.

The extraordinarily heavy rainfall associated with hurricane Mitch caused a landslide at the Casita volcano in Nicaragua that was 18 km long and 3 km wide, and totally destroyed three towns and killed more than 2,000 people. Torrential rains triggered the landslide of denuded and unstable slopes in Venezuela in 1999 with more than 20,000 fatalities.

Less than two years later, one of the earthquakes in El Salvador caused a landslide on a slope destabilized by deforestation and slope mining, burying almost 500 people living in ill-placed communities that were probably compromised at least in part by lax control of building regulations.

In 2001 similarly disastrous floods and mudslides caused more than 800 fatalities, most extraordinarily in the Algerian capital, Algiers. The most severe winter storms in a century swept through Canada in 1998, through Western European countries in 1999, and the following year in Mongolia, with even greater loss of livelihoods and longer-term consequences because of the decimated flocks of nomadic herders.



The village of Carmen de Uria, Venezuela, was completely covered by the debris flow in December 1999. The location of the former settlement is marked. Source: Prof. Roberto Prado, 1999.

In the past three years, severe earthquakes in Colombia, Greece, India, Peru, Taiwan and Turkey have shaken previously complacent official views on building practices. El Salvador experienced two major earthquakes within one month, one of them measuring 7.6 on the Richter scale, the second strongest in 90 years.

Meanwhile during 2001, persistent drought conditions eroded already fragile livelihoods in Afghanistan (which also experienced an earthquake in 1998 and 2002) and in several other countries of Central Asia, in Eastern and Southern Africa, and in much of Central America. The consequences of uncontrolled wildfire and related conditions of severe atmospheric pollution and haze intruded into neighbouring areas of North-Eastern Africa, Central and North America, South-East Asia, Southern Europe, and within individual states of Australia.

The El Niño/La Niña events of 1997-1998 were the most intense occurrence of this cyclical climatic phenomenon during the twentieth century. Beyond representing economically costly variations to normal climate expectations, these events also created conditions around the world, which spawned extensive flooding, extended drought conditions and widespread wildfires.

The shift towards disaster reduction

In all of these cases the drama of the disasters and the urgent international activities to provide emergency relief assistance, command the attention of the international media – generally only for a few days. The consequences of the disasters last much longer and are more poignantly measured in solitude: lives lost, livelihoods disrupted, property destroyed and often increasingly fragile environments damaged. All of these losses impede the development of the human condition and often sacrifice previously hard-won individual and national accomplishments. They also compromise both immediate and long-term resources upon which current societies, as well as future generations, depend.

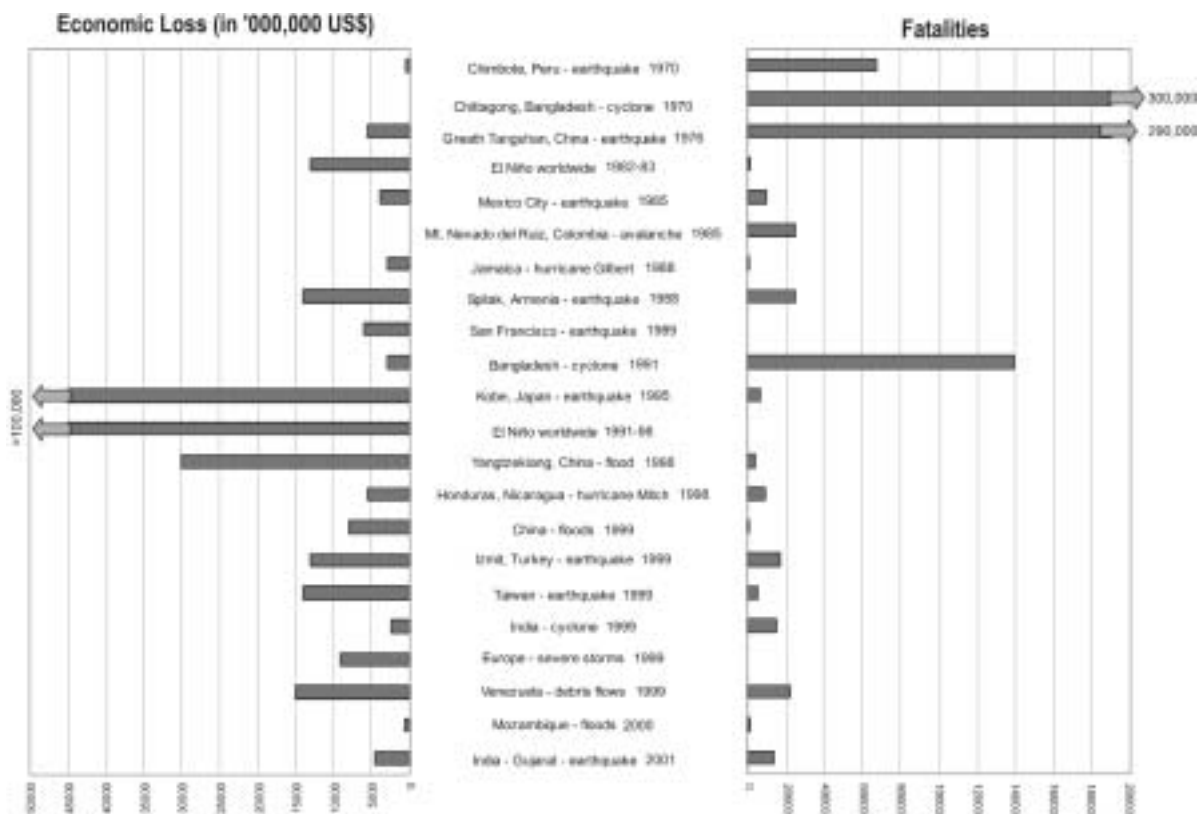
The subject of disaster and risk reduction draws its relevance from earlier contributions and previous practices in the disaster management fields, where traditionally the focus has been on preparedness for response. Before proceeding further though, it is important to establish a common understanding of the basic tenets of disaster reduction that this review addresses. Thus, the review’s outlooks, abilities and practices will be clearly distinguished from the conventional understanding of expressions related to emergency or disaster management issues.

Those closest to affected populations – political authorities, professionals from many different fields, commercial interests, public organizations, educational institutions and local community leaders – are increasingly recognizing the essential public value of sustained efforts to reduce the social, economic and environmental costs of natural disasters. There has, for example, been a tidal change in the understanding of countries in Central America over the past three years, following the repeated devastating effects of natural disasters. There is now increased emphasis placed on risk, and an acceptance that disaster, development and environmental problems are inextricably linked.

Disaster reduction policies and measures need to be implemented, with a twofold aim: to enable societies to be resilient to natural hazards while ensuring that development efforts do not increase vulnerability to these hazards.

This understanding is essential if communities are to become more resilient to the effects of hazards so that disaster losses can be reduced in coming years. These activities make the news much less often, perhaps because they are mostly concerned with people during their ordinary work, focused on incorporating risk awareness into their daily existence.

Some Major Catastrophes in the 20th Century



Learning risk reduction from practices in the past

There are early historical examples of societies protecting their people and their important resources. This was accomplished first, by **anticipating** potential catastrophes based on knowledge of hazardous conditions and possible destructive events, then by investing in protective measures. Inca rulers, living in the Andes between the thirteenth and fifteenth century, took great care to create terraces on steep slopes to conserve the scarce soil and water necessary for their crops. Many of these terraces remain today, as do similar constructions maintained for over a thousand years in the mountain provinces of Indonesia and the Philippines.



Structures were built in places to provide protection from floods, like the embankments in Shanghai and Singapore which have protected lucrative commercial and port activities since the middle of the nineteenth century.

Low countries in Northern Europe, such as the Netherlands, are famous for having constructed an extensive system of sea dykes that have both reclaimed land and protected inhabitants from flooding since the eighteenth century.

In Viet Nam, villagers are obliged to clean, repair and strengthen their crucial irrigation channels and sea dykes prior to the start of every annual cyclone season. This was recognized as a necessary precaution to ensure the continued cultivation of rice, on which the society depends.

Traditionally, Pacific islanders built their houses from local, lightweight, but strong materials that could absorb torrential rains, yield superficially to the high winds of typhoons and withstand the shaking of earthquakes.

Local crop preservation techniques were also used as a hedge against possible drought or other conditions of food shortage.

Traditional practices of farmers around the world have been influenced by locally developed knowledge of weather patterns or naturally occurring indicators in plants and animals, to forecast particularly harsh conditions. If imprecise, such methods did demonstrate an awareness of potential risk that led people to consider alternate courses of action in order to protect their livelihood.

More recently, with the increase of scientific knowledge, policies have developed in some countries that have tried to protect people from or to control the forces of nature. With mixed success over the long term, these efforts grew from concepts seeking to prevent or to reduce the immediate consequences of potentially hazardous conditions and the adverse effects that they could cause to nearby human life, habitation and property.

The Japanese experience of monitoring volcanic activities, early warning and effective evacuation from Mount Usu in Hokkaido is a telling example of how science and technology do save lives and assets.



Long-accepted policy measures and principles designed to prevent forest fires are now understood to have created conditions of fuel accumulation that resulted in more intense, uncontrollable, and ultimately more costly, wildfires at a later date. Now more subtle measures are being employed in managing the relationship between natural fire hazards, human use of forested natural resources and sustainable environmental benefits for a vital society.

Taking these developments into account, during the past 30 years, there has been a continuous evolution in the common understanding and practice of disaster management. To different political constituencies or various professional interests at particular times, there have been many different approaches to addressing catastrophic circumstances from natural hazards and their impacts on societies. These bodies of practice have variously been known as emergency assistance, disaster response, humanitarian assistance, civil defence, civil protection, homeland security and disaster prevention.

Currently, a more holistic approach focussing on risk and vulnerability has brought about the concept of risk reduction or disaster risk management.

There is no doubt that the role of relief assistance during the acute phase of a crisis will remain important and need to be enhanced at all levels. However, the question must be asked: Can modern societies afford to value their social and material assets only **after** they have been lost in a disaster? In many places political commitment and the allocation of resources to address hazardous conditions have been concentrated overwhelmingly on short-term emergency contingencies. Much greater attention will need to be given to protective strategies that can contribute to saving lives and protecting property and resources before they are lost.

From 1990 to 1999, during the *International Decade for Natural Disaster Reduction (IDNDR)* proclaimed by the General Assembly of the United Nations, work was done to advance a wider commitment to activities that could reduce the consequences of natural disasters, under the theme *Building a Culture of Prevention*. The *Yokohama Strategy and Plan of Action for a Safer World* (World Conference on Natural Disaster Reduction, Yokohama, 1994) stressed that every country had the sovereign and primary responsibility to protect its people, infrastructure and national social or economic assets from the impact of natural disasters. Experience gained since then has demonstrated that by focusing on the socio-economic factors involved, human actions can reduce vulnerability of societies to natural hazards and related technological and environmental disasters.

The role of science and technology

The idea of launching a decade dedicated to natural disaster reduction came from the scientific community. It was motivated by a desire to expand the scope and access of scientific and technical abilities and knowledge for disaster reduction into the decision-making processes and wider practical implementation.

Science and technology play key roles in monitoring hazards and vulnerabilities, developing an understanding of their continually changing patterns and in developing tools and methodologies for disaster risk reduction. The dissemination and application of new strategies and measures to protect lives, livelihoods and property within societies experiencing dynamic change are key areas of work for the scientific and technical communities. Scientific knowledge, technical expertise and experiences to reduce risk have to be shared and made widely available as an integral part of multi-disciplinary technical cooperation. Efficient disaster reduction needs a mutually reinforcing interaction between scientists, decision-makers and informed citizens.

However, the limitations of science and technology in responding to the fundamental problems of people and political processes in identifying and managing risk factors need to be carefully considered. An over-concentration on technical abilities at the expense of being able to motivate the human aspects that compose the economic, social and political dimensions of societies will continue to provide disappointing results in effective or sustained commitments to risk reduction. It must also be recognized that in particular circumstances science and technology can be misapplied, sometimes provoking or aggravating risks to a society.

The scientific and technical applications relating to each aspect of disaster risk reduction are extensively addressed throughout this report.

Initially, the *IDNDR* was influenced by largely scientific and technical interest groups. However, a broader global awareness of the social and economic consequences of natural disasters developed as the decade progressed, highlighting the increasing importance of engaging a much broader community in hazard awareness and risk management practices. The importance given to socio-economic vulnerability as a rapidly increasing factor of risk in most of today's societies underlined the need to encourage the wider participation of local communities in hazard and risk reduction activities.



World Conference on Natural Disaster Reduction, Yokohama Strategy and Plan of Action for a Safer World (May 1994)

YOKOHAMA MESSAGE

"We, the States Members of the United Nations and other States, having met at the World Conference on Natural Disaster Reduction, in the city of Yokohama, Japan, from 23 May to 27 May 1994, in partnership with non-governmental organizations, and with the participation of international organizations, the scientific community, business, industry and the media, deliberating within the framework of the International Decade for natural Disaster Reduction, expressing our deep concern for the continuing human suffering and disruption of development caused by natural disasters, and inspired by the Yokohama Strategy and Plan of Action for a Safer World...""adopted the following Principles, Strategy and Plan for Action"

1. Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies and measures.
2. Disaster prevention and preparedness are of primary importance in reducing the need for disaster relief.
3. Disaster prevention and preparedness should be considered integral aspects of development policy and planning at national, regional, bilateral, multilateral and international levels.
4. The development and strengthening of capacities to prevent, reduce and mitigate disasters is a top priority area to be addressed so as to provide a strong basis for follow-up activities to the IDNDR.
5. Early warnings of impending disasters and their effective dissemination are key factors to successful disaster prevention and preparedness.
6. Preventive measures are most effective when they involve participation at all levels from the local community through the national government to the regional and international level.
7. Vulnerability can be reduced by the application of proper design and patterns of

development focused on target groups by appropriate education and training of the whole community.

8. The international community accepts the need to share the necessary technology to prevent, reduce and mitigate disaster.
9. Environmental protection as a component of sustainable development consistent with poverty alleviation is imperative in the prevention and mitigation of natural disasters.
10. Each country bears the primary responsibility for protecting its people, infrastructure, and other national assets from the impact of natural disasters. The international community should demonstrate strong political determination required to make efficient use of existing resources, including financial, scientific and technological means, in the field of natural disaster reduction, bearing in mind the needs of the developing countries, particularly the least developed countries.

Basis for the Strategy:

"Natural disasters continue to strike and increase in magnitude, complexity, frequency and economic impact. Whilst the natural phenomena causing disasters are in most cases beyond human control, vulnerability is generally a result of human activity. Therefore, society must recognize and strengthen traditional methods and explore new ways to live with such risk, and take urgent actions to prevent as well as to reduce the effects of such disasters. The capacities to do so are available."

Although articulated in 1994, the principles contained in the *Yokohama Strategy and Plan of Action for a Safer World* are possibly more relevant to risk reduction now than when they were conceived.



The International Strategy for Disaster Reduction

IDNDR provoked the recognition that disaster reduction was a social and economic imperative that would take a long time to fulfil.

As the successor to IDNDR in 2000, the United Nations *International Strategy for Disaster Reduction (ISDR)* was designed to foster this need by proceeding from the previous emphasis of protection against hazards to the processes involved in the awareness, assessment and management of disaster risks.

This development highlights the integration of disaster risk reduction into the broader context of sustainable development and related environmental considerations. By means of this *global review of disaster reduction initiatives*, ISDR seeks to further multidisciplinary advocacy for wider professional understanding of disaster risk reduction practices which can be achieved by working through political, professional, institutional and public collaboration.

ISDR in a nutshell

The International Strategy for Disaster Reduction was launched by the General Assembly of the United Nations to provide a global framework for action with the objective of reducing human, social, economic and environmental losses due to natural hazards and related technological and environmental phenomena. The ISDR aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development. In January 2000, through its resolution 54/219, the General Assembly established two mechanisms for the implementation of the ISDR, the Inter-Agency Secretariat and the Inter-Agency Task Force on Disaster Reduction. This was reconfirmed in resolution 56/195 in December 2001. ISDR builds on the learning from IDNDR, the Yokohama Strategy and Plan of Action and the Geneva Mandate of 1999.

The General Assembly also calls upon governments to establish national platforms or focal points for disaster reduction, and to strengthen them where they already exist, with a multisectoral and inter-disciplinary approach.

(a) the *Inter-Agency Secretariat for the ISDR (UN/ISDR)*

The UN/ISDR is the focal point within the United Nations system for co-ordination of strategies and programmes for disaster reduction and to ensure synergy between

disaster reduction activities and those in the socio-economic and humanitarian fields.

The secretariat also serves as an international clearinghouse for the management and the dissemination of information, in particular on current knowledge and status of disaster reduction through the publication of this *global review of disaster reduction initiatives*. It develops activities such as advocacy campaigns to promote wider understanding about natural hazards and disaster risk to motivate a world-wide commitment to disaster reduction. A particularly important role is to encourage both policy and awareness activities by promoting national committees dedicated to disaster reduction, and working in close association with regional initiatives. An outreach programme has been established in Latin America and the Caribbean to this effect, and plans are underway to collaborate with additional regional institutions in Africa and in the Asia and Pacific regions.

The ISDR secretariat has a facilitating role, bringing agencies, organizations and different disciplines together, providing a common platform and understanding of the scope of disaster risk reduction. In this regard, one main function of the secretariat is to support the Inter-Agency Task Force (IATF) for the development of policies on natural disaster reduction.



(b) the *Inter-Agency Task Force on Disaster Reduction (IATF/DR)*

The Task Force was established in 2000 as the main forum within the United Nations system for devising strategies and policies for the reduction of natural hazards. It is also tasked with identifying what is lacking to improve disaster reduction policies and programmes and recommending remedial action with particular attention to ensuring complementary action by the different United Nations agencies involved in disaster reduction.

The Task Force is chaired by the Under-Secretary General for Humanitarian Affairs of the United Nations and is composed of up to 14 representatives of agencies and organizations of the United Nations system; up to eight representatives from regional entities and up to eight representatives of civil society and relevant professional sectors. The Director of the ISDR secretariat acts as the Secretary of the Task Force.

The Task Force has established four Working Groups to work on climate variability, early warning, vulnerability and risk analysis, and wild-land fires. More details on their work are outlined in other chapters of this review.

The Task Force has since its first meeting expressed interest in pursuing additional areas, as opportunities allow. These include drought, ecosystem management, land-use planning, integrating disaster reduction issues into sustainable development and national planning agendas, raising the political profile of disaster reduction or exploring private and public sector partnerships.

Framework for action for the implementation of the ISDR

The IATF/DR, supported by the secretariat, has formulated a framework for action for the implementation of the ISDR with four main objectives:

- Increase public awareness to understand risk, vulnerability and disaster reduction.
- Promote the commitment of public authorities to disaster reduction.
- Stimulate multidisciplinary and intersectoral partnerships, including the expansion of risk reduction networks.
- Improve scientific knowledge about the causes of natural disasters, as well as the effects that natural hazards and related technological and environmental disasters have on societies.

The framework also incorporates two additional activities specifically mandated to the ISDR secretariat by the United Nations General Assembly:

- Continue international co-operation to reduce the impact of El Niño and other climate variations.
- Strengthen disaster reduction capacities through the development of early warning systems.

In pursuing these objectives, the framework for action outlines the following areas of common concern:

- Incorporating the recognition of the special vulnerability of the poor in disaster reduction strategies
- Environmental, social and economic vulnerability assessment with special reference to health and food security;
- Ecosystems management, with particular attention given to the implementation of Agenda 21;
- Land use management and planning, including appropriate land use in at-risk rural, mountain and coastal areas, as well as unplanned urban areas in megacities and secondary cities;
- National, regional and international legislation with respect to disaster reduction.

Disaster risk reduction - a shared responsibility

Governments and communities must understand that disaster reduction policy is a wise investment. Direction and resource allocations often need to be provided from higher levels of authority within a society, as much as decisions and individual commitment need to grow from the local understanding and active participation of those people most immediately affected by disaster risks.

Where governments have not done so already, there is a need to regain a level of wide and inclusive national participation, before a disaster occurs. This public responsibility will require a collective discipline that can be sustained through the education and practice of many trades and professions.

Since disaster reduction is based on a continuous strategy of vulnerability and risk assessment, many actors need to be involved, drawn from governments, technical and educational institutions, professions, commercial interests and local communities. Their activities will need to be integrated into planning and development strategies that both enable and encourage the widespread exchange of information. New multidisciplinary relationships are essential if disaster reduction is to be both comprehensive and sustainable.

Vulnerability to disasters should be considered in a broad context encompassing specific

human, social/cultural, economic, environmental and political dimensions, that relate to inequalities, gender relations and ethical and racial divisions. A disaster with all its negative consequences offers a good opportunity to formulate forward-looking policy concepts pertaining to social development and equity, economic growth, environmental quality and justice, i.e. sustainability.

However, to be successful, the integration of holistic disaster reduction strategies into development policies should happen from the outset, thereby solving a broad range of social, economic and environmental problems as well. This requires the participation of all relevant sectors (such as environment, finance, industry, transport, construction, agriculture, education and health). It also requires different forms of management than in the case of emergency or disaster management. The responsibilities of risk reduction are even more broadly extended than is commonly understood.

This is why the most efficient forms of hierarchical "command and control" practices for crisis management are much less suited to the deliberate and more widely considered forms of public, private and professional participation in risk reduction which draw their information and inspiration from many different sources in a society. The following chart outlines some of these comparisons in management approaches (Jeggle 2001):

Emergency assistance, crisis management	Disaster risk reduction strategies
Primary focus on HAZARDS and DISASTER events.	Focus on VULNERABILITY and RISK issues.
Single, event-based scenarios.	Dynamic, multiple risk issues and development scenarios.
Basic responsibility to respond to an event.	Fundamental need to assess, monitor, update.
Often fixed, location-specific conditions.	Extended, changing, shared or regional, local.
Responsibility in single authority or agency.	Involves multiple authorities, interests, actors.
Command and control, directed operations.	Situation-specific functions, free association.
Established hierarchical relationships.	Shifting, fluid and tangential relationships.
Often focused on hardware, equipment.	Dependent on related practices, abilities, software.
Specialized expertise.	Specialized expertise, squared with public views.
Urgent, immediate-to-short time frames in outlook, planning, attention, returns.	Comparative, moderate-to-long time frames in outlook. Planning, values, returns.
Rapidly changing, dynamic information usage. Often conflicting or "sensitive". Primary, "authorized" or singular sources. Need for definitive "facts".	Accumulated, historical, layered-updated, comparative, information. Open or public. Multiple and diverse or changing sources. Differing perspectives, points of view.
Operational, or public information-based use of communications.	Multiple-use, shared exchange, intersectoral use of information. Matrix, nodal communication.
In-out, or vertical flows of information.	Dispersed, lateral flows of information.
Matters of public security, safety.	Matters of public interest, investment and safety.



■ Understanding the meaning of disaster and risk reduction

Difference between a hazard and a disaster

“Strictly speaking, there are no such things as natural disasters, but there are natural hazards.

A disaster is the result of a hazard’s impact on the society. So the effects of a disaster are determined by the extent of a community’s vulnerability to the hazard (or conversely, its ability, or capacity to cope with it). This vulnerability is not natural, but the result of an entire range of constantly changing physical, social, economic, cultural, political, and even psychological factors that shape people’s lives and create the environments in which they live. ‘Natural’ disasters are nature’s judgement on what humans have wrought”

John Twigg

Disaster reduction strategies include, first and foremost, vulnerability and risk assessment, as well as a number of institutional capacities and operational abilities. The assessment of the vulnerability of critical facilities, social and economic infrastructure, the use of effective early warning systems, and the application of many different types of scientific, technical, and other skilled abilities are essential features of a disaster reduction strategy.

The sharing of information and experience, both for the purposes of public information and all forms of education and professional training are as important for creating a safety culture, as are the crucial involvement of local community action and new forms of partnership motivated by cooperation and shared responsibilities.

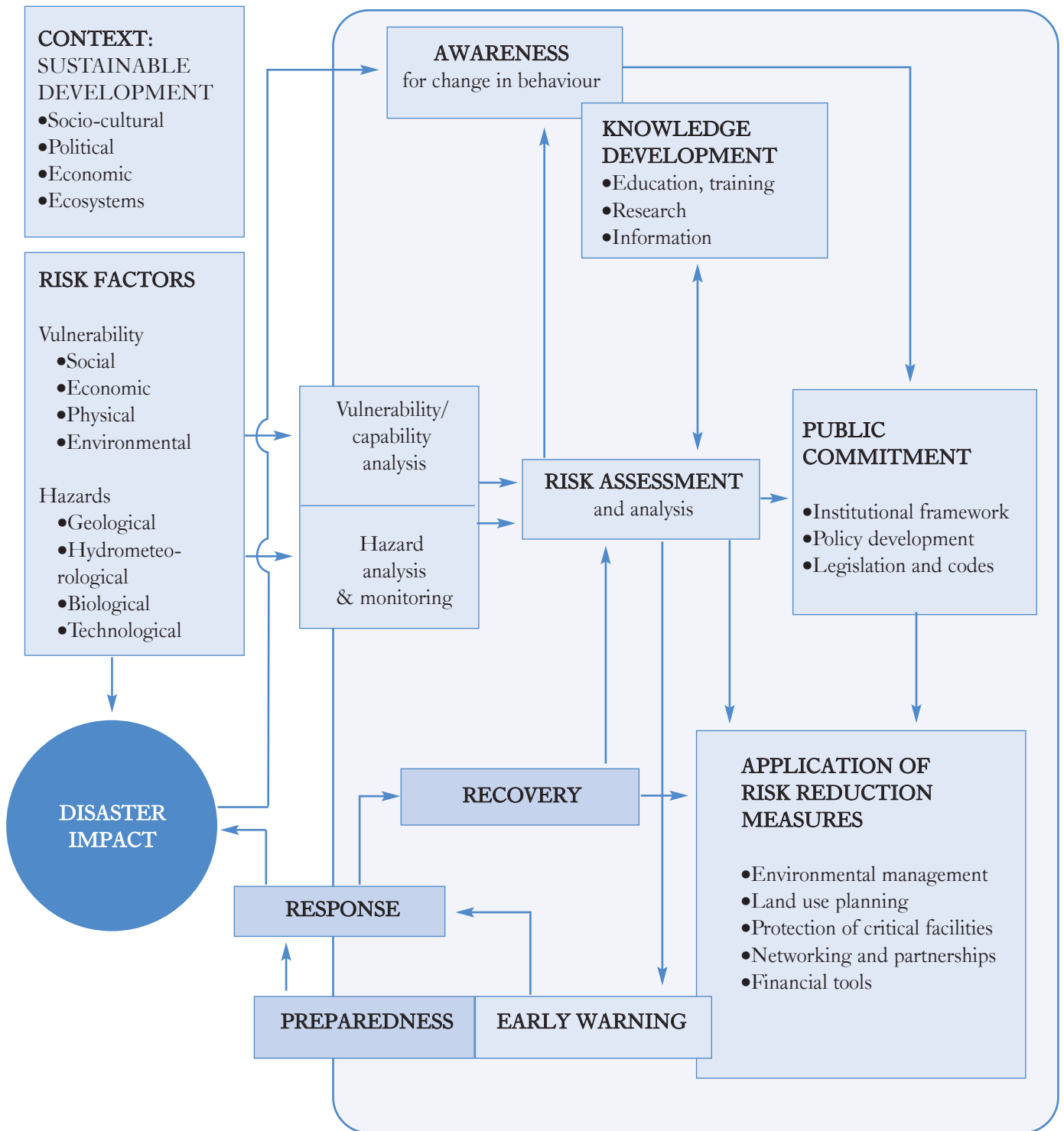
Fortunately, modern forms of information access and communications can facilitate the wider exposure and networking that these new and shifting forms of association require. Above all, despite these many contributions, functions associated with disaster reduction need to be viewed not as an expense, but as an investment in a society’s future.

As common as all of these attributes are to any sustained strategy of disaster reduction, one must also take account of the various political, cultural, and social distinctions that exist among all countries. There are fundamental elements in every disaster reduction strategy, but the priorities, relative emphasis, available resources, and specific ways of implementation must take account of practices that are most suited to local conditions, understanding and effectiveness.

The graphic representation on next page describes the main context and activities involved in disaster risk reduction. These are elements to take into consideration for any disaster risk reduction strategy. The sections of the global review have been organized around these issues, with exception of preparedness, response and recovery initiatives.



FRAMEWORK FOR DISASTER RISK REDUCTION





Defining a few key terms

One of the continuous functions of the ISDR is to support a more homogeneous use of disaster related terms. This Global Review, provides concise definitions, based on a broad collection of different international sources, in order to create a common terminology on disaster reduction issues, useful for the public, authorities and practitioners. This effort will be continued in future reviews and answers a need expressed in several international forums, regional commentary and national responses to the ISDR questionnaire. Key terms used in this review are explained below. Definitions of additional terms can be found in Annex 1.

Hazard

A potentially damaging physical event, phenomenon or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological 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. Each hazard is characterised by its location, intensity and probability.

Vulnerability

A set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of a community to the impact of hazards.

Positive factors, that increase the ability of people and the society they live in, to cope effectively with hazards, that increase their resilience, or that otherwise reduce their susceptibility, are considered as capacities.

Risk

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions. Conventionally risk is expressed by the equation $\text{Risk} = \text{Hazards} \times \text{Vulnerability} / \text{Capacity}$

Beyond expressing a probability of physical harm, it is crucial to appreciate that risks are always created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

Risk assessment/analysis

A process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability/capacity that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

The process of conducting a risk assessment is based on a review of both technical features of hazards such as their location, intensity and probability, and also the analysis of the physical, social and economic dimensions of vulnerability, while taking particular account of the coping capabilities pertinent to the risk scenarios.

Coping capabilities/Capacity

The manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process.

The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards.

Resilience/resilient

The capacity of a system, community or society to resist or to change in order that it may obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is capable of organising itself, and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster.

Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community/society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Risk management

The systematic management of administrative decisions, organisation, operational skills and responsibilities to apply policies, strategies and practices for *disaster risk reduction*.

Disaster risk reduction (disaster reduction)

The systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development.

Prevention

Activities to provide outright avoidance of the adverse impact of hazards and related environmental, technological and biological disasters.

Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disaster. In the context of public awareness raising

and education, prevention refers to attitude and behaviour leading towards a “culture of prevention”.

Mitigation

Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Preparedness

Activities and measures taken in advance to ensure effective response to the impact of disasters, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location.

Early warning

The provision of timely and effective information, through identified institutions, that allow individuals at risk of a disaster, to take action to avoid or reduce their risk and prepare for effective response.

Early warning systems consist of three elements (i) forecasting and prediction of impending events, (ii) processing and dissemination of warnings to political authorities and population, and (iii) undertaking appropriate reaction to warnings.



1.2. Contexts and processes linked to disaster risk reduction: sustainable development

Political support for disaster risk reduction has to be established from the apex of political power but that can only be realistic if the perceptions of risk and the actions proposed accord with the cultural beliefs and habits of society. In today's interconnected world, societies are confronted with rapid winds of change. Therefore, the value of disaster risk reduction can only be realized through rigorous identification and continuous evaluation of the relationships that exist between the distinctive beliefs and human conditions in which people live, the changing environment people inhabit and depend upon for their livelihoods, and the immutable forces of nature. Most importantly, disaster risk reduction relies upon the consequences of collective decisions made and individual actions taken – or not taken.

The emergence of a disaster reduction culture is conditioned by contexts and processes that are described below:

- The sustainable development context, the ultimate international goal;
- The political context, essential for action;
- The three contexts linked to the pillars of sustainable development:
 - (a) The socio-cultural system
 - (b) The economic system
 - (c) The environmental system

Sustainability means recognizing and making best use of the interconnection between social, economic and environmental goals to reduce significant hazard risks. This entails the ability to reduce one's exposure to, and recover from, infrequent large-scale, but also frequent smaller scale, natural and human driven events.

The bottom line for any country, especially the poorest, is to build sustainable communities thriving from generation to generation with a social foundation that provides for health, respects cultural diversity, is equitable and considers the needs of future generations. They require has a healthy and diverse ecological system that is life-sustaining and productive, a healthy and diverse economy that adapts to change and recognizes social and ecological limits. This cannot be achieved without the incorporation of disaster reduction strategies, one of the six principles of sustainability supported by a strong political commitment.

The six principles of sustainability

1. Maintain and enhance quality of life
2. Enhance economic vitality
3. Ensure social and intergenerational equity
4. Maintain and enhance environmental quality
5. Incorporate disaster resilience and mitigation into actions and decisions
6. Use a consensus-building, participatory process when making decisions

Source: J. Monday, 2002



Disaster risk management and reduction are about looking beyond hazards alone to consider prevailing conditions of vulnerability. It is the social, cultural, economic, and political setting in a country that makes people vulnerable to unfortunate events. The basis of this understanding is simple: the national character and chosen form of governance can be as much of a determinant in understanding the risks in a given country, as are the various social, economic and environmental determinants.

“While we cannot do away with natural hazards, we can eliminate those we cause, minimize those we exacerbate, and reduce our vulnerability to most. Doing this requires healthy and resilient communities and ecosystems. Viewed in this light, disaster mitigation is clearly part of a broader strategy of sustainable development-making communities and nations socially, economically, and ecologically sustainable.”

J. Abramovitz

The motivation to invest in disaster risk reduction is first and foremost a human, people centred concern. It is about improving standards of safety and living conditions with an eye on protection from hazards to increase

resilience of communities. A safer society to withstand disasters may be argued as a case of ethics and social justice and equity. It is also motivated by economic gains. Socio-economic development is seriously challenged when scarce funds are diverted from longer-term development objectives to short-term emergency relief and reconstruction needs. It is considered by some as illusory to quantify benefits from disaster reduction. They see the issue foremost as a human and social concern rather than based on economic rationale and efficiency. Others advocate that effective planning and development options can only be based on a careful estimation of the economic gains and poverty impacts of disasters, accompanied by economic justification for the required investments in vulnerability reduction.

Environmentally unsound practices, global environmental changes, population growth, urbanization, social injustice, poverty, and short-term economic vision are producing vulnerable societies. The impact of development on disasters should be fully embraced if disaster risk reduction is to yield its expected benefits. “Instead of demonising hazards for their impacts on society, it would be probably more correct to demonise society for its impacts on hazards!” (A. Lavell, *IDNDR Programme Forum Proceedings*, 1999).



Children preparing to combat wildland fires in Indonesia

Photo: Global Fire Monitoring Centre, 2000



The sustainable development context

“Can sustainable development along with the international instruments aiming at poverty reduction and environmental protection, be successful without taking into account the risk of natural hazards and their impacts? Can the planet afford the increasing costs and losses due to so-called natural disasters? The short answer is, no.”

*ISDR background paper
for WSSD, 2002*

The escalation of severe disasters is increasingly posing a threat to both sustainable development and poverty reduction initiatives. As a consequence principle 1 of the Rio Declaration is imperilled. This states that human beings are at the centre of concerns for sustainable development and are entitled to a healthy and productive life in harmony with nature. Repeated exposure to disasters can lead to a downward spiral of poverty.

It is still the post-disaster reconstruction period that provides the most opportune time to introduce disaster reduction into sustainable development planning. Therefore, political commitment and social acceptance of the value of risk reduction are necessary for forward-looking developers who want to increase the sustainability of communities. When perceived as a distinct set of activities, risk management initiatives are placed in competition with other developmental objectives, rather than being seen as integral parts of the same whole.

Regional considerations

Progress can be shown by some examples of regional strategies for sustainable development that strive to reduce vulnerability to disasters. In some cases, it was only after unacceptable losses occurred, or when provoked by angry demands of the public after particularly disastrous events (e.g. after the Gujarat earthquake in India, following hurricane Mitch in Central America, or in the aftermath of the floods in Mozambique), that international development banks and development assistance agencies have begun to require risk assessment and management processes to be included in new infrastructure development projects.

- **In Asia**, although there have been few examples of effective, systematic and long-term integration efforts between disaster reduction and poverty alleviation programmes, a dialogue between the two interest groups is beginning to take place.

In February 2001, the *Asian Development Bank (ADB)* organized the Asia Pacific Forum on Poverty. One of the key focus areas was social protection to diminish vulnerability to risks, generate employment and improve productivity and working conditions in Asia and the Pacific. It was one of the few times that a discourse on poverty alleviation in the region recognized disaster reduction as one of the key interventions for social protection.

The region, however, has a long way to go in terms of integrating poverty alleviation and disaster reduction programmes in practice. More research is required on understanding the nature of linkages between poverty and vulnerability in different social, political, economic and hazard-specific contexts. Only then can specific frameworks, tools and methodologies be developed and applied to integrate poverty alleviation and disaster reduction programmes.

A notable example of an integrated program is the recent initiative of the *Mekong River Commission (MRC)*. Following the extensive floods in Viet Nam and Cambodia in 2000, it developed a holistic strategy for flood management and mitigation that emphasizes land-use planning, structural measures, flood preparedness and emergency response.

The Phnom Penh Regional Platform on Sustainable Development for Asia and the Pacific adopted in the participatory phase leading up to WSSD, notes that the financial crisis of 1997, the isolation and vulnerability of *Small Island Developing States (SIDS)* and recurrent natural disasters had posed major constraints to the achievement of sustainable development. Coping with natural disasters is perceived as an essential issue to be addressed in the region. Measures are called for to ensure that populations suffering the consequences of natural disasters, severe environmental degradation and other relevant humanitarian emergencies are given every assistance and protection so that they can resume normal life as soon as possible.

- **In the Pacific**, the crucial relationships that exist between natural disaster risks, the environment and their combined impacts on human societies are particularly evident. In the Pacific small island states people are highly depend-



ent on the natural environment, and historical records testify to the devastating effects that natural disasters cause in the region.

There is growing concern among government officials and scientists about the potential for increasingly frequent and more severe meteorological and hydrological hazards resulting from climate change, and how they may affect Pacific islands.

- **In Africa** poverty levels remain high, especially among the rural poor. High levels of foreign debt have discouraged investment and growth. Under these austere conditions, it is unrealistic to expect significant investments at household or national level to mitigate the impact of natural or other threats.

In Southern Africa, in preparation for WSSD, the *Southern African Development Community (SADC)* expressed concern that ten years after the adoption of international agreements at the United Nations Conference on Environment and Development, Southern Africa was still “confronted by social, economic and environmental crises”.

Among the core issues identified, poverty was highlighted as the primary constraint to socio-economic development, but matters of health, food security, climate change, water availability, land degradation and market access were also cited as critical issues. Each of these factors has a bearing on prevailing vulnerability and risk issues in the region. In a region still heavily dependent on agriculture to maintain household livelihoods and national food security, drought and extreme rain events present serious challenges to sustainable development.

The African Ministerial Statement to WSSD states that the increased incidence of natural disasters in Africa poses a major obstacle to the African continent’s efforts to achieve sustainable development, especially in view of the region’s insufficient capacities to predict, monitor, handle, and mitigate natural disasters.

Reducing the vulnerability of the African people to natural disasters and environmental risks is mentioned as a requirement to achieve the poverty reduction goals of the Millennium Declaration alongside other basic requirements including economic growth, access to sources of energy and basic health services. Extreme weather events such as floods and droughts induced by climate change are singled out.

- **In Latin America and the Caribbean**, the health sector has recognized that risk reduction is a key consideration for an improved health sector. The hurricanes and earthquakes affecting the region in the nineties have convinced the *Pan American Health Organization (PAHO)* and most health authorities that a culture of prevention must include mitigation of structural and non structural damages in health facilities and water supply systems. This was made clear following the collapse of a hospital during an earthquake in Mexico in 1995. Action requires significant capital investment, a decision in the hands of ministries and financing organizations. As a result, only a limited number of hospitals have been retrofitted, illustrating once more that disaster reduction requires a large consensus and political decisions across the board.

- **In Central America**, natural hazards are exacerbated by the high level of vulnerability in the region. Therefore, any sustained commitment to reduce risk should be considered in the context of poverty reduction. Increasing attention is being given to the global notion of risk as opposed to a more restricted view of disaster management. *UNDP* in El Salvador is proposing the use of risk management as a unifying concept in the design of its next five-year programme with the government. The conceptual framework used in the Lower Lempa Valley implemented with the Salvadoran Ministry of Environment was elaborated around the notion of global or total risk, where risk reduction is regarded as a component of development investment.

The severity of the El Niño/La Niña phenomenon of 1997-1998, led to the establishment of the *Andean Regional Programme for Risk Prevention and Reduction (PREANDINO)* with the objective of promoting the development of disaster risk prevention and mitigation policies and new institutional arrangements aimed at incorporating prevention into development planning.

The *Rio de Janeiro Platform for Action on the Road to Johannesburg 2002* was adopted by the Regional Preparatory Conference of Latin America and the Caribbean for WSSD. Ministers of environment and other senior representatives from Latin American and Caribbean countries stressed the need for actions that reduce disaster vulnerability and promote a culture of risk awareness by means of education, improved information dissemination and the use of early warning systems.

The political context

“Managing risk depends on political will. Political will depends on political leadership and a shifting set of incentives, pressures and polemics. The political costs of redirecting priorities from visible development projects to addressing abstract long-term threats are great. It is hard to gain votes by pointing out that a disaster did not happen. How can we, who see risk management as a central priority and who have valuable technical knowledge and skills to contribute, enter this policy arena? This question is at the centre of the [disaster risk reduction] discourse. We know now that we must engage, but do we know how?”
I. Christophos, J. Mitchell and A. Liljelund, 2001

Political commitment is an essential quality for sustained efforts of risk reduction. Only political willingness can give disaster reduction the place it deserves. Obtaining political commitment from public authorities is one of the four overriding objectives of ISDR to effectively reduce the impacts of disasters. This objective needs to be addressed through increased coordination at all levels, risk management strategies and the allocation of appropriate resources including development of new funding mechanisms. Disaster reduction should be dealt with as a policy issue across relevant fields of gov-

ernment including health, agriculture and environment. National and regional policies are addressed in chapter three.

To be feasible, disaster reduction needs to show it is able to address short-term and immediate needs of survival as well as to take care of longer-term objectives of prevention and capacity building. This approach is illustrated by efforts undertaken in the cities of *Manizales and Medellin in Colombia*.

There, the death toll and economic damage due to landslides and floods have decreased considerably thanks to initiatives undertaken by the municipalities, together with universities, the private sector and community groups, through reforestation, plant cover works, improved drainage systems and engineering works. In some cases, these investments are even generating income through harvesting and tourism.

Political change, economic reform and development of public policy to protect people and resources are fundamental solutions to treating causes rather than only symptoms. Politicians that undertake no-regret policies and apply precautionary principles in matters of environmental protection should be able to take the same stance regarding disaster reduction.

The political context in Southern Africa

In Southern Africa, other forces have combined to influence the political context of disasters. Decades of armed conflict, political instability and population displacement have conditioned more recent approaches to disaster management. In addition to the loss of lives, war-related damage and destruction to infrastructure, the prevalence of prolonged relief operations was widespread in places, creating a sense of dependency on external assistance.

International humanitarian assistance that often inundates countries facing severe drought or flood crises, is seldom accompanied by support for longer-term institutional change that promotes practical mitigation efforts. To a significant extent, the emphasis given to the urgent supply of material requirements and logistical capabilities born of crisis and responding to the needs of unsettled populations, persists long after the acute conditions have been resolved. Too often a memory of relief supplies or a legacy of external assistance remains to discourage local initiatives or sustained institutional investments in disaster risk reduction.

“The state of a country's . . . political condition at the time of the onset of a disaster is a major determinant in the impacts on society of that event.”
M. Glantz, 2000

Similarly, the public that exercises great pressure to bring about environmental policy changes should become a political force putting pressure on governments to protect people from disasters. If it becomes a popular issue, disaster risk reduction will gain momentum.

While disaster reduction will not reign without political willingness, a word should also be said about the negative consequences political decisions can have on disaster impacts. For example, huge hydraulic projects may change landscape references of communities and their perception of risk, thereby increasing vulnerability by reducing the people's capacity to assess and anticipate hazard-related threats.

Paired Perspectives: Two countries' response to the same question in the ISDR questionnaire regarding the role of political commitment in disaster risk reduction.

Country 1: A highly disaster-prone country, with considerable technical, material and financial resources, with strong political aspirations to modernize.

Disaster mitigation is not a priority item, except at times of disaster. With many pressing requirements related to health, education, development, defence, etc., disaster mitigation must during normal times be given diminished attention. We do not think that an easy recipe exists to overcome these obstacles.

Country 2: A highly disaster-prone country, with few technical, material and financial resources, and much greater demands to realize its strong political aspirations to develop.

It has been possible for the government to institutionalise the concept of disaster management and also to generate momentum at the grass-roots level for self-reliance in coping with and responding to disasters.

Links to the pillars of sustainable development

● The socio-cultural context

The links between disaster and the socio-cultural system are an important component in disaster risk reduction and a pillar of sustainable development. Social vulnerability is further discussed in chapter two.

The term culture is understood in a myriad of ways and represents an extremely complex notion. It is, therefore, useful to provide a definition.

Differences exist among groups of people, and these differences reflect a variety of factors including language, socio-economic and political systems, religion and ethnicity as well as historical experience and relationships towards nature. Each cultural group has its own set of experiences and expectations. Furthermore, relationships between people and groups of different cultures are often embedded in different sets of values, unequal power relations with some groups becoming dominant and others being marginalized. All of these factors are highly relevant in the context of natural disasters.

Much early thinking about disasters was based on a notion of nature and culture being separate. Disasters were seen as the products of a precocious and unpredictable nature and therefore to be out of the control of humans or referred to in terms such as acts of supernatural forces, or acts of god.

Philosophical definition of culture: The way of life of a people, including the attitudes, values, beliefs, arts, sciences, modes of perception, and habits of thought and activity. Cultural features of forms of life are learned but are often too pervasive to be readily noticed from within.

Psychological definition of culture: The sum total of the ideas, beliefs, customs, values, knowledge and material artefacts that are handed from one generation to the next in a society.

It became increasingly obvious that the causes of disasters are complex and that beside nature people are a causal factor. Looking beyond beliefs, more and more disasters are understood in terms of their cultural and social components. Vast differences in disaster vulnerability among countries and within individual societies have their roots in unequal sets of power relations, leading to unequal distribution and access to wealth among different cultures or political settings.

It is important that ownership of the disaster context is not stripped from local people who can be left even more powerless than would be the case if external intervention did not occur. There is a growing appreciation of the need for disaster reduction activities to be based on more attentive participatory approaches involving local communities as much as possible, considering them as proactive stakeholders and not passive targets for intervention.

Common sense solutions in one cultural setting are often contrary to what may be common sense in others. Local socio-political structures



and cultural conditions such as kinship arrangements, customary rights, community and family networks and systems of leadership nearly always persist during disasters and it is important that these are not undermined. For example, it is important to recognize that dealing with death and illness is a strong cultural process. Where decisions about matters such as mass burials are imposed on cultural groups by others, serious problems can occur that disrupt grieving and have long-term social, legal and psychological consequences.

The differing needs and roles of men and women also need to be taken into account. Men are usually seen as income generators while women ensure social cohesion and continuity by taking care of children, the elderly and the disabled. Different priorities, perceptions and abilities to cope with abnormal situations need careful thinking to maximize the success of risk management and to achieve sustainable development.

The impact of cultural change on disaster resilience

Cultural changes tend to reduce disaster resilience in traditional communities and at the same time, disasters can exaggerate the influence these change agents exert. While such changes most probably would have happened anyway, there can be little doubt that they can be hastened by disaster events, as the following examples from Pacific small island states demonstrate:

- Introduction of new crops, especially cassava which is more vulnerable to high winds than yams or taro, the common traditional subsistence crops;
- Replacement of traditional hazard-resistant housing with climatically inappropriate disaster-relief homes;
- Reduced need for food preservation and storage resulting from relief supplies, especially of rice, which has become an increasingly dominant component of diets in rural and urban areas, alike.

In many cultures, attachment to place is a critically important element, thus decisions to move people must be made carefully. In some cases, people have felt more afraid and at risk

in the sites they have been moved to than if they had remained (even where the risk of death is relatively high). In many cases people are also unwilling to leave a house in which they have invested most of their time and money and which constitutes their principal legacy to their children.

In other instances, host communities have felt imposed upon by those who have been relocated and violent responses are not uncommon. The issue is that relocation of communities at risk may be scientifically the most attractive and reasonable prevention measure but it can be strongly opposed culturally.

Cultural change is an important consideration in disaster reduction as is cultural continuity. For example, intercommunity cooperation following disasters was extremely common among traditional Pacific island communities, and to a large extent sustained by ceremonial exchange systems. These exchange networks fell away as commercial trading, often centred in colonial capitals, replaced traditional forms of exchange, colonial governments replaced traditional political networks and missionaries discouraged exchanges as threats to Christianity.

Relief aid also reduced the need to sustain such networks. However, with the migration of many Pacific islanders to places such as Australia, California and New Zealand, new exchange networks have emerged. Following disasters, major flows of resources now enter Pacific island states in the form of remittances from kinfolk. Culturally, disasters have become important events through which the Pacific island diasporas maintain links with the home islands.

An important finding of many researchers working in developing countries or in local communities is that a wide variety of measures for reducing disasters existed in earlier, often pre-colonial, times. A variety of socio-cultural or economic factors mentioned have gradually eroded these measures, undermining cultural support and social activities that might have contributed to sharing the exposure to risk among members of the community.

● The economic context

The links between disaster and the economic system, another pillar of sustainable development, are as clear as the financial incentive for disaster reduction. Indeed, historically people have always made investments to obtain, and then to protect, those resources that hold the greatest value for them. This is the principle behind insurance or other efforts to spread risk among a community including joint ownership or responsibility for protecting assets.

The concern demonstrated by a farmer to protect a single cow, or a fisherman to mend nets in subsistence economies, as well as the rapid growth of investment in business continuity practices seen in more commercialised societies, validate the economic basis of reducing risks in order to minimize the negative impacts of future disasters. Economics and the awareness of the importance of disasters that increase in severity and frequency through human action, provide incentives for development banks and international assistance institutions to integrate risk reduction in their development strategies and to develop innovative forms of financial investment. Some of these strategies are discussed further in chapter five.

Risk management planning involves an estimation of the impacts of disasters on the economy, based on the best available hazard maps and macroeconomic data. These include assessments of the costs of disasters, evaluation of the costs and benefits of disaster reduction and risk trans-

Economic losses due to natural hazards in 2001

Altogether, 700 natural hazard losses were recorded last year. At around US\$ 36 billion, economic losses were about 20 per cent above the previous year's level. Insured losses in 2001 increased by more than 50 per cent compared with the previous year. Around the globe 80 earthquakes produced economic losses of US\$ 9 billion and insured losses of about US\$ 900 million. As in previous years, insurers' statistics were dominated by windstorms and floods. These accounted for more than two thirds of all events (480) and no less than 92 per cent of all insured losses. Tropical Storm Allison (United States) triggered an overall loss of US\$ 6 billion (more than half of which was insured). Typhoon Nari caused major damage in Taipei (Taiwan, Province of China) and generated an insured loss of US\$ 600 million.

Source: MunichRe, Topics (2001).

fer measures (including the value of improved forecasting systems) and incentives from the international community that lead towards proactive disaster reduction projects. Such studies are carried out through international cooperative arrangements.

Given the recurrence and frequency of natural hazards, a concerted effort will always be required to respond effectively to them, and to assess the frequency of emergency recovery assistance, as well as the prospects of reducing damage in the future.

Evidence of the economic benefits of disaster reduction efforts

In the *Caribbean*, empirical evidence shows that it is significantly more cost-effective to design and build a structure to standards that would withstand maximum expected wind or seismic forces in a given location, rather than build to lower standards and suffer the damages.

Source: OAS, 1993.

Switzerland long ago recognized the value of forests in protecting important economic assets (roads, industries, infrastructure, tourism) as well as human settlements and people against avalanches and landslides. The economy provided by the protection afforded by forests was estimated between US\$ 2 billion and US\$ 3.5 billion per year.

Source: OFEFP, Switzerland, 1999.

In the *United States*, after the 1993 Midwest floods, government buyouts of flood-prone residents and movement of material property to areas outside the 100-year flood plain were successful in reducing flood claims in subsequent flood events. The buyout initiative resulted in a significant reduction in National Flood Insurance Program (NFIP) claims and the availability of land in floodplains for other purposes. In the long run, economic sustainability hazard mitigation efforts plus enhanced risk assessment utilizing appropriate tools will have environmental pay-offs.

Source: Annual Hazards Research and Applications Workshops, University of Colorado, 2001.

Areas for action specific to economic aspects of disaster reduction

- Assessment of natural disaster damage and loss potential (including historical perspective).
- Consider costs and benefits of natural disaster management (cost-effective allocation of resources).
- Assessment of hazard risks at the project appraisal stage of all potential investment projects, including cost-benefit analyses that estimate the hazard vulnerability implications of alternative levels of overall quality and strength as well as returns to specific disaster-proofing features.
- Evaluate trade-offs between quality and quantity of structural mitigation measures.
- Create incentives, cost sharing and recovery for disaster reduction.
- Consider disaster risk transfer and financing.
- Enforce regulations under different levels of economic development and government capacity.
- Determine pricing policy designed for rational use of resources (water, energy).

Adapted from: C. Benson, ODI, DFID, 2001-2002.

The benefits of long-term disaster management versus the costs of repeated short-term post-disaster reconstruction need to be documented. In view of the exorbitant economic and social costs of recurring disasters, long-term hazard reduction planning is, more and more, a guiding principle and prerequisite for the sustainability of physical investments in need of replacement, reconstruction or construction.

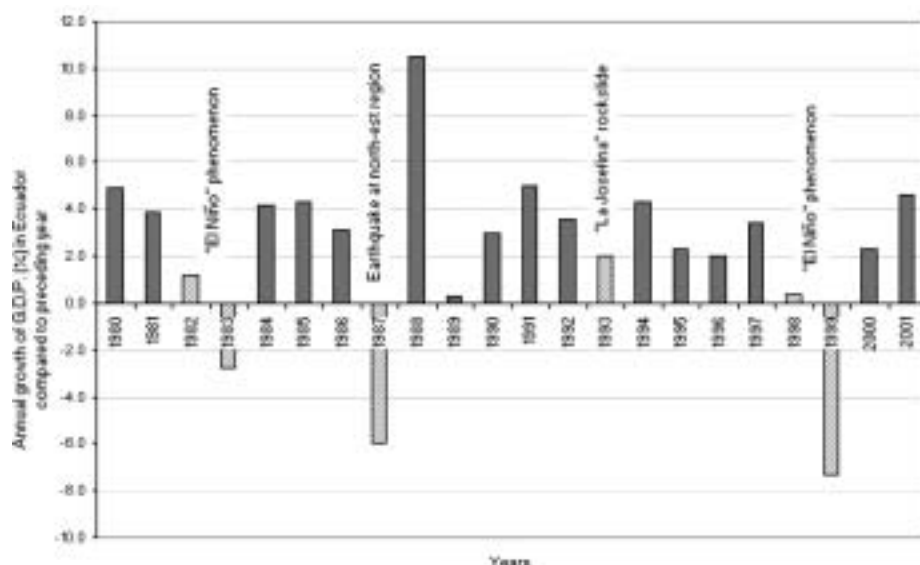
Improvement in, and enforcement of, regulatory frameworks of disaster reduction including disaster-related insurance, building codes and land use planning will ensure that infrastructure is properly sited and built to minimize damages as well as to reduce the costs of repair. This involves public insurance policy, market and regulatory incentives for risk and vulnerability reduction, pro-

tection against fluctuations in insurance/reinsurance prices, augmentation of insurance coverage at reasonable cost and backstop financial mechanisms.

The relationship between disaster and risk reduction and globalisation also needs to be researched further to explore, on the one hand the detrimental effects of deregulation and economic interconnection, and on the other hand, the beneficial effects associated with trade opportunities and economic competitiveness.

In a globalizing world, the potential of risk reduction as an essential element to building competitiveness, protecting investment and securing trade opportunities, while ensuring that new risks are not created and business not interrupted, has to be fully comprehended.

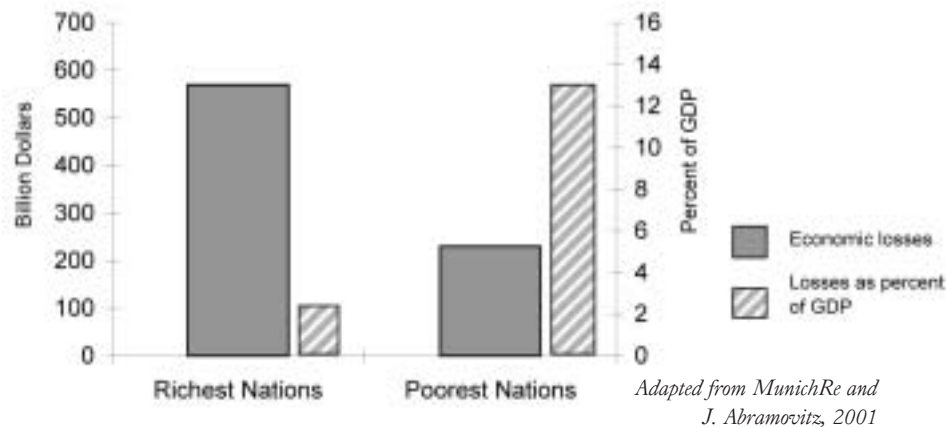
Annual growth Gross Domestic Product (GDP) and occurrence of major "natural disaster" in Ecuador



Source: ISDR, Central Bank of Ecuador, 2002

The figure shows the gross domestic product (GDP) of Ecuador from 1980 to 2001. The disruption of normal growth coincides with the occurrence of some major disasters, even though political and other circumstances also have influenced this trend. After the El Niño event of 1982-83 the GDP decreased to minus 2.8 per cent compared to the previous year. In 1997 a medium intensity earthquake affected important, economic infrastructure, including a key oil pipeline, decreasing GDP to minus 6 per cent. The widespread damage by floods due to the El Niño event of 1997-98, an earthquake in 1998 and political turmoil, was followed by a decrease of the GDP to minus 7.3 per cent in 1999.

Disaster losses, total and expressed as share of GDP, in the richest and poorest nations, 1985-1999



Although smaller in absolute figures, the percentage of economic loss in relation to the gross national product (GNP) in developing countries far exceeds that in developed countries. This fact becomes even more relevant for small island developing states (SIDS).

The economic impacts of natural disasters in Pacific small island states

Experience in Pacific small island states as in many other poor countries, shows that it is probably not the actual dollar value of disaster losses that is most relevant, but rather the cost to the particular nation in terms of percentage of **GDP** – and this can be very significant indeed.

A major study of the economic impacts of natural disasters in Pacific island countries was conducted as a part of the *South Pacific Disaster Reduction Project (SPDRP)* by Te'o I.J. Fairbairn (UNDHA-SPO 1997a). The study concluded that natural disasters have a significant impact on key economic elements such as GDP, employment and trade, and macroeconomic aspects, including government finances, monetary policy, inflation and the level of international reserves. The conclusions underlined the importance of adopting appropriate policy and institutional capabilities in order to minimize the extent of physical damage and economic losses, in addition to the continuing role that donors have played in providing assistance for relief and rehabilitation purposes.

Fairbairn observed that “with their limited economic diversification, combined with a high agriculture-GDP ratio prevalent among many of the small Pacific island countries, [they are] particularly exposed to disaster devastation and considerable economic losses. In the short to medium term, the destruction of standing crops, physical infrastructure and housing could be severe, with the consequences that GDP could become sharply depressed for some time, with likely consequence of provoking macroeconomic instability. In the longer term, the study noted that damage to productive assets could lead to a loss of output with reduced economic growth and declining standards of living. The reallocation of financial resources after a disaster for emergency and rehabilitation purposes as well as reductions in capital investments can impede the realization of major national development objectives. However it was equally noted that “the extent of the destruction and economic losses that result, both immediately and over time, depends on a variety of factors including the degree of dependence on agricultural production, the level of structural diversification achieved, resource endowment and the level of disaster preparedness”.

In small countries generally, and in small development states specifically, primary attention needs to be given to a range of mitigation strategies that can reduce the exposure or risk of damage to productive assets and associated economic losses. The promotion of appropriate macroeconomic policies can also be vital in cushioning the destabilizing impact of natural disasters. These can include firm adherence to fiscal and monetary policies at the time of severe demands on financial resources created by emergency conditions or post-disaster requirements, the encouragement of property owners to adopt insurance as means of spreading their risk, and the creation of a disaster reserve fund to facilitate a quick recovery of vital economic activities or infrastructure facilities following a disaster. At a more basic level of reducing risks long before they threaten, practices that maintain a continued commitment to strong macroeconomic fundamentals, including adequate external reserves, can serve as buffers against disaster-related crises.



● Environmental context

“Around the world, a growing share of the devastation triggered by ‘natural’ disasters stems from ecologically destructive practices and from putting ourselves in harm’s way. Many ecosystems have been frayed to the point where they are no longer resilient and able to withstand natural disturbances, setting the stage for ‘unnatural disasters’ – those made more frequent or more severe due to human actions. By degrading forests, engineering rivers, filling in wetlands, and destabilizing the climate, we are unravelling the strands of a complex ecological safety net.”
J. Abramovitz, 2001.

The third system with which disaster reduction is closely linked is the environmental system, yet another pillar of sustainable development. Disasters do not only affect the built environment but also the natural environment. Furthermore, environmental degradation increases the intensity of natural hazards and is often the factor that transforms the hazard, or climatic extreme such as a heavy downpour, into a disaster. For example, river and lake floods are aggravated or even caused by deforestation which causes erosion and clogs rivers. Poverty and hazard vulnerability is integrally linked to this situation. The poor are compelled to exploit environmental resources for survival, therefore increasing both risk and exposure to disasters, in particular those triggered by floods, drought and landslides.

The natural environment provides solutions to increase protection against disaster impacts. Therefore, successful disaster reduction should enhance environmental quality, which includes protection of natural resources and open space, management of water run-off, and reduction of pollution.

Successful environmental policies should highlight the effectiveness of disaster reduction measures. This should entail an acceptance of some degree of natural disturbance to avoid the greater consequences of

Nature’s solutions to reduce disaster impacts

“The time has come to tap nature’s engineering techniques – using the services provided by healthy and resilient ecosystems. Dunes, barrier islands, mangrove forests, and coastal wetlands are natural shock absorbers that protect against coastal storms. Wetlands, floodplains, and forests are sponges that absorb floodwaters. Nature provides these valuable services for free, and we should take advantage of them rather than undermining them.”

Source: Abramovitz, 2001.

“Open space, greenways, and riverside parks serve as habitat for wildlife protect streams from pollutants, help maintain water temperatures, and keep people and development from the highest-risk floodplains. Trees can drastically reduce storm water management costs. American Forests studied Garland, Texas, and calculated that the city’s canopy reduced storm water runoff by 19 million cubic feet during a major storm. Annually, the trees save Garland \$2.8 million in infrastructure costs and \$2.5 in air quality costs and residential energy bills.”

Source: Natural Hazards Research and Applications Information Center, 2001.

Around the village of Guarita in Honduras, local people practiced traditional Quezungal farming methods consisting of planting crops under trees, maintaining ground vegetation and terracing, in order to root the soil and reduce erosion. During hurricane Mitch, only 10 per cent of the crop was lost, leaving reserves that could be shared with more severely affected neighbouring areas.

The Viet Nam Red Cross Society conducted an environmental preservation project in Thai Binh province to address different aspects of risk relating to typhoon occurrence that threatens the people living on the coast. Two thousand hectares of mangrove plantation were created along the coastline serving to reduce wind and wave velocity and action, thereby protecting landscape, human life and local development assets. Resource opportunities for improving livelihoods were provided by a healthier natural environment. The limited damage provoked by the worst typhoon in a decade provided the best possible indication of the effectiveness of the plantation in reducing risks and its ability to enhance the resiliency of local communities.

Source: IFRC, 2002.

Linking environment and disaster reduction activities

- Assessment of environmental problems linked to hazards based on reliable sources of existing information, mapping of environmentally sensitive areas, description of the characteristics of the environment and development trends in these areas, assessment of impacts and the need for additional data.
- Examination of environmental benefits to be drawn from disaster reduction activities throughout sectors.
- Monitoring to provide information for decision-making purposes, e.g. removal of disaster-prone land from development (land-use plans enable local governments to gather and analyse information about the suitability of land for development, so that the limitations of hazard-prone areas are understood by policy makers, potential investors and community residents).
- Environmental tools for disaster reduction purposes: regulatory (zoning, subdivision regulations, building codes, special ordinances), incentives (tax incentives, transfers of development rights, easements, land purchases, voluntary agreements, donations, leases, covenants, charitable deductions), programmes (conservation/restoration of ecosystems, wildlife, wetlands), hazard control and mitigation, water/watershed, coastal-zone management.

extreme events, and an appraisal of alternative solutions to an exclusively engineering approach.

There is growing recognition that by following principles of wise environmental management, increased hazard protection as well as economic benefits can be provided by the natural environment. This can be accomplished by building national and local capacities, exchanging experience and information regionally and engaging programme and investment partners internationally.

The wealth of information and knowledge from both environmental and disaster management studies should be mutually beneficial. Both areas are inherently multi-disciplinary and dynamic in their approach and analysis of the socio-environmental nexus. Institutionally, both have been, and largely continue to be, operated by the public sector and NGOs. Similar tools are continuously being refined in both fields, namely vulnerability indexing, inventory mechanisms, educational programmes for public awareness and impact assessments.

Encompassing long-term comprehensive goals to manage growth, development and land use implies incorporating an effective environmental component into disaster reduction strategies. Adapted, sustainable and integrated management of natural resources, including reforestation schemes, proper land use and judicious settlements should increase the resilience of communities to disasters by reversing current trends of environmental degradation and

dealing with hazard management in a comprehensive way. Secondary benefits expected from the introduction of environmental projects in disaster reduction programmes include social acceptance, political feasibility and economic rationale.

Disaster reduction and environmental management should become national priorities. Entities responsible for disaster reduction should have clear environmental mandates. Coordinated and inter-agency programmes are needed to promote a holistic problem-solving strategy, justifying the protection and restoration of natural functions of ecosystems, and assessing programme subsidies to create the right incentives for sustainability. Environmental accounting systems that produce information suited for decision-making should reflect disaster reduction considerations. Additional studies are needed to improve systems of ecological economic accounting. Translating environmental resources and services into conventional economic figures is still very much a challenge.

As disaster reduction and environment have a lot in common, the disaster reduction community should look closely at experience gained in promoting environmental policies. The environmental community has been promoting its agenda for 30 years. Today, the role of environmental strategies to achieve sustainable development is now no longer questioned and disaster reduction policy must follow a similar path.



Until recently, the relationship between environmental degradation and mismanagement, hazard incidence and vulnerability was a non-issue in most regions and countries except for lip-service. Neither the subject nor the designated authorities for disaster management were thought to be relevant for ecologists and environmentalists. There was little discussion, and even less organizational contact, linking the perceived interests of environmental management and the dynamics associated with risk reduction. In fact, the primary actors frequently considered one another to be antagonists, struggling to represent forces either empowering the interests of the people or expanding the uncompromising power and authority of the State, often played out over competing uses of land and natural resources. It should also be recalled that the existence of environmental divisions in bilateral and multilateral agencies as well as of environmental ministries was not the norm during the 1980s.

Long-term environmental changes and disasters

At the beginning of the 21st century, there is, particularly in Pacific island developing states, growing concern about the long-term consequences of climate change, the El Niño phenomenon and the potential for rising sea levels. In recognizing the heavy dependence of small island developing states on the natural environment and that they are exposed to almost all types of natural, technological and human-related hazards, there is a strong rationale for considering all these hazards in a generic sense as ultimately being environmental hazards.

Environmental impact is precisely the premise for disaster reduction in five generic environments:

- Built environment – property, buildings, infrastructure
- Natural environment – geography, physiology
- Human environment – human life, socio-economic factors integral with the surface of the earth
- Terrestrial environment
- Marine environment

This changed dramatically in the closing years of the 1990s in Latin America and the Caribbean. El Niño and Hurricanes Georges and Mitch focused attention on the importance

of the full range of the hydrological cycle to both development and disaster concerns. The magnitude of the resulting fires, drought, flooding and landslides associated with these disasters inevitably stimulated discussion about the relationships that exist between environmental mismanagement and the occurrence of hazards. One of the most important initiatives was the CCAD publication, *Strategy for the Reduction of Environmental Vulnerability in Central America when Faced with Natural Disasters: Environmental Management and the Evaluation of Vulnerability*, (May 1999). Produced with the collaboration of the Economic Commission for Latin America and the Caribbean (ECLAC), UNDP, UNEP and the World Bank, this document provided an overview of the disaster and vulnerability problems in the region and proposed many wide-ranging projects for financing as part of the international process to rehabilitate the Central American region. The content of the proposals went quite beyond environmental problems, touching on almost every foreseeable topic of interest to risk analysts and managers.

Concluding remarks

Despite the progress achieved, much more is required to implement institutional changes favouring the evolution of a disaster reduction culture. The processes conditioning the emergence of disaster reduction need to be conducive to risk and vulnerability understanding, awareness and management, leading to long-term safe development planning based on anticipation rather than cure.

Disaster reduction strategies drawing upon sustainable development concepts should be proactive, and, on a continuous basis. They should promote political commitment, financial rationale, environmental sensibility and cultural awareness. Such a shift in mentality should, in particular, meet the mitigation requirements imposed by the slow-onset disasters that global environmental changes will bring about.



Chapter 2

Risk awareness and assessment

- 2.1 Understanding the nature of risk
- 2.2 Emerging trends in disaster impact, hazards and vulnerability patterns
- 2.3. Risk assessment



Photo: J. Jenkins/PAHO

2.1. Understanding the nature of risk

Disaster risk is part of every day. Awareness of risk is therefore a necessary condition to engage in disaster risk reduction. The focus on risk management, rather than on the disaster event, reflects a proactive attitude for dealing with potential threats to social and materials assets, before they are lost. The analysis and lessons learned from prior experiences of disasters help to define profiles of risk attached to people, activities and places that share attributes, in the face of particular potential sources of damage. Understanding risk relates to the ability to define what could happen in the future, given a range of possible alternatives to choose from. Assessing risks, based on vulnerability and hazard analysis, is a required step for the adoption of adequate and successful disaster reduction policies and measures

This chapter will discuss briefly:

- The nature of risk, with emphasis on the linkages between hazards and vulnerability.
- The emerging trends in disaster impact, hazard and vulnerability patterns.
- Risk analysis and assessments with examples of application of these methodologies.

Levels of risk awareness depend largely upon the quantity and quality of available information and on the difference in people's perceptions of risk. People are more vulnerable when they are not aware of the hazards that pose a threat to their lives and assets. Risk awareness varies among people, communities, agencies and governments, according to their particular perceptions. These can be influenced by the knowledge of hazards and vulnerabilities, as well as by the availability of accurate and timely information about them.

Risk

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions.

Two elements are essential in the formulation of risk: the probability of occurrence for a given threat – **hazard**; and the degree of susceptibility of the element exposed to that source – **vulnerability**. The negative impact, or the disaster, will depend on the characteristics, probability and intensity of the hazard, as well as the susceptibility of the exposed elements

based on physical, social, economic and environmental conditions.

The recognition of vulnerability as a key element in the risk equation has also been accompanied by a growing interest in linking the positive capacities of people to cope, withstand and recover from the impact of hazards. It conveys a sense of the potential for managerial and operational capabilities to reduce the extent of hazards and the degree of vulnerability. This awareness is reflected by the incorporation of capacity in the risk equation:

$$\text{Risk} = \text{Hazard (H)} \times \text{Vulnerability (V)} / \text{Capacity (C)}$$

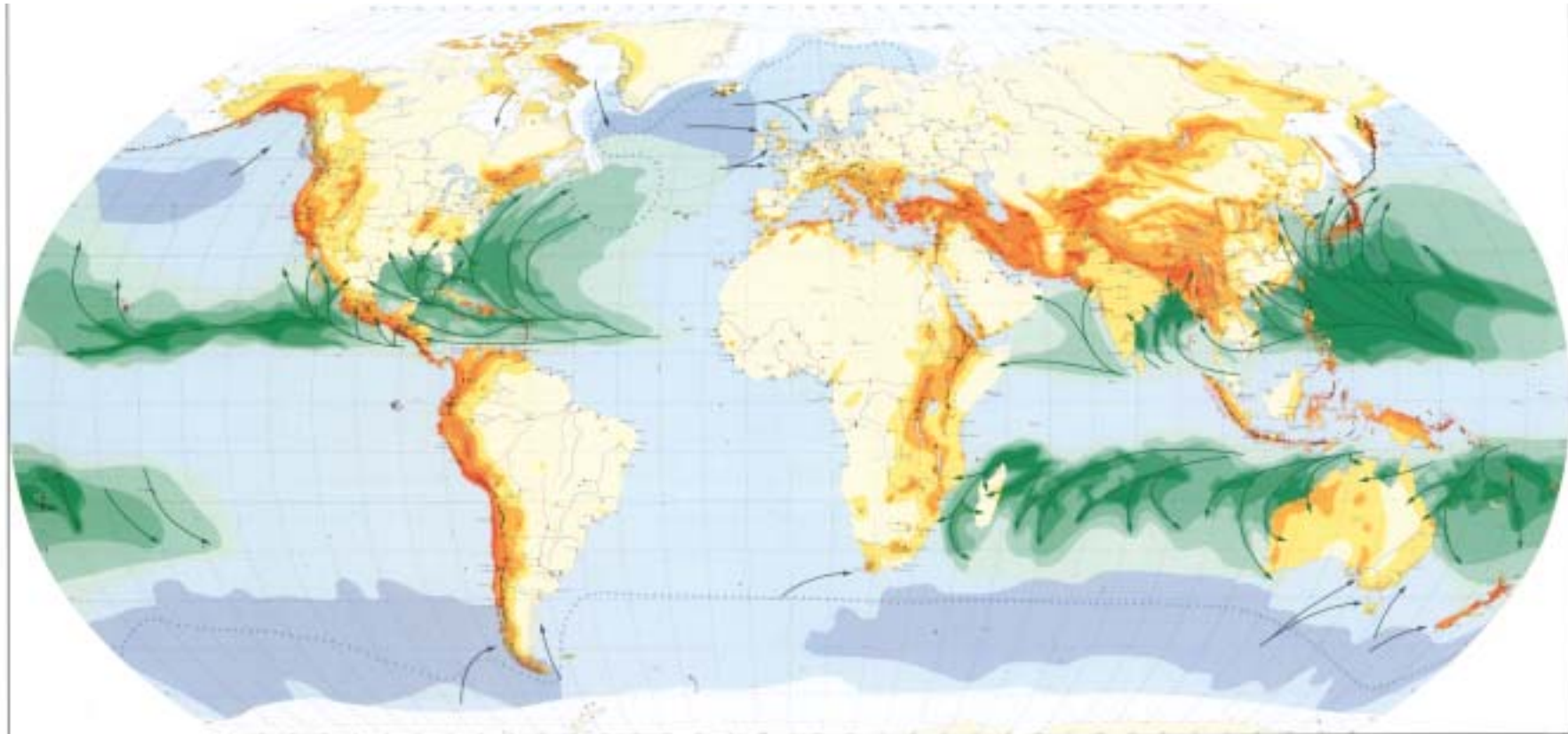
or

$$\text{Risk} = \text{function of (H and V / C)}$$

Social dimensions are intimately linked to the decision-making process to deal with disaster risk, as they embrace a range of risk perceptions and their underlying causes.

A closer look at the nature of hazards and the notions of vulnerability and capacities in the context of disaster risk, allows for a better and more comprehensive understanding of the challenges posed by disaster risk reduction.

World Map of Natural Hazards



The main and auxiliary maps of the 3rd edition of the World Map of Natural Hazards include fully revised exposure zones for earthquakes, storm (tropical storm, extratropical and monsoon storm, tsunami, high sea), heavy rain, hailstorm and lightning. Furthermore, the maps indicate a number of other exposures (e.g. volcanic eruption, storm surge, tsunami, iceberg drift) and the effects of natural and man-made

climatic changes. Together with the comprehensive worldwide catalogue of major catastrophes, the detailed descriptions of the various natural hazards and their detrimental effects in the special publication facilitate a sound and realistic assessment of the risk of loss.

This map is also available as a large wall map in various languages and as an attractive globe in English (see back for order numbers).

Understanding the nature of hazards

Understanding the nature of natural hazards involves a consideration of almost every physical phenomenon on the planet. The slow movements in the earth's mantle – the convection cells that drive the movement of continents and the manufacture of ocean floors – are the starting point and also the sticking point. They lift mountains and shape landscapes. They also build volcanoes and trigger potentially catastrophic earthquakes. Like those other invisible movements that take place on a vast scale through the atmospheric medium – the carbon cycle and the water cycle and the nitrogen cycle – volcanoes and earthquakes, along with technological advancements, provide the bedrock of strong nations, rich industries and great cities. They do, of course, have the potential to destroy them. This is also what happens with technological hazards and environmental degradation.

While most natural hazards may be inevitable, disasters are not. By seeking to understand and to anticipate future hazards by study of the past and monitoring of present situations, a community or public authority is poised to minimize the risk of a disaster. It is a measure of people's wisdom and a society's values if a community is able to learn from the experiences of others, rather than to suffer its own. There is a wealth of knowledge about the nature and consequences of different hazards, expected frequency, magnitude and potential geographical impacts, but many fewer examples of lessons learned from them.

Hazards are increasingly dynamic and with highly varying potential impacts. Due to changing environments, many countries and regional organisations call for a greater knowledge of hazard characteristics. Such knowledge requires additional, more focussed research on hazards and a greater understanding of their nature, effects and history.

A wide range of geophysical, meteorological, hydrological, environmental, technological, biological and even socio-political hazards, alone or in complex interaction, can threaten living and sustainable development. Hazards have often been divided into natural, human-induced technological and increasingly negative effects of environmental degradation is being added to this list.

While natural hazards can be divided into three broad categories -hydrometeorological, geological and biological- the variety, geographical coverage and types of impacts are huge. Forest fires, for example, are recognised as a natural hazard but are often referred to as environmental, along with pest infestation and desertification. In order to distinguish between different hazard types, many institutions have developed hazard

catalogues. A table has been prepared by ISDR to summarise the current thinking (*see next page*).

The strong compound relation between different types of natural hazards may give the impression that attempts to catalogue them are fatuous. At what stage does a landslide, recognised as a geological hazard, become a mud-flow, which is often classified as a hydrological hazard? In the same vein, primary hazards often give rise to a myriad of related potential collateral or secondary hazards. In many cases, these cause greater threat to a community than do the primary hazards. Tropical cyclones can trigger other hazards, in particular storm surges, flash floods and landslides. Often the most serious impact of a tropical cyclone comes from the associated coastal and river floods. Similarly, damages related to earthquakes are often caused by landslides, fires, tsunamis, and floods.

All communities – urban or rural – are vulnerable to most hazards. However, different regions will be more prone to certain types of hazards than others. Floods and windstorms are the hazards that most frequently lead to disasters in Asia, the Pacific, Europe and North America, while it is droughts and epidemics that are reported in African countries. In contrast, Pacific and Caribbean islands are most vulnerable to the effects of tropical cyclones. El Niño events, floods, volcanic eruptions and earthquakes affect in greater degree the Andean and Meso-American countries. Even within a specific region, such as the Pacific, the frequency and intensity of specific hazards varies from one country to another. Hydrometeorological hazards are most common and floods alone account for two-thirds of people affected by natural hazards.

In the same way, different levels of income groups are more or less vulnerable to certain types of haz-



Hazard classification

HAZARD

potentially damaging physical event, phenomenon and/or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

NATURAL HAZARDS

Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

Natural hazards can be classified by origin in: geological, hydrometeorological or biological.

ORIGIN	PHENOMENA / EXAMPLES
<p>Geological hazards Natural earth processes or phenomena in the biosphere, which include geological, neotectonic, geophysical, geomorphological, geotechnical and hydrogeological nature.</p>	<ul style="list-style-type: none"> • Earthquakes, tsunamis; • Volcanic activity and emissions; • Mass movements i.e.: landslides, rockslides, rockfall, liquefaction, submarine slides; • Subsidence, surface collapse, geological fault activity.
<p>Hydrometeorological hazards Natural processes or phenomena of atmospheric, hydrological or oceanographic nature.</p>	<ul style="list-style-type: none"> • Floods, debris and mud flows; • Tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; • Drought, desertification, wildland fires, heat waves, sand or dust storms; • Permafrost, snow avalanches.
<p>Biological hazards Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances</p>	<p>Outbreaks of epidemic diseases, plant or animal contagion, and extensive infestations.</p>

TECHNOLOGICAL HAZARDS

Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Sometimes referred to as anthropogenic hazards. Some examples: industrial pollution, nuclear activities and radioactivity, toxic wastes, dam failures; transport, industrial or technological accidents (explosions, fires, spills)

ENVIRONMENTAL DEGRADATION

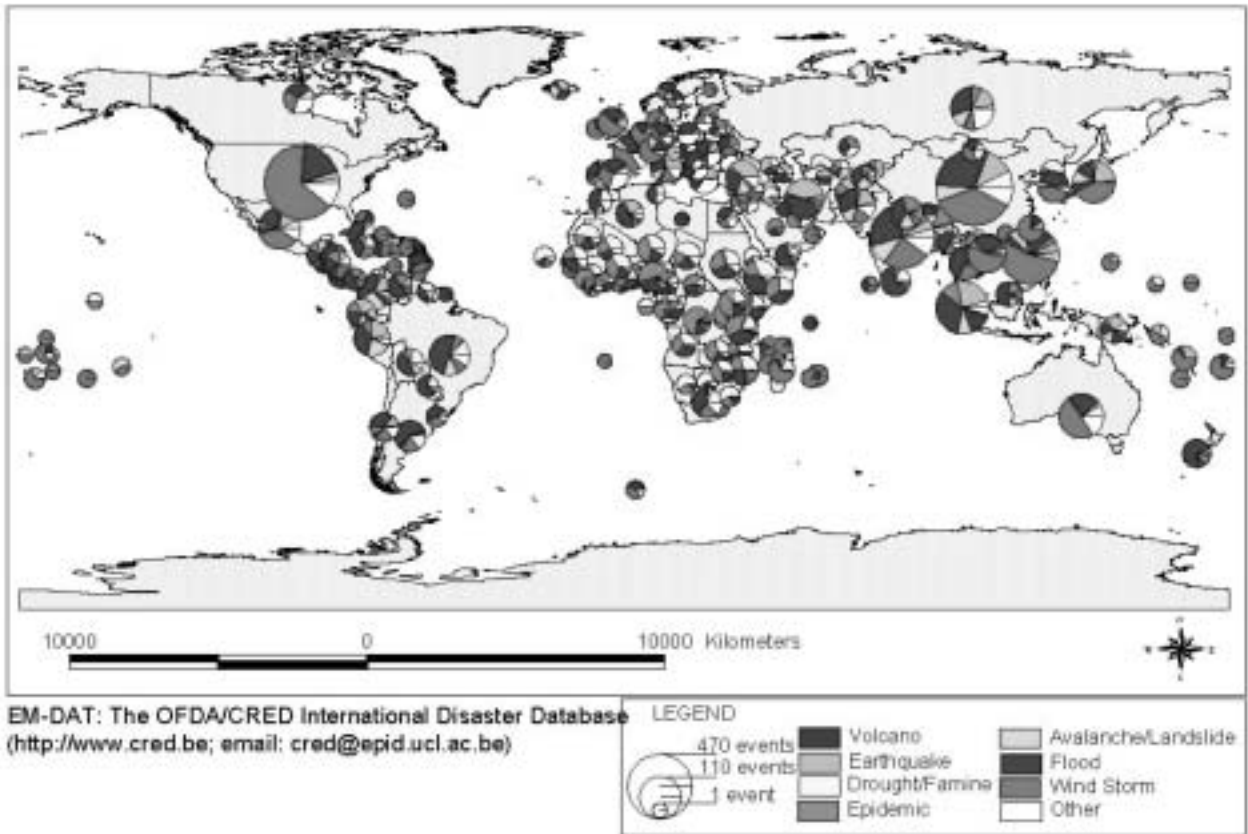
Processes induced by human behaviour and activities (sometimes combined with natural hazards), that damage the natural resource base or adversely alter natural processes or ecosystems. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.

Some examples: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise, ozone depletion.

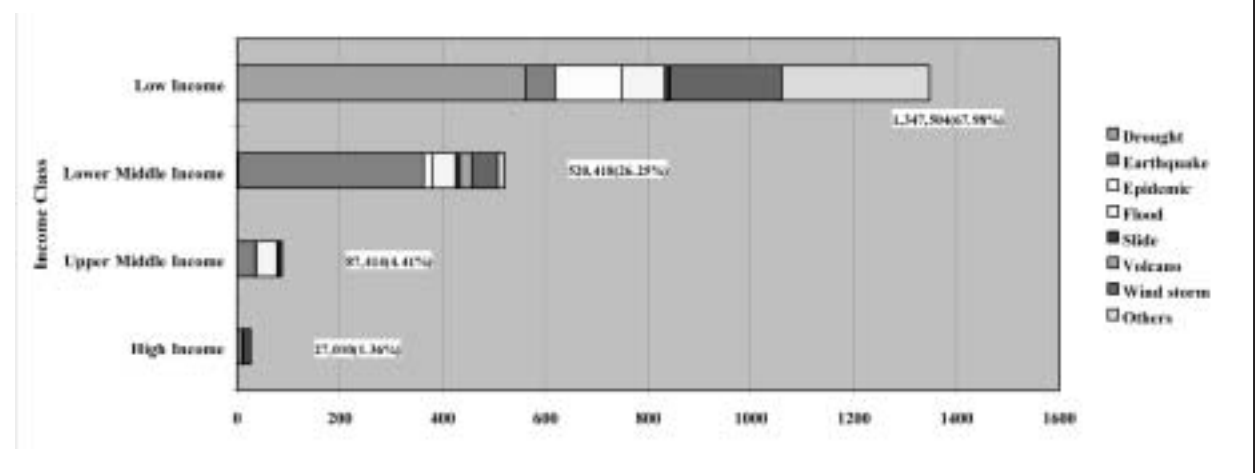
NOTES:

1. Hazards can be single, sequential or combined in their origins and effects.
2. Some hazards may have natural or human-induced origin, i.e. wildland fires and desertification, in such a case they may be classified as hydrometeorological hazard or referred to environmental degradation.

Map- Distribution of natural disasters, by country and type of phenomena (1975-2001)



Number of People Killed (Income Class/Disaster Type)
 (1975-2000) World Summary



Graphic elaborated by ADRC from OFDA/CRED international disaster database

ards. While droughts affect primarily the lower social classes, the impact of earthquakes and floods are more evenly spread out between society.

■ Understanding the nature of vulnerability and capacity

Risk is rooted in conditions of physical, social, economic and environmental vulnerability that need to be assessed and managed on a continuing basis. The primary objective is to minimize exposure to hazards through the development and reliance on individual and societal capabilities and institutional capacities that can withstand potential loss or damage

Over the past thirty years there has been a significant and important development in the understanding about what makes people, social, economic and environmental assets susceptible to hazards. The concept of vulnerability may have been referred to first by engineers, in considering construction values and building designs related to levels of resistance to physical forces exerted by earthquakes, wind and water.

During the 1980s and 1990s, there was a growing interest in the linkages between disasters and

Vulnerability

A set of conditions and processes resulting from physical, social, economical and environmental factors, which increase the susceptibility of a community to the impact of hazards.

Coping capacity

The manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process.

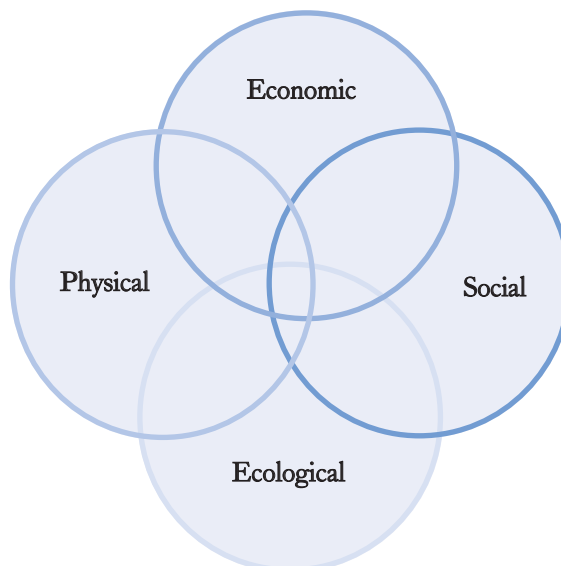
development. Originally focussed on considering primarily the impact of disaster on development, it was then expanded also to address the impact of development on the toll of disaster related damage. This expressed a new range of socio-economic and environmental concerns built around the notion of vulnerability.

In parallel with this expanded interest on the relationship between disasters and development during the last decades, the role of community participation as well as people's general coping capacities was also recognized as key elements in explaining disaster risk. The creative link between the negative conditions with which people live, and the often overlooked positive attributes which they also possess, underline the importance of socio-economic dimensions of risk. However, it remains a challenge to encourage the identification of locally available strengths and capacities to reduce risk to hazards. The importance of exposing capacities hidden in non-disaster times becomes a critical task for disaster risk reduction. Capacity apply to all levels of society and social organizations, and a broad range of physical, social, economic and ecological considerations.

Vulnerability is a reflection of the state of the individual and collective physical, social, economic and environmental conditions at hand that are shaped continually by attitudinal, behavioural, cultural, socio-economic and political influences at the individuals, families, communities, and countries.

Governed by human activity, vulnerability cannot be isolated from ongoing development efforts, and it therefore plays a critical role in the social, economic and ecological spheres of sustainable development.

Interaction of vulnerability factors



The figure below illustrates the four broad areas in which different aspects of vulnerability can be grouped. They are depicted by intersecting circles to show that all spheres interact with one another.

Physical factors: This concept is conventionally asset-oriented, and comes from the schools of land use planning, engineering and architecture. Physical aspects of vulnerability, although continually broadening in scope, still mainly refer to the location considerations and susceptibilities of the built environment. It may be described as exposure to hazards – “living in harms ways” or “being in the wrong place at the wrong time.” Physical vulnerability may be determined by aspects such as density levels, remoteness of a settlement, its siting, design and materials used for critical infrastructure and for housing.

Social factors: Social vulnerability is linked to the level of well being of individuals, communities and society. It includes aspects related to levels of literacy and education, the existence of peace and security, access to basic human rights, systems of good governance, social equity, positive traditional values, knowledge structures, customs and ideological beliefs, and overall collective organizational systems.

Some groups are more vulnerable than others, mainly those less privileged in class and caste structures, ethnic minorities, the very young and very old, and other disadvantaged and marginalized segments of the population. Gender issues, particularly the role of women, are also important. In many societies, women have a primary responsibility for domestic life, essential shelter and basic needs. Therefore, women are more likely to become more burdened, or more vulnerable in times of crisis.

Public health, concerning physical, mental and psychological well being, is a critical aspect of social vulnerability. The disabled, of whom there are hundreds of millions world-wide, are particularly susceptible, as their evacuation and continued care is severely hampered during disasters. Predisposition to infection, exaggerated exposure to communicable diseases, lack of defensive mechanisms, insufficient basic infrastructure, especially water supply and sanitation, as well as inadequate health care facilities and supplies, are all expressions of increased vulnerability.

Levels of literacy and training, traditional knowledge systems, and access to information on disaster risk and measures, as well cultural aspects, such as indigenous beliefs, traditions and ways of coping also shape levels of

susceptibility. Deeply rooted beliefs that are destiny oriented or pose a fatalistic vision of disasters, can reflect a religious or ideologically inherited sense of vulnerability, and these people may present a great challenge in moving towards the acceptance of a culture of prevention and protection.

Social vulnerability is also linked with other factors, like the state of domination and power relations in the concerned society. A great social cohesion and regulation improves the coping capacities, whereas social insecurity increases vulnerability. In this sense, the decline of traditional structures, civic groups or communities formerly engaged in the collective well being, or in the protection of the weakest people, can strengthen the disastrous consequences of a hazard.

Organizational and governance structures play an important role in the level of social vulnerability.

Economic factors: Levels of vulnerability are highly dependent upon the economic status of individuals, communities and nations. The poor are in general far more vulnerable than economically better off sectors of society. This relates both to the proportional possibility of higher losses when a disaster strikes, and to the capacity to recover from disasters. The links between the eradication of poverty, impact consequences on recovery conditions from natural disasters, and the state of the environmental resource base upon which both depend are crucial.

Economic vulnerability also includes levels of individual, community and national economic reserves, levels of debt and the degree of access to credit and loans as well as insurance. An economy lacking in diversity is generally more vulnerable. Similarly, inadequate access to critical and basic socio-economic infrastructure, including communication networks, utilities and supplies, transportation, water, sewage and health care facilities increase people's exposure to risk.

Ecological factors: The discussion of environmental aspects of vulnerability covers a very broad range of issues in the inter-acting social, economic and ecological aspects of sustainable development as it relates to disaster risk reduction. The key aspects of environmental vulnerability can be summarized by the following five distinctions: (*see page 60 diagram on “Environmental degradation”*)

- The extent of natural resource depletion.
- The state of resource degradation.
- Loss of resilience of the ecological systems.
- Loss of biodiversity.
- Exposure to toxic and hazardous pollutants.



2.2 - Emerging trends in disaster impact, hazards and vulnerability patterns

More than 90 per cent of natural disaster related deaths are to be found in developing countries. Disaster impact statistics show the global trend – there are now more disasters but fewer people die in proportion, even though more population is affected and economic losses are increasing, as discussed in the next section.

Closely linked and influenced by changing perception, hazards and vulnerability is constantly shaped by dynamic and complex socio-economic and ecological processes. They are compounded by stresses felt within individual societies.

The current aspects of physical exposure of human beings and economic assets have been partly shaped by historical patterns of settlements. Beneficial climatic and soil conditions that have spurred economic activities are in many cases also associated to hazard-prone landscapes. Both volcanic slopes and flood plains areas have historically attracted human activities. Where settlement patterns have contributed to configure risk scenarios, new forces, such as **population growth** and increased **rural/urban migration**, act as dynamic pressures contributing to changing patterns in increasing people's exposure to hazards.

The processes through which people and goods become more exposed to hazards are also socio-economic conditioned. In particular, **poverty levels** and the impact of **development processes**, especially those associated with an increasingly **globalised society**, are reflecting, to some degree, current trends in socio-economic vulnerability to disasters. The pace of modern life has also introduced new forms of vulnerabilities related to **technological** developments. In addition to discouraging poverty levels, the emergence of virulent **biological** threats has revealed even greater vulnerability.

Systemic ecological and localized **environmental degradation** is becoming highly influential as well, lowering the natural resilience to disaster impact, delaying recovery time and generally weakening the resource base on which all human activity is ultimately dependent.

At the **ecosystem level**, phenomena like El Niño/La Niña, **climate change** and the potential for rising sea levels, are affecting the patterns and intensity of **hydrometeorological hazards**. Environmental degradation influences the effects of natural hazards, by exacerbating their impacts and limiting the natural absorptive capacity and resilience of the areas affected.

Biological hazards in the forms of plant or animal contagion, extensive infestations, human disease epidemics and pandemics, continue to factor into the disasters-development scenario in new and unpredictable ways. They exert considerable socio-economic impacts on food security and human mortality, health and economic productivity, among other things.

Disaster triggered by technological hazards often resulting from major accidents associated with industrialisation and forms of technological innovation, have significant socio-economic and environmental impact. Although technological hazards have been part of society for hundreds of years, the trends are showing an increasing impact. Technological advancements, specifically in the energy, transport and industrial sectors, are developing innovations with associated risks that are not always understood or heeded. The adverse effects of some technological disasters, both on society and on the environment, can considerably outlast the impacts associated with natural disasters.



Trends in disaster impact

While no country in the world is entirely safe, lack of capacity to limit the impact of hazards remains a major burden for developing countries, where more than 90 per cent of natural disaster related deaths are to be found.

Twenty-four of the 49 least developed countries (LDCs) still face high levels of disaster risk. At least six of them have been hit by between two and eight major disasters per year in the last 15 years, with long-term consequences for human development (*UNDP, 2001*). These figures do not include the consequences of the many smaller and unrecorded disasters that cause significant loss at the local community level.

The re-insurance giant Munich Re, a member of the ISDR Inter-agency Task Force, in its annual publication *Topics* for 2000, looked at the trend of economic losses and insurance costs over a 50 year period linked to what it calls “great natural catastrophes”.

There were 20 of these, costing the world US\$ 38 billion (at 1998 values) between 1950 and 1959. However, between 1990 and 1999, there were 82 such major disasters and the economic losses had risen to a total of US\$ 535 billion. That is, disasters had multiplied fourfold but economic losses were 14 times higher. And in each decade between, both the number of great disasters and the economic loss involved had risen steadily. However, losses in 2000 and 2001 were down.

These are absolute figures of economic loss, most of them to be found in developed and industrialized countries. But seen as losses by percentage of GDP, it is developing countries that lose most in relative terms, as shown in the graphic based on figures provided by MunichRe. For example, the economic losses of the United States from the 1997-98 El Niño event were estimated to US\$ 1.96 billion or 0.03 per cent of GDP. The economic losses in Ecuador were US\$ 2.9 billion, but this represented 14.6 per cent of GDP (*ECLAC 2000*).

The International Federation of Red Cross and Red Crescent Societies, another ISDR Task Force member, confirms the worsening trend of human suffering and economic loss during

the last decade. The total number of people each year affected by natural disaster – that is, who at least for a time either lost their homes, their crops, their animals, their livelihoods, or their health, because of the disaster – almost doubled between 1990 and 1999, by an average of 188 million people per year (*CRED 2002*). This is six times more than the average of 31 million people affected annually by conflict (*OCHA, 2002*).

Comparing the last three decades, the trend shows an increase in the number of natural hazard events and of affected populations. Even though the number of disasters has more than tripled since the 1970s, the reported death toll has decreased to less than half (see graphic page 12). This is among other factors due to improved early warning systems and increased preparedness. This statistic varies enormously depending on region and figures used. One needs to bear in mind that large disasters are rare events that defeat any statistical analysis in

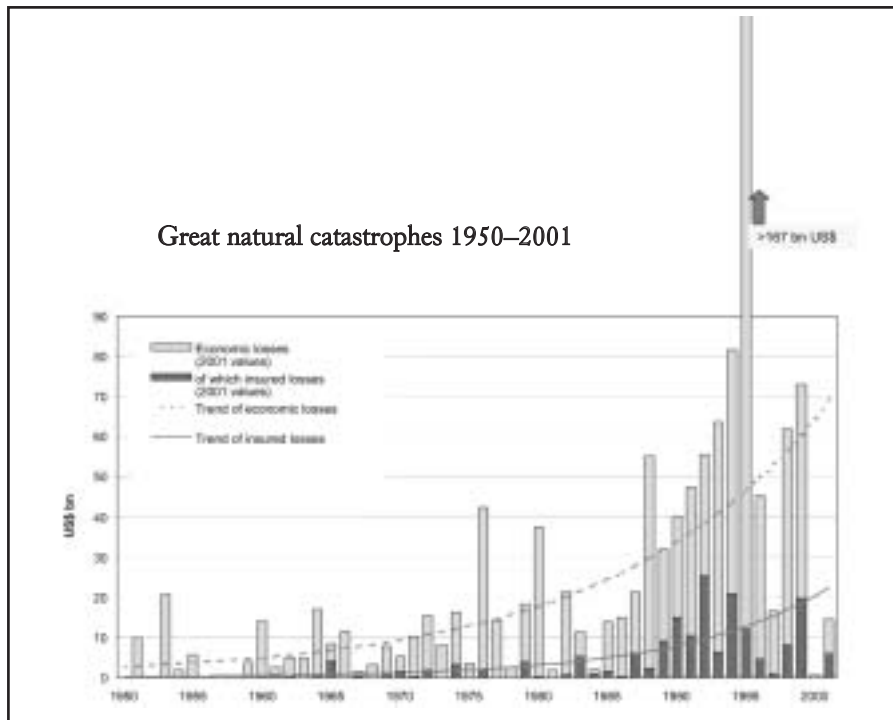
The ecological footprint

Demographic pressure means more forest loss and more land degradation. This means more flooding, drought, or both. Every human requires an area of land and shallow sea for food, water, shelter, transport, energy, commerce and waste. This is called an ecological footprint. In rich nations such as the US, this ecological footprint is almost 10 hectares per person. But even in the poorest places in the US this footprint is at least one hectare.

Every day, another 200,000 newborns will require up to 200,000 hectares of what might have been a benign and necessary wilderness. More people also means more fossil fuel consumption, which means more carbon dioxide emission, which means climate change. And such a world, climate scientists have warned repeatedly, is a world with a greater frequency of extreme events.

The combination of climate change and population growth will exact a price. The latest UN calculation is that three decades from now, around 70 per cent of the world's land will be affected in some way by human activity and half the people in the world will be short of water. Many of the other half will be at risk from increased flooding. By that time, there could be eight billion people on the planet.

Adapted from the environmentalist E O Wilson, Scientific American, February 2002



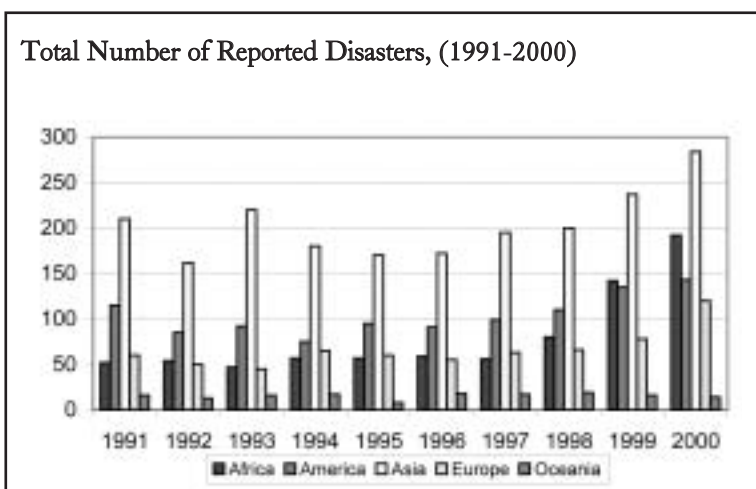
the short term. Perhaps more significant in the life of many are those daily disasters, generally underreported and not reflected at all in global figures on losses, but accumulating to probably large tolls of both economic and health losses.

There is a considerable geographic variation in the occurrence and impact of natural hazards. Asia is disproportionately affected with approximately 43 per cent of all natural disasters in the last decade. During the same period, Asia accounted for almost 70 per cent of all lives lost due to natural hazards. During the two El Niño years of 1991-92 and 1997-98, floods in China alone affected over 200 million

people in each year. Nevertheless, in relative terms and counted per capita, Africa is the most heavily affected country, in particular when drought, epidemics and famine are included.

The single most terrible year in human loss during the last decade was 1991, when a cyclone devastated Bangladesh killing 139,000 people, bringing the global total of deaths for that year to 200,000. Cyclones are cyclical events and they continue to hit the Bangladesh coasts but no such catastrophe has happened again. This is at least in part because the machinery of warning and preparedness – watchful officials, an aware public and a stronger sense of community responsibility – came into play.

The worst global economic loss during last decade occurred in 1995, due to the Great Hanshin-Awaji earthquake in Kobe, Japan. A highly developed, prepared and economically strong nation faced serious setbacks economically by losing important facilities of its primary port. Even seven years after that disaster, the amount of shipping trade in Kobe has dropped by 15 per cent. But now Kobe is rebuilt and modernised.

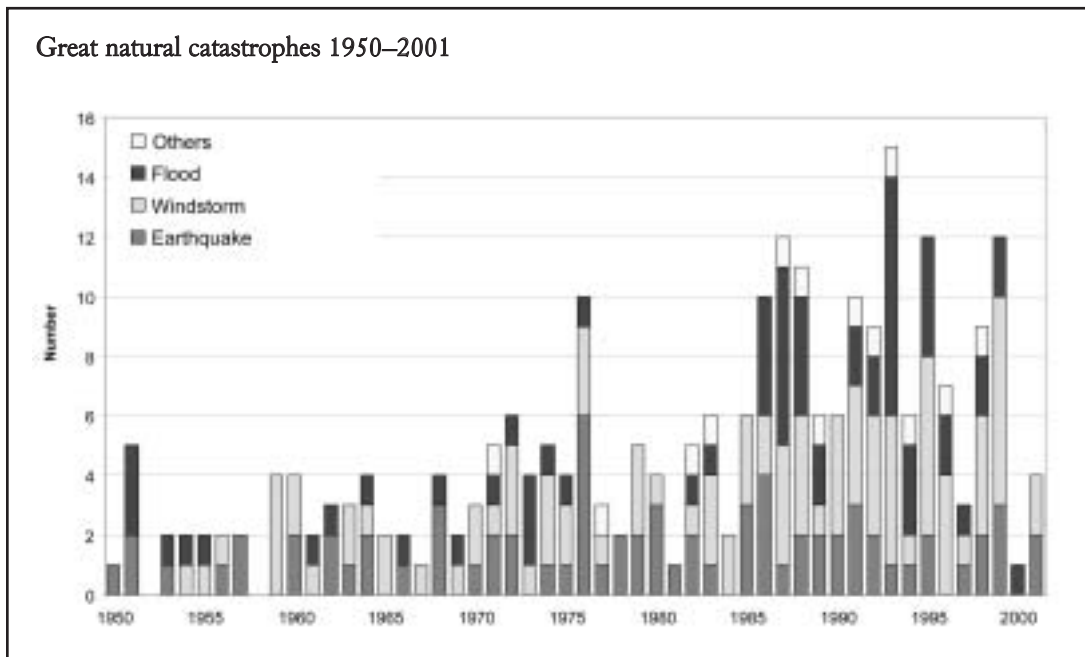


Trends in hazards

Until recently, the intensity and frequency of natural hazards, as events, whether geological or hydrometeorological in nature, only varied on very long time-scales due to natural variation in global temperatures and variation in the intensity of seismic activity.

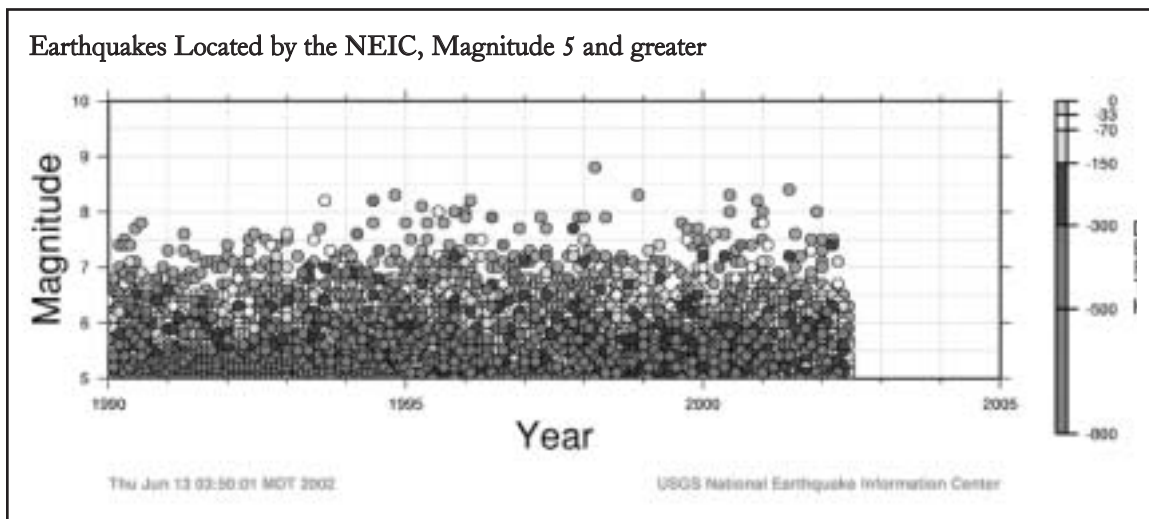
Today, in particular hydrometeorological hazards are increasing due to human activities. The findings of the Intergovernmental Panel

on Climate Change (IPCC) provide a new outlook about the changing patterns related to hazards themselves. Certainly, the scale of volcanic or seismic activity is not altered by human-induced sources, but it appears that our changing climate is affecting both the frequency and intensity of hydrometeorological hazards and related mass movements. Although it is very difficult to show scientific evidence of these changes, projections for the future invite concern.



Source: MunichRe, 2001

The figure below shows that there is currently no major change in the frequency and intensity of reported earthquakes. Nevertheless, the economic losses caused by earthquakes are increasing.



Volcanic Hazards

About 50 to 60 volcanoes erupt every year worldwide. Large eruptions endanger lives, human settlements and livelihoods of the almost 500 million people estimated to live near active volcanoes in 2000. That number will increase in the future as today more than 60 large cities are located near potentially active volcanoes, threatened by volcanic eruption.

Volcanoes with high activity are located predominantly in developing countries, particularly in Latin America, the Caribbean, parts of Asia and in the southwest Pacific. In these countries, despite the improvements in many national civil defense agencies' capacities to manage volcanic emergencies, eruptions are becoming increasingly risky because of rising population density and intense interweaving of infrastructure in the areas surrounding volcanoes.

As the physical characteristics and chemical properties of a specific volcano become better known, it can be more easily monitored. However, the prediction of an impending eruption can still remain a major challenge for volcanologists. Therefore, predicting future volcanic eruptions and related hazards must also be matched with a series of other forms of mitigation, including the following:

- Volcanic risk analysis.
- Early warning and short-term forecast of eruptions.
- Timely and effectively organized evacuation of people from hazardous areas.
- Development and application of land-use and contingency plans to minimize future volcanic disasters.
- Sustained information and educational programs for the population.

Major volcanic eruptions do not occur spontaneously and are preceded by a variety of physical, geological and chemical changes, which accompany the rise of magma toward the surface. The monitoring and measure-

ment of these changes with well established scientific techniques provide the best opportunity to develop a warning system. Recent volcanic disasters show that the cost of monitoring volcanic activity and pre-disaster planning is very small when compared to the potential losses.

For early warning to be effective, sustained public education and information is necessary. This includes understanding results of volcanological studies and analysis, the possible dangers and the local plans to address them prior to the occurrence of emergency conditions. It can be done through the use of brochures, lectures, or courses although the best prepared communities also conduct regular disaster warning and prevention exercises.

In 1990, the *International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)* launched a program to support the IDNDR and to promote the reduction of risks related to volcanoes. The initiative selected 16 volcanoes for monitoring and research with the aim of directing attention to a small number of active volcanoes, and to encourage the establishment of a range of research and public-awareness activities aimed at enhancing an understanding of the volcanoes and the hazards they pose.

That commitment demonstrated a concentrated effort within the scientific community to publicize the realistic aspects of disaster reduction by working in close association with communities at risk from volcanic hazards. Such collaborative scientific activities continue to show benefits as quite a lot of work continues with those same volcanoes. As a result of improvements in monitoring made during the IDNDR, better data has been developed, especially as those volcanoes continue to be restless. Ongoing work that would not have occurred were it not for this earlier concentrated attention includes, ongoing German-Indonesian cooperation at Merapi Volcano, on the Indonesian island of Java.

Nyiragongo Volcano, Goma, Democratic Republic of Congo, January 2002

“Goma is overshadowed by two large and active volcanoes- Nyiragongo and Nyamalagira. Part of the former is a large “hanging” crater of lava- said to be the largest active lava lake in the world. Any weaknesses in the sides could result in catastrophic consequences.”

Nyiragongo is considered by the scientific community as one of the most notable and dangerous volcanoes in Africa. Nyiragongo and neighbouring Nyamuragira are responsible for nearly two-fifths of Africa’s historical eruptions. However, according to a UN/DHA mission report, despite the 500,000 people living close to Nyiragongo, no serious studies has been engaged and no initiatives has been established to reduce volcanic risks.

Nyiragongo showed activity in 1977, 1982, 1994 and February 2001. Extremely fluid, fast moving lava flows drained the summit lava lake in 1977 probably killing about 50-100 people, although other estimates run as high as 2,000 fatalities. Following a crater eruption of Nyamuragira in January 2000, the one local volcanologist signaled the possibility of a later eruption of Nyiragongo, as there are subterranean geological connections between the two.

In May 2001, the small Goma observatory requested assistance for seismographs, thermometers and funds to conduct field surveys. At the beginning of 2001 and again in October 2001, Nyiragongo showed signs of activity, and an earthquake was felt in Goma while black smoke was sighted above the volcano. The same phenomena were repeated on 4 January 2002, in addition to several other signs suggesting an imminent eruption – signs noted prior to previous eruptions.

The local volcanologist sent additional messages to the international community on 8 January 2002, raising the alarm of an imminent eruption and requesting assistance. Nyiragongo began erupting on 17 January and continued until 23 January. One lava flow headed for the town of Goma, where it literally split the town in half. Another lava flow headed toward Gisenyi in Rwanda.

According to an expert report, “the eruption forced the rapid exodus of 300,000 to 400,000 persons, most into neighboring Rwanda, with dramatic humanitarian consequences... Forty-seven victims were reported as directly due to the eruption, to whom one must add about 60 people killed during the explosion of the petrol gas station in Goma center on January 21.” At least 16,000 homes were destroyed, leaving 100,000 people homeless, and 24,000 children were left without schools. Goma and Gisenyi cities also suffered from strong seismic activity that accompanied and followed the eruption.

Adapted from: Final report of the French-British scientific team, 2002

Climate related hazards

Societies are increasingly dependant on medium to long term variations in the climate, such as El Niño/La Niña (see box “El Niño outlooks”), which affect precipitation and temperatures over time-scales of two to three years. These regional climatic shifts, the specific character of which is still very much unknown, develop their own variation in hazard trends, in particular hydro-climatic hazards associated with climate variability. The prevalence of droughts and floods as leading hazards shows that many countries are particularly vulnerable in dealing with current natural variability and extremes, let alone climate change.

The projected changes in climate will adversely affect many regions, in particular tropical and sub-tropical regions of the planet. When dealing with the complex issue of climate change there are some observations that can now be accepted as fact. It is now established that temperatures are increasing globally, although these increases are not evenly distributed around the planet. As the atmosphere becomes warmer throughout the world it can absorb more water vapour, leading to a general increase in humidity. As a result there is the probability that tropical storms and cyclones will be accompanied by extreme precipitation increases.

El Niño outlooks

Climatic factors that affect the occurrence of natural disasters are the irregularly recurrent variables, such as the El Niño and La Niña phenomena. Atmosphere-ocean circulation models project that as the earth's climate warms over the next 100 years, it is likely that a more El Niño-like condition may persist, leading to an increase in the incidence of floods and droughts in many parts of the world. Both the 1981-82 and 1997-98 events, the strongest ever recorded, had disastrous impacts on Pacific rim countries, and the effects were felt worldwide.



According to insurers SwissRe, the total economic impact of the 1997-98 event, amounted to US\$ 98 billion. This highlights the need for better monitoring of the phenomena, better forecasts of the related extreme events, and more importantly, stronger institutions to deal with such information and increase local community's preparedness and resilience.

The WMO, in collaboration with the International Research Institute for Climate Prediction (IRI) of Columbia University in the U.S.A., has undertaken to coordinate the preparation of "El Niño outlooks", whenever the threat of an event manifests itself, as a contribution to the UN Interagency Task Force on Disaster Reduction. These outlooks draw on contributions from the Australian Bureau of Meteorology, China Meteorological Administration, European Centre for Medium Range Weather Forecasts, IRI, Japan Meteorological Agency, National Institute of Water and Atmospheric Research in New Zealand, Met Office United Kingdom, and the Climate Variability and Predictability (CLIVAR) Project of the World Climate Research Programme.

Unfortunately, these factors have a compound effect on the occurrence and impact of disasters. On the one hand, they affect the intensity and frequency of extreme hydrometeorological events, and on the other hand, they increase the vulnerability of societies. As we know, change in precipitation patterns, soil moisture and vegetation cover, are linked to the occurrence of floods, droughts, but also landslides and debris flow events. Climate change is also resulting in slight sea level rise and may cause more devastating storms and hurricanes in coastal areas. The only natural hazards that are not directly

influenced by climate change are, possibly, volcanic eruptions and earthquakes.

The Inter-Agency Task Force on Disaster Reduction (IATF/DR) of the ISDR has a working group dealing with climate and disasters (WG1) and another with wildland fires (WG4). In the area of drought preparedness and mitigation, there are a number of coordinated and collaborative initiatives that are foreseen to be undertaken within the framework of the ISDR Task Force involving all its working groups.

ISDR working group 1: Climate and disasters (WG1)

WG1 of the Inter-agency Task Force on Disaster Reduction is led by the WMO and consists of members representing UN agencies, regional and scientific organizations and the private sector. It is examining how climate information of a scientific nature can best be conveyed to different user groups. Such information can be applicable to various space and time scales, and it is important that linkages between global, regional and national centres are working effectively in order to ensure that users, who may be obtaining information from various sources, are receiving a consistent message on a particular development and that they will know what to do with the information.



The group defined a matrix on information transfer for a more coordinated and systematic approach between those involved in the interpretation of scientific assessments and the wide range of user communities. Under the auspices of the group, El Niño outlooks are now being prepared. (see box)

In view of the direct impact of meteorological and hydro-meteorological hazards on the increase in frequency and intensity of disasters, WG1 together with the working group on risk, vulnerability and impact assessment (WG3) expressed the need to improve disaster impact databases and link them to climate databases.

The group has prepared a background paper and proposal on the need for concerted drought information and policies, for all the groups of the ISDR Task Force to engage in. The information on drought in this review draws from that paper

Drought distinction

Absence of a precise and universally accepted definition of drought adds to the confusion as to whether it exists, and if it does the degree of its severity. Thus, drought is often forgotten once it ends, and everybody seems to be caught unawares again by the next one. Most of the drought definitions have therefore been application (impact) specific. Other drought definitions have been regional specific. The discussions of drought here are focused on three types of drought – meteorological, agricultural, and hydrological. Meteorological drought is principally defined by the deficiency of precipitation from expected or normal levels over an extended period of time. Hydrological drought is best defined by deficiencies in surface and subsurface water supplies, leading to a lack of water for meeting normal and specific water demands. Agricultural drought may be charac-

terized by deficiency in the water availability for specific agricultural operations such as deficiency of in soil moisture, which is one of the most critical factors in defining crop production potential.

During the coming decade and century, it is expected that drought vulnerability will increase, mainly due to development pressures, population increases, and environmental degradation that could itself lead to climate change. Several efforts have therefore been made at international, regional and national levels to address drought challenges. The international and regional efforts include the programmes and activities of the organizations such as WMO, FAO, WFP, IFAD, ADPC, ACMAD and the Drought Monitoring Centres in Africa, US/NOAA, IRI of Columbia University and USGS, that have established programmes to deal with drought monitoring,



prediction, early warning and disaster preparedness. They are also covered by the work of the UN sustainable development conventions, the UNFCCC, UNCCD and CBD.

Drought, unlike sudden-onset disasters, has some unique characteristics that may require different approaches to effectively address how to reduce their impacts:

- Drought does not directly destroy food in storage, shelter or infrastructure.
- Its effects are cumulative.
- It is often very difficult to detect its onset until some major impacts such as lack of water or food become discernible.
- Impacts can be spread over a larger geographical area than the damages that result from most of the other natural disasters, and hence quantification of impacts and provision of disaster relief is far more difficult.

“Amartya Sen, the Nobel prize winning economist of Cambridge University, famously pointed out that ‘in the terrible history of famines in the world, no substantial famine has ever occurred in an independent and democratic country with a relatively free press’. The Human Rights Watch took this to heart, and asserts that ‘the best way to prevent famine today is to secure the right to free expression – so that misguided government policies can be brought to public attention and corrected before food shortages become acute’”

Source: The Economist, 18 August 2001

Further, there are several social and economic parameters that affect the severity of drought including food prices, wars, various intervention methods, human activity, vegetation, water supplies and demands, making it extremely difficult to quantify its severity and also provide universal definition and indicators of drought. Drought risk is a product of a region's exposure to the natural hazards and its vulnerability to extended periods of water shortage. To reduce serious consequences, affected nations must improve understandings of hazards and the factors that influence vulnerability, and establish comprehensive and integrated early warning systems.

Case: Zimbabwe

Drought is the most common hazard in Zimbabwe, a country whose economy is dependent on agriculture. The incidence of drought is often linked to the occurrence of El Niño episodes and has worsened since the 1980s. Floods frequently occurring in the southern and northern provinces of the country compound drought conditions in other parts of the country. In 1996, there were localized floods resulting from abnormally heavy downpours. However, in 2000, flooding associated with Cyclone Eline caused considerable infrastructure and environmental damage in the country. The livelihoods of more than 250,000 people were affected in rural areas, with 100 fatalities and more than US\$ 7.5 million in losses recorded.

Drought has been a recurrent feature in most parts of Southern Africa, with five major periods of drought since 1980: 1982-83, 1987-88, 1991-92, 1994-95 and 1997-98. Three of these events were regional in scale, with the 1991-92 drought considered the “worst in living memory”, placing more than 20 million people at serious risk.

Case: Central Asia

The persistent multi year drought in Central and Southwest Asia is an example of climatic variability that has affected up to 60 million people in parts of Iran, Afghanistan, Tajikistan, Uzbekistan and Turkmenistan, since November 2001. Chronic political instability in many parts of the region and the recent military action in Afghanistan have further complicated the situation. A recent study by the International Research Institute for Climate Prediction (IRI) concludes that Central and Southwest Asia represent the largest region of persistent drought over the last three years in the world. In Iran alone, 37 million people are affected. Water reserves in the country were down by 45 per cent in 2001, 800,000 heads of livestock were lost in 2000, and 2.6 million hectares of irrigated land and 4 million hectares of rain-fed agriculture were affected. Damage to agriculture and livestock has been estimated by the UN at US\$ 2.5 billion in 2001 and US\$ 1.7 billions in 2000. Afghanistan and Pakistan are affected on a similar scale.

Reducing drought impacts

The need to improve drought preparedness through the development of policies and plans has become well accepted: *South Africa* (early 1990's), *Sub-Saharan Africa* (UNDP/UNSO, 2000), *West Asian and North Africa countries*, *Mediterranean region* (CIHEAM, 2001), *Morocco*. Some of these were developed with UNCCD, (total number of Ratification of the Convention in January 2002: 178 countries). In *Australia*, the *1992 National Drought Policy* is widely recognised as a successful policy and often replicated. It has three main objectives:

- Encourage primary producers and others sections of rural Australia to adopt self-reliant approaches to managing for climatic variability.
- Maintain and protect Australia's agriculture and environment resource base during periods of extreme climate stress.
- Ensure early recovery of agriculture and rural industries, consistent with long term sustainable goals.

Climate change, sea level rise and coastal systems

Coastal zones are characterized by much diversity of ecosystems and a variety of socio-economic activities. An estimated 46 million people per year, living in coastal areas, are at risk of flooding from storm surges, and sea-level rise. Climate change will exacerbate these trends with significant impact upon the ecosystems and populations. A growing number of people will, continue to be located in coastal areas. Many traditional communities and subsistence level populations also rely on the resource wealth of coastal areas and continue to be drawn to these higher risk coastal regions. For

example, indigenous coastal and island communities in the Torres Strait of Australia and in New Zealand's Pacific Island Territories are especially vulnerable. Although adaptation options do exist, such measures are not easily implemented on low-lying land. Also, climate change and sea-level rise issues are not as yet well incorporated into current models and frameworks for coastal zone management.

There is a direct link between tropical sea temperature in the oceans and the frequency of tropical cyclones, hurricanes or typhoons. More heat in the atmosphere means more evaporation which means more rainfall and more flooding in some places, more frequent drought in others, more violent windstorms or heavier snows elsewhere.



Photo: PAHO

**Table : Examples of impacts resulting from projected changes in extreme climate events
Report of Working Group 2 of the Intergovernmental Panel on Climate Change, 2001)**

Projected changes during the 21 st century in extreme climate phenomena and their likelihood ^a	Representative examples of projected impacts ^b all high confidence of occurrence in some areas ^c
<i>Simple extremes</i>	
Higher maximum temperatures: more hot days and heat waves over nearly all land areas (very likely ^a).	<ul style="list-style-type: none"> • Increased incidence of death and serious illness in older age groups and urban poor. • Increased heat stress in livestock and wildlife. • Shift in tourist destinations. • Increased electric cooling demand and reduced energy supply reliability.
Higher (increasing) minimum temperatures: fewer cold days, frost days, and cold waves over nearly all land areas (very likely ^a).	<ul style="list-style-type: none"> • Decreased cold-related human morbidity and mortality. • Decreased risk of damage to a number of crops and increased risk to others. • Extended range and activity of some pest and disease vectors. • Reduced heating energy demand.
More intense precipitation events (very likely ^a over many areas).	<ul style="list-style-type: none"> • Increased flood, landslide, avalanche, mudslide and debris flow. damage. • Increased soil erosion. • Increased flood runoff could increase recharge of some floodplain aquifers. • Increased pressure on government and private flood insurance systems and disaster relief.
<i>Complex extremes</i>	
Increased summer drying over most mid-latitude continental interiors and associated risk of drought (likely ^a).	<ul style="list-style-type: none"> • Decreased crop yields. • Increased damage to building foundations caused by ground shrinkage. • Decrease water resource quantity and quality. • Increased risk of forest fire.
Increase in tropical cyclone peak wind intensities, mean and peak precipitation intensities (likely ^a over some areas ^c).	<ul style="list-style-type: none"> • Increased risks to human life, risk of infestious disease and epidemics. • Increased coastal erosion and damage to coastal buildings and infrastructure. • Increased damage to coastal ecosystems such as coral reefs and mangroves.
Intensified droughts and floods associated with El Niño events in many different regions (likely ^a).	<ul style="list-style-type: none"> • Decreased agricultural and rangeland productivity in drought and flood-prone regions. • Decreased hydro-power potential in drought-prone regions.
Increased Asian monsoon precipitation variability (likely ^a).	<ul style="list-style-type: none"> • Increased flood and drought magnitude and damages in temperate and tropical Asia.
Increased intensity of mid-latitude storms (little agreement between current models ^b).	<ul style="list-style-type: none"> • Increased risks to human life and health. • Increased property and infrastructure losses.

a Likelihood refers to judgmental estimates of confidence used by TAR EGI: very likely (90-99% chance); likely (66-90% chance). Unless otherwise stated, information on climate phenomena is taken from the Summary for Policymakers, TAR WGI.

b These impacts can be lessened by appropriate response measures.

c High confidence refers to probabilities between 67 and 95% as described in Footnote 6.

d Information from TAR EGI, Technical Summary, Section F.5.

e Information from TAR EGI, Technical Summary, Section F.5.

Wildland fire as an environmental hazard

Throughout the world and in many different types of vegetation, fire is part of agriculture and pastoral livelihoods. Natural wildfires are established elements in traditional land-use systems and have beneficial effects in natural ecosystem processes and in bio-geo-chemical cycles. However, the excessive use or incidence of fire due to rapid demographic and land-use changes leads to the destruction of property and reduction of natural productivity by reducing the carrying capacities, biodiversity and vegetation cover of the landscape. Climate variability such as the periodic occurrence of extreme droughts or the protracted effects associated with the El Niño/La Niña phenomenon add to the severity of fire impacts. Projected demographic and climate change scenarios suggest that these situations will become more critical during coming decades.

ISDR working group 4: wildland fires (WG4)

The overall objective of WG4 of the Inter-agency Task Force on Disaster Reduction is to propose means and to facilitate the creation of mechanisms that can share information and undertake tasks to reduce the negative impacts of fire on the environment and humanity. It brings together both technical members of the fire community and authorities concerned with policy and national practices in fire management to realise their common interests of fire risk management and disaster reduction at a global scale.

WG4 is chaired and coordinated by the Global Fire Monitoring Centre (GFMC) at the Max Planck Institute for Chemistry, in Freiburg, Germany. WG4 attends to the existing programmes being implemented by its members to ensure complementary work plans. Its priorities are to:

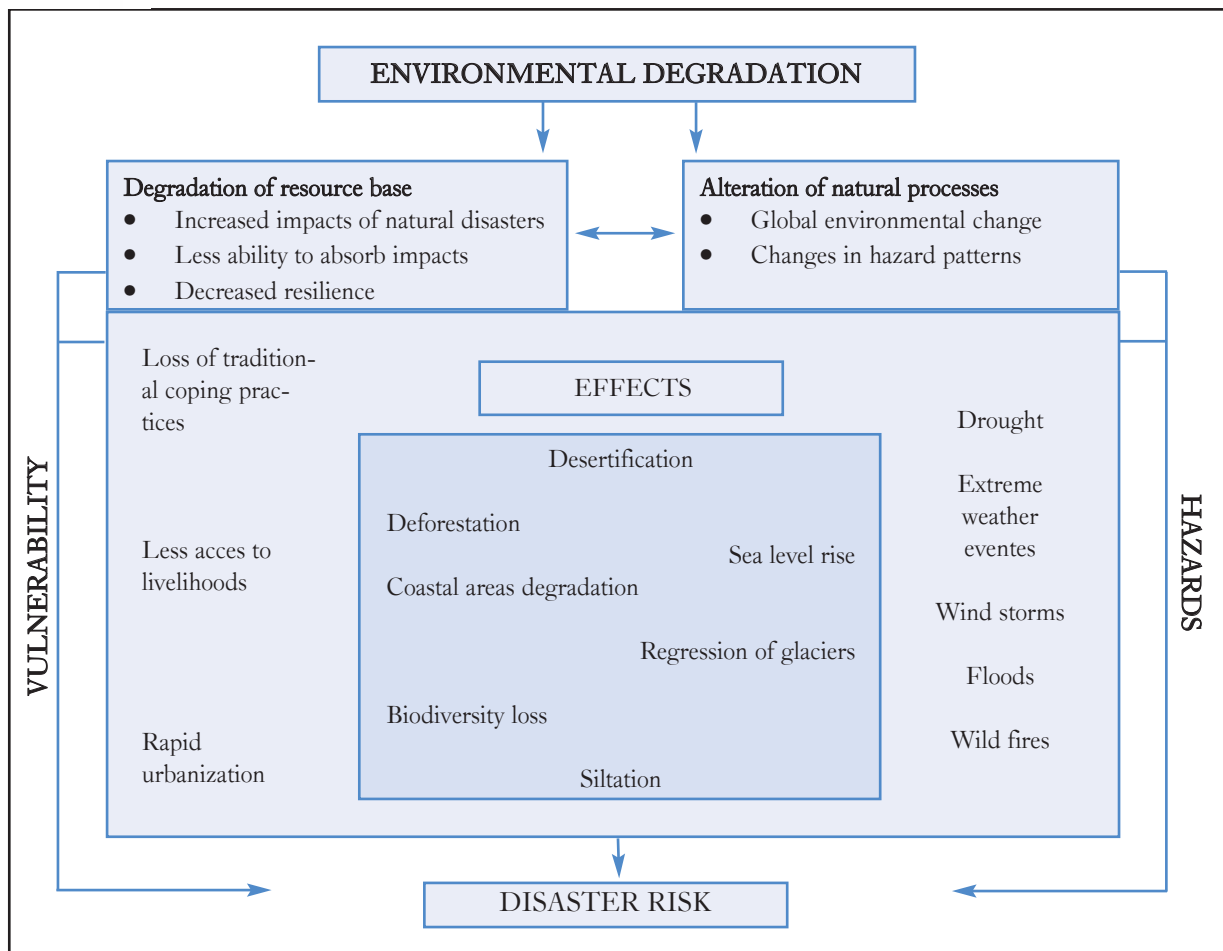
- Establish, and determine operational procedures for a global network of regional and national focal points for the early warning of wildland fire, fire monitoring and impact assessment, with the intention to enhance existing global fire monitoring capabilities and facilitate the functioning of a global fire management working programme or network.
- Propose internationally agreed criteria, common procedures, and guidelines for the collection of fire data and related damage assessments in order to generate knowledge required by the various user communities at global, regional, national and local levels.
- Strengthen the existing regional, national and local capabilities in fire management and policy development through the dissemination of information and increased networking opportunities to meet the information needs of such international initiatives as the Convention on Biological Diversity, the Convention to Combat Desertification, the UN Framework Convention on Climate Change, the United Nations Forum on Forests, the FAO Global Forest Resources Assessment and the ongoing international criteria and indicators processes of the Collaborative Partnership on Forests, as well as the overall scope of work of the UN agencies and programmes concerned.
- Transfer knowledge to local communities to advance their participation and utilization of appropriate tools that contribute to wildfire prevention, fire disaster preparedness and fire disaster mitigation.

Environmental degradation

As human activity continues to alter the biosphere, changes result in the environment in specific places and at ecosystem levels. Environmental degradation compounds the actual impact of disasters, limits an area's ability to absorb the impact, and lowers the overall general natural resilience to hazard impact and disaster recovery. In addition, environmental degradation that occurs and is significant enough to alter the natural patterns in an

ecosystem, also affects the regular temporal and spatial occurrence of natural phenomenon. Climate change is currently the most obvious example.

The figure illustrates the inter-linking nature of environmental degradation, natural disasters and vulnerability. It should be noted that environmental degradation is described in terms of diminished resources. Toxicification and other imbalanced forms of altering the natural environment also add to environmental degradation.



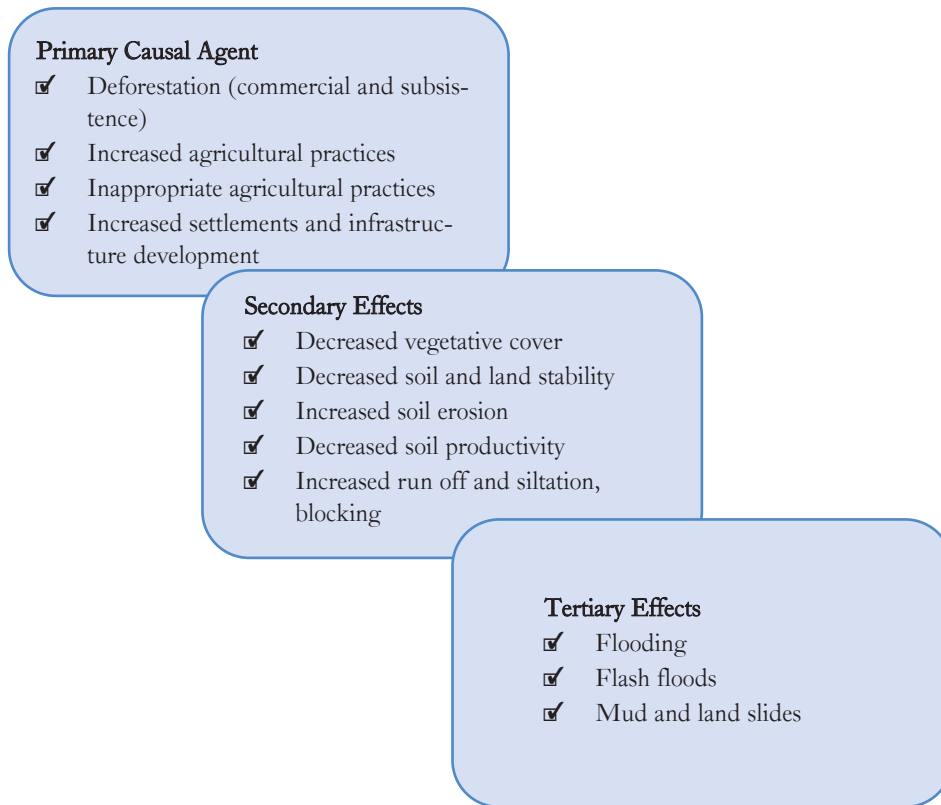
The interconnectedness between environmental degradation and progressive impact of natural disasters can be illustrated by the case of

the Yangtze River Basin, in China, where concerns related to environmental vulnerability have been incorporated in watershed management (also see chapter 1 and 5.1).

The catastrophic floods in the Yangtze River Basin, China, in 1998, brought to national attention the fact that land use changes and environmental degradation in watersheds had greatly exacerbated flooding from extremely high levels of rainfall in the Yangtze Basin, and rapid snowmelt from Tibet and the Himalayas. Prior to this event, the pressure for rapid development tended to overshadow environmental concerns. Since environmental degradation has now been firmly accepted as one of the root causes of increased impact from natural disasters, it is essential to articulate and establish both the conceptual and operational links between environmental management and disaster risk reduction. In 1999, concluding that flooding was exacerbated by environmental degradation, the government formulated a new policy framework to promote ecological watershed management. As a result, a massive plan to redirect land-use management in river basins, targeted at the Yangtze River Basin and the Yellow River Basin was initiated.

Viet Nam offers another example of the complex links between deforestation and floods/landslides. Viet Nam's forest cover dropped from 43 per cent to 28 per cent in 50 years. This is due to a combination of many years of war, with the use of deforestation as a tool of war, legal and illegal trade in timber as Viet Nam's economy became more open to international investment and trade, and, it is also quite likely, climate change. Reduced forest cover will make the people of Viet Nam more vulnerable to floods and landslides.

The chart below, shows how primary and secondary effects of environmental degradation result in increased impacts of natural disasters – in this case in relation to watershed management and floods.



● Land degradation and flash floods

According to UNEP data, two thirds of Africa is dry land over 70 per cent of which is classified as degraded. About 90 per cent of pasture land and 85 per cent of crop lands in the countries closest to the Sahara have been affected and there is some evidence that the desert is advancing towards the south and east. Deforestation is an important catalyst of land exhaustion and soil erosion. In Africa, more than 90 per cent of all wood is used for cooking and other energy needs and the demand for fuel wood has grown considerably since the oil price rise in 1974. Since kerosene is expensive to buy, there is an urban shadow of stripped land around most settlements. In effect, economic and social pressures – made worse by drought – have caused the breakdown of the traditional system of land use which was adapted to this fragile environment.

Flood risk, especially flash floods, is also exacerbated by increasing land degradation. In Southern Africa, escalating land degradation is strongly associated with overgrazing, which accounts for more than half the soil degradation in the region.

● Technological hazards

Technological hazards are related to quickly occurring, high-impact events such as hazardous spills and nuclear accidents, and are therefore more linked with exposure, than long-term environmental degradation. In the case of hazardous materials – chemical and

Declining agricultural yields in the SADC region are also attributed to water erosion. In Zambia, soil erosion by water is the most serious form of physical soil degradation, with approximately 100,000 hectares at various stages degradation. Similarly, it is estimated that approximately 30 per cent of croplands in communal farming areas of Zimbabwe have been abandoned due to depleted soil fertility. In South Africa, as much as 6.1 million hectares of cultivated soil are affected by water erosion, with up to 300 million tons of soil lost annually due to physical degradation processes (FAO/AGL, 2001). Land degradation processes have been particularly prominent in Zambia as a result of deforestation, dense human population, overgrazing, poor crop cover and poor soil management techniques. This is reflected in marked deforestation, reaching 2644 km² annually from 1990-1995. While land degradation increases the severity of flood and drought impacts in the region, it is an unsurprising outcome, both of widespread rural poverty as well as macro-economic forces.



toxic waste leakage – exposure is the critical factor. That was the case in Bhopal, India, in 1984, where material leaked to form a deadly cloud that killed and injured a huge number of people – most of whom came from poor families allowed to settle around the chemical plant. The fatal consequences of this chemical release were directly related to modernization efforts introduced as a complex and poorly managed industrial production system into a society unable to cope with it.

A very important aspect of exposure to technological hazards is the fact that they are not exclusively confined to urban-industrial societies. Virtually every modern product and process is disseminated to most countries and social settings. Of 25 nations with operating nuclear power stations, at least 14 are in developing countries. Great oil spills and releases of nuclear radiation are associated with the dominant energy and transportation technologies. Chernobyl, Exxon Valdez, Minimata and Bhopal, are some well known examples of technological disasters.

● **Biohazards and vulnerability**

HIV/AIDS can be considered a biological hazard. However, due to its enormous real and potential impact on the human community, it also constitutes a major vulnerability factor to the impact of other natural hazards. In particular, HIV/AIDS exacerbates vulnerability to drought conditions. Household size and income diversification, which count as key strategies to cope with droughts, are severely affected by HIV/AIDS, both by reducing the

The situation is very critical for Southern Africa, facing catastrophic consequences of HIV/AIDS infection. With many countries recording adult HIV infection rates of 25-30 per cent, the 1990s have seen the deaths of thousands of skilled young people occupying middle-management positions in the private and public sectors. Precious opportunities to develop sustainable local and technical capacities in disaster reduction have been undermined by continuing HIV-related deaths. With its far-reaching effects that span all professions, social sectors and communities in Southern Africa, HIV/AIDS will continue to constitute a major aspect of both household and national vulnerability for the foreseeable future.

labour force and diverting vital economic resources towards medication and treatments. Moreover, infected people living in cities, usually return to their home villages to die, reinforcing the already higher vulnerability in rural environments in most African countries.

■ **Trends in physical vulnerability**

Ninety per cent of the global population growth is taking place in least developed countries (LDCs). In these countries, exposure to hazards is already high through dense concentrations of population in largely unsafe human settlements. Vulnerability levels are also exacerbated by socio-economic and environmental conditions. In 1980, sub-Saharan Africa had a population of 385 million. This figure is expected to at least double by 2005. Population growth is outstripping food production that represents 40 per cent of GDP in some instances. But even this figure is precarious given less reliable rainfall patterns.

The long term trends of demographic growth for LDCs are creating environmental, as well as political, refugees. As many as 10 million people have emigrated during recent years but there may eventually be even greater redistributions of the African population in response to the deteriorating food situation. Some of this redistribution will likely concentrate even greater numbers in hazardous areas.

Due to the urban concentration of population, the greatest potential for disaster exists in the hundred most populous cities. Over three-quarters of these are exposed to at least one natural hazard. No less than seventy of these cities can expect, on average, to experience a strong earthquake at least once every fifty years. The greatest concern is for the fifty fastest growing cities, all of which are located in developing countries. Cities were often founded on accessible locations with inherent risks such as coastlines, to facilitate transport or floodplains because of their fertility and ample space for growth. Urbanization and increasing competition for land, results in the creation of unregulated construction which spills over into high risk areas, such as along hill sides, into low lying areas, next to industries, or on flood plains.

15 largest cities in world in 2000 and forecasts for 2010 (population in millions)	2000		2010	
	26.4	Tokyo	26.4	Tokyo
	18.1	Mexico City	23.6	Bombay
Urban population as a percentage of total population	18.1	Bombay	20.2	Lagos
annual growth rate as a percentage	17.8	Sao Paulo	19.7	Sao Paulo
	16.6	New York	18.7	Mexico City
	13.4	Lagos	18.4	Dhaka
	13.1	Los Angeles	17.2	New York
	12.9	Calcutta	16.6	Karachi
	12.9	Shanghai	15.6	Calcutta
	12.6	Buenos Aires	15.3	Jakarta
	12.3	Dhaka	15.1	Delhi
	11.8	Karachi	13.9	Los Angeles
	11.7	Delhi	13.79	Metro Manila
	11.0	Jakarta	13.7	Buenos Aires
	11.0	Osaka	13.7	Shanghai

	1970	1995	2015	1970-1995	1995-2015
Least developed	12.7	22.9	34.9	5.1	4.6
All developing	24.7	37.4	49.3	3.8	2.9
Industrialized	67.1	73.7	78.7	1.1	0.6

HDI: Human Development Indicator (UNDP)

	1970	1995	2015	1970-1995	1995-2015
Low HDI	18.2	27.4	38.6	4.1	3.7
Medium HDI	23.0	37.7	52.7	3.9	2.8
High HDI	52.8	70.9	78.5	3.3	1.7

Extract from The State of the World's Cities, UN-HABITAT, 2001.

Cities now hold disproportionate amounts of material wealth in terms of both residential and commercial buildings and infrastructure. This infrastructure is critical to the functioning of the city. The impact of disasters on cities can devastate national economies and industrial markets at an international level. This is especially important true for nation states, or emerging economies, where one or perhaps two primary urban areas will account for the vast majority of economic and social activity.

The dynamic growth of coastal areas evident in the Andean sub-region is also seen elsewhere. Nearly 3 billion people live in coastal zones, and 13 of the 15 largest cities are also located on the sea.

In some of the Andean countries, the current trend is a dynamic growth of the coastal areas, where an urban axis, articulated along the Pan-American highway, integrates the main port cities including Lima, Guayaquil, Puerto Cabello and La Guaira. Rapid urbanization in these areas contributes to increased levels of risk. Thirty-five per cent of the Peruvian population now lies between Lima and Callao.

The triangle formed by Quito, Guayaquil and Cuencas contains more than 70 per cent of the Ecuadorian population in only 15 per cent of the national territory. The triangle formed by La Paz, Cochabamba and Santa Cruz accounts for 80 per cent of the total GDP, and about 70 per cent of the Bolivian population.

In South Africa, it is expected that around 50 per cent of the population will live within 50 km of the coast in the near future. While this affords economic and other opportunities, it also exposes millions of people to extreme weather events triggered by the Indian, Atlantic and Southern Oceans. Moreover, coastal development for tourism is being actively promoted in many countries, which are prone to tropical cyclones and tsunamis.

Not only is the exposure of people exacerbated by the occupation of hazard-prone areas, the concentration of industrial infrastructure and critical facilities are also affected. Communication networks and educational and health infrastructure are becoming more vulnerable to the potential impact of natural hazards.

Behind the rapid urbanization process, rural displacement accounts for the rapid growth of informal, illegal settlements in the most dangerous places near cities like Mexico City, Rio de Janeiro and Manila, amongst others. Disaster risk concerns go hand in hand with other equally pressing urban issues, such as decaying infrastructure, poor housing and homelessness, hazardous industries, inadequate services, unaffordable and poor transport links, and unemployment.

Trade corridors are formed as a result of trade agreements. In Latin America we find the Central American highway, the Quito-Guayaquil corridor, the Pan-American Highway in the Andean region, the Buenos Aires-Mendoza-Santiago-Valparaiso corridor, and Brazilian coastal corridors with maritime connections to Asian and European destinations. The development of trade corridors has political, economic, social and environmental implications. Their resilience to the impact of natural hazards is particularly relevant to enhance the sustainable development of cities and regions.

An example of high vulnerability to natural hazards, in the context of trade corridors, is provided by the recurrent impacts experienced along the Pan-American Highway. For instance, during Hurricane Mitch, in 1998, the Central American intra-regional market was interrupted for more than fifteen days due to the damages in many parts of the Central American Highway. In 1997-98, in Peru and Ecuador, the impact from the El Niño event disrupted the circulation of the Pan-American Highway in hundreds of sections.

Trends in socio-economic vulnerability

The relation of disaster risk and development offers a good starting point to identify macro trends in socio-economic vulnerability. To some degree, socio-economic and environmental vulnerability is shaped by development processes and *vice versa*. Understanding how patterns of social change and development set the scene for future disasters become crucial to improving disaster risk assessment and analysis, and therefore essential for disaster risk reduction as a whole.

● Development and vulnerability

The analysis of disaster impact shows that an estimated 97 per cent of natural disaster related deaths each year occur in developing countries (*World Bank*, 2001). Although smaller in absolute figures, the percentage of economic loss in relation to the GNP in developing countries far exceeds those in developed countries. This fact becomes even more relevant for SIDS. Between 1985 and 1999, the world's wealthiest countries sustained 57.3 per cent of the measured economic losses to disasters, representing 2.5 per cent of their combined GDP. During the same years, the world's poorest countries endured 24.4 per cent of the economic toll of disasters, representing 13.4 per cent of their combined GDP.

Some of the vulnerability factors or processes are closely associated with certain types of development models and initiatives. The links between disaster and development are explored in detail in the *World Vulnerability Report*, currently being developed by UNDP.

Increasing or permanent levels of poverty remain as a relevant issue for the analysis of vulnerability trends.

In Southern Africa, poverty levels remain high, especially among the rural poor, with 63.7 per cent, 36 per cent and 37 per cent of Zambians, Zimbabweans and Mozambicans respectively, living on less than US\$ 1 per day. Their GDP falls far short of per capita GDP in developing countries. Moreover, GDPs for Zambia and Mozambique are around half of those for sub-Saharan Africa. In addition, high levels of foreign debt have discouraged investment and growth, with Zambia shoul-

dering external debts that constitute 181 per cent of its GNP. Under these conditions, it is unrealistic to expect significant investments at household or national level to mitigate the impact of natural or other threats.

● Globalisation as a dynamic force

Globalisation has a number of distinctive characteristics that have had a profound influence on the structure of international socio-economic relations. The impact of globalisation on patterns of vulnerability is critical to identify new trends in disaster risk. The economic dimensions of globalisation include the dominance of a global market, as one of its main features. The combined impacts of economic adjustment measures to encourage greater efficiencies and global competitiveness have been reflected in significant job losses and unemployment. In South Africa alone, between 1996-2000 more than 500,000 formal sector jobs were lost. Between 1997-2000 more than 140,000 miners became unemployed and 50,000 primarily female workers lost their jobs in textile industries. This is an increasingly relevant area which will require further analysis and focus.

● Traditional knowledge at risk

The pace of technological change and the cultural implications of globalisation pose a real threat to the wealth of local knowledge, and related skills and resources, preserved among indigenous people and in many rural communities.

In the past, people from Pacific islands used various techniques to cope with the impact of natural hazards, such as special forms of food preservation, harvesting wild foods, planting disaster-resistant crops, using hazard-resistant forms of traditional house design and construction, and relying on established social networks for extended community support. Many of these traditions have become neglected as more people gravitate towards modern lifestyles, often becoming increasingly disassociated from a sensitive consideration of natural conditions in the process. It has also been observed that crops which formerly provided food security in many countries at times of disaster are now rarely planted.

Economic vulnerability is increasing as local livelihoods are transformed from relying on traditional forms of production to using more intensive or modern methods of agriculture and land use systems.

Traditional versus "modern" ways to cope. Is it necessary to choose?

The traditional pattern of agricultural land use in the Sahel was well adapted to uncertain rainfall conditions. Generally speaking, the northern zone, with a mean annual rainfall of 100-350 mm was used for livestock, while the southern Sahel, with a rainfall of 350-800mm, was used for rain fed crops. This system permitted a degree of flexible inter-dependence. Herders followed the rains by seasonal migration, while the cultivators grew a variety of drought-resistant subsistence crops, including sorghum and millet, to reduce the risk of failure. Fallow periods were used to rest the land for perhaps as much as five years in order to maintain the fertility of the soil. In the absence of a cash economy, a barter system operated between herders and sedentary farmers.

During recent decades this system has collapsed for a variety of reasons. Population growth has exerted pressure on the land, resulting in soil erosion. In turn, the range-lands have been over-grazed with rapid degradation of the resource base. The need of national governments for export earnings and foreign exchange has produced a trend towards cash crops, which have competed for land with basic grains and reduced the fallowing system. Subsistence crops have been discouraged to the extent that produce prices have consistently declined in real value for over twenty years. At the same time, the build-up of food reserves has been seriously neglected under pressure from international banks wanting loan re-payments. In addition, a lack of government investment to improve the productivity of rain-fed agriculture and a failure to organize credit facilities for poor farmers have also tended to undermine the stability of the rural base.

National governments have progressively campaigned against a nomadic lifestyle. In many instances, foreign aid has been earmarked for sedentary agriculture rather than herders. Increasingly, strict game preservation laws have been introduced which restrict the possibility of hunting for meat during drought. Traditional forms of employment, such as in caravan trading, have declined as a result of the enforcement of international boundaries and customs duties, together with competition from lorries.

Source: K. Smith, 1997

Risk Assessment
 A process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

2.3. Risk assessment

Risk assessments include detailed quantitative and qualitative information and understanding of risk, its physical, social, economic, and environmental factors and consequences. It is a necessary first step for any other disaster reduction measure. Its relevance for planning and development of disaster risk reduction strategies was explicitly addressed during the IDNDR (1989), which stated that:

“In the year 2000, all countries, as part of their plan to achieve sustainable development, should have in place:

a) Comprehensive national assessments of risks from natural hazards, with these assessments taken into account in development plans.”

This was reiterated as the first principle, in the Yokohama Strategy and Plan of Action (1994): *“Risk assessment is a required step for the adoption of adequate and successful disaster reduction policies and measures.”*

Risk assessment encompasses the systematic use of available information to determine the likelihood of certain events occurring and the magnitude of their possible consequences. As a process, it is generally agreed upon that it includes the following activities:

- Identifying the nature, location, intensity and probability of a threat.
- Determining the existence and degree of vulnerabilities and exposure to the threat.
- Identifying the capacities and resources available.
- Determining acceptable levels of risk.

The analytical phases involved in risk assessment include some of the basic tasks for risk management. The following diagram shows the basic stages undertaken in a risk assessment process.

Stages of risk assessment

R I S K A N A L Y S I S	IDENTIFICATION OF RISK FACTORS		R I S K A S S E S S M E N T
	HAZARD	VULNERABILITY/ CAPACITIES	
	Determines geographical location, intensity and probability	Determines susceptibilities & capacities	
	Estimates level of risk		
	Evaluates risks		
	Socio-economic cost/benefit analysis Establishment of priorities Establishment of acceptable levels of risk Elaboration of scenarios and measures		

The identification of hazards usually constitutes the departing point for the risk assessment process.

Both hazard and vulnerability/capacity assessments utilise formal procedures that include collection of primary data, monitoring, data processing, mapping, and social surveys techniques, among others. In the case of hazard assessment, where usually high technological developments for monitoring and storing data of geological and atmospheric processes are involved, the assessment activities are mostly restricted to a scientific community. On the other hand, vulnerability and capacity assessments make use of more conventional methodologies and techniques, by which the community at risk may also play an active role, such as in community-based mapping.

Beyond these particularities, hazard and vulnerability/capacity assessment follow a set of more or less formal procedures that are generally captured under the concept of risk analysis. Seen as this, risk analysis constitutes a core stage of the whole risk assessment process by means of providing relatively objective and technical information from which levels of risk can be estimated.

The information produced by technical risk analysis allows for the establishment of impartial government policy, resources needed for disaster preparedness, and insurance schemes. But from the estimated levels of risk to the

determination of acceptable levels of risk, a different range of value judgements are usually taken into account. Socio-economic cost/benefit analyses usually lead to the establishment of priorities that in turn help to draw levels of acceptable risk. These levels will depend largely on government, community priorities, interests and capacities. It is at this stage, particularly, when the more subjective trade-offs of quantitative and qualitative approaches to risk assessment need to be sorted out.

The distinction between **risk assessment** and **risk perception** has important implications for disaster **risk reduction**. In some cases, as in vulnerability/capacity assessment exercises, risk perception may be formally included in the assessment process, by incorporating people's own ideas and perceptions on the risks they are exposed to. Nevertheless, the wide and increasing use of computer assisted techniques and methodologies – such as those involved in Geographic Information Systems (GIS) – may widen the breach between the information produced by technical risk assessments and the understanding of risk by people.

Therefore, acceptable levels of risk may vary according to the relative contribution of views on objective risk versus perceived risk, at the various individual, community and institutional scales. The table below depicts the main differences between risk assessment and risk perception.

Phase of analysis	Risk assessment processes	Risk perception processes
Risk identification	Event monitoring Statistical inference	Individual intuition Personal awareness
Risk estimation	Magnitude/frequency Economic costs	Personal experience Intangible losses
Risk evaluation	Cost/benefit analysis Community policy	Personality factors Individual action

Adapted from: K. Smith. Environmental hazards, 1997

Hazard assessment

The objective of a hazard assessment is to identify the probability of occurrence of a specified hazard, in a specified future time period, as well as its intensity and area of impact. For example, the assessment of flood hazard is extremely important in the design and setting of engineering facilities and in zoning for land use planning. Construction of buildings and residences is often restricted in high flood hazard areas. Flood assessment should be developed for the design and setting of sewage treatment as well as land and buildings having industrial materials of a toxic or dangerous nature, due to the potential spread of contaminants.

Certain hazards have well-established techniques available for their assessment. This is the case for floods, earthquakes and volcanic hazards. Many of the analytical techniques useful for hazard assessment can be applied using medium powered computers and widely available software packages.

On seismic hazards, the dynamic ground shaking and ground movement are the two most important effects considered in the analysis. Dynamic ground shaking is a critical consideration for buildings and construction. The objective of a statistical earthquake hazard assessment is to assess the probability that a particular level of ground motion at a site is reached or exceeded during a specified time interval. An alternative approach is to consider

the evaluation of the ground motion produced by the maximum conceivable earthquake in the most unfavourable distance to a specific site. Earthquake hazard assessment in areas of low seismic activity is much more subject to large errors than in areas with high earthquake activity. This is especially the case if the time span of the available data is considerably smaller than the mean return interval of large events, for which the hazard has to be calculated.

In most cases, one is able to characterise the overall activity of a volcano and its potential danger from field observations by mapping the various historical and prehistoric volcanic deposits. These deposits can, in turn, be interpreted in terms of eruptive phenomena, usually by analogy with visually observed eruptions.

Other hazards have less well-defined assessment methodologies. In the future, efforts must continue to increase our understanding and develop methodologies for the assessment of hazards such as heat waves and dust storms; in particular, with regard to the factors which influence their development, movement and decay.

Multi-hazard assessments are difficult to achieve due in part to the different approaches taken by the various disciplines in assessing the specific potential hazards. But multi-hazard assessments are essential, for example, in the case of a tropical storm event. The event cannot be looked at in isolation and should consider the different components that actually represent the risks occurring either separately or all together. These components are flood, landslide, storm surge, tornado and wind. Various hazards will be measured according to different scales, which make comparisons difficult. An earthquake will be quantified based on the amount of energy released (Richter scale) or the amount of damage potentially caused (Modified Mercalli scale), while a heat wave is measured using maximum temperatures and a wind storm using wind velocity.

Even without sophisticated assessment tools, it is possible for local communities to collect hazard information. Such steps are suggested in UNEP's Technical Report N°12, *Hazard Identification and Evaluation in a Local Community*, consisting of basic checklists to identify, and basic approaches to map major hazards in a locality. Various tables invite more detailed

WMO and the IDNDR Scientific and Technical Committee promoted a project to further develop the concept of comprehensive, multi-hazard or joint assessment of natural hazards. It was recognised that society is usually at risk from several different hazards, many of which are not water-related or natural in origin. More importantly, it was also recognised that joint assessment of risk from these various hazards is in its infancy. Recognising these points, the project focused on the most destructive and most widespread natural disasters, namely those of meteorological, hydrological, seismic, and volcanic origin. An example of the development and application of such approach in land-use planning was provided by Switzerland where the composite exposure to risks from floods, landslides and avalanches were considered. The project noted that an increased understanding of the hazard assessment methodologies of each discipline is required, as these methodologies varied from discipline to discipline.

consideration about the nature of impacts and the severity of various consequences of different hazards on affected populations.

Hazard mapping, awareness and public policy

A key dimension of hazard assessment is the presentation of the results and the understanding of the added value by policy makers. Maps can be prepared manually using standard cartographic techniques or with a GIS. Different types of hazards will require different mapping techniques. The importance lies in the easy understanding and use of the information generated.

For example, maps are the standard format for presenting flood hazards. The flood-hazard areas are usually divided according to severity (deep or shallow), type (quiet water or high velocity) or frequency. In the case of volcanic hazards, the zoning of each direct and indirect hazards can be drawn according to the intensity, the extent of the hazard, the frequency of occurrence or in combination. Composite phenomena and hazard maps are recognised as an important tool for joint hazard assessments. These combined hazard assessments need to be presented using a simple classification, such as high, medium and low risk, or no danger.

One of the constraining factors in hazard mapping is not so much the lack of infrastructure but the lack of proper training capabilities. There are many government employees that do not have computer access. Hazard maps are also not as widely used as they could

Several initiatives on hazard mapping were developed during the 1990s, as part of IDNDR. One example is the “*Eastern Asia Natural Hazards Mapping Project*” (EANHMP), started in Japan in 1994. The objectives of the project were to enhance awareness on natural hazards, in particular geological hazards among planners and policy makers of national and regional development, as well as general public in a given region, promote scientific studies on geological hazards, and transfer technology on hazard mapping to developing countries through collaborative activities. The Eastern Asia Geological Hazards Map is one of the products already available.

Source: Geological Survey of Japan, AIST, 2002

be, were more planners and decision-makers aware of their potential. For example, in Bangladesh, while many different entities are carrying out various projects in risk and hazard mapping and land-use planning, there exists no common focal point for easy access to this information. Moreover, communication is deficient: maps are not shared, and data is collected several times, or mismanaged.

Vulnerability and capacity assessment

Vulnerability and capacity assessments are an indispensable complement to hazard assessment exercises. Despite the considerable efforts and achievements reflected in improved quality and coverage of scientific data on different hazards, the mapping and assessing of social, economic and environmental vulnerabilities of the population are not equally developed. Some

High risk cholera areas due to polluted surface water (2001)

In South Africa, various institutions are engaged in hazard mapping. While projects are sometimes conducted in isolation and the data is not widely used, there are other examples where the resulting information is beneficial to additional institutions beyond the one which collected it. Most hazard maps are becoming available online and they often function as clickable image maps containing additional information about particular areas. The Agriculture Research Council, the National Disaster Management Centre, the Department of Water Affairs and Forestry, and the Department of Health are all using satellite data to compile hazard maps, which then become part of their much larger geographical information systems. Use of US/NOAA satellite data further enables the generation of locally relevant geo-referenced maps. The National Botanical Institute also embarked on the mapping of degradation patterns for the whole of South Africa. These maps provide valuable information on the state of South Africa’s ground cover.

Source: NDMC (<http://sandmc.pwv.gov.za/ndmc/cholera/Maps/Nmmp.jpg>)



aspects of vulnerability/capacity, especially those related to the social nature of these concepts, pose a different range of challenges to risk assessment.

Often there is a huge gap in the understanding and application of vulnerability/capacity assessments between the institutions undertaking these tasks, and the local authorities and communities involved in the exercise.

A great deal of work has been focused on the assessment of the physical aspects of vulnerability. This has been done mainly in relation to more conventional hazardous phenomenon, such as windstorms, earthquakes and floods. A high percentage of the vulnerability mapping developments at an earlier stage is reflecting this trend. This was accentuated by the wide utilisation of GIS techniques for the spatial integration of different variables in the 1980s. The spatial overlapping of hazard zones with infrastructure such as airports, main highways, health facilities and power lines, amongst others, is one of the common

exercises, highly focused on in the examination of the physical aspects of vulnerability.

The Organization of American States (OAS) has been one of the pioneers in Latin America in using GIS tools for physical vulnerability assessment, focused on infrastructure and critical facilities. A pilot project launched early in the 1980s on GIS Applications for Natural Hazards Management in Latin America and the Caribbean, implemented more than 200 applications in 20 countries of the region, integrating hazards, natural resources, population and infrastructure data. The fact that it was discovered that all of the main airports in Guatemala are located within high intensity seismic areas, or that 670 kilometers of paved routes in Ecuador were located within a 30 kilometre radius of active volcanos, have been instructive, to say the least.

Several initiatives towards comprehensive risk assessments are currently going on in the Pacific islands states. In the Cook Islands, for example, risk assessments related to tropical cyclones and associated flooding have been undertaken. These include both the technical aspects of hazard mapping, vulnerability assessments of building stock, infrastructure, lifelines and critical facilities, and the social aspects of potential economic losses and impacts on communities. The risk assessment information provided input for community early warning systems for tropical cyclones, *ERWIN*, as well as primary information for reports and technical support materials such as: Cook Islands Building Code; Disaster Management Work Plan; National Disaster Management Plan; Cyclone Response Procedures; Tsunami Response Procedures.

Another good example for this region is provided by Fiji, where in recent years, several comprehensive risk assessment projects have been undertaken. These have always involved the relevant government departments and infrastructure agencies, and include representation from NGOs and the private sector. The participation of international agencies and/or consultants which has ensured that

Community risks in Australia

One of the advantages of GIS techniques is the possibility to carry out multi-hazard analysis. Community Risk in Cairns is the first of a series of multi-hazard case studies by the Australian Geological Survey Organization (AGSO). It considers earthquakes, landslides, floods and cyclones.

A report detailing the hazard history of Cairns, the risk assessment methodology and results has been prepared by several researchers and AGSO, in collaboration with Cairns City Council and ERSIS Australia.

The AGSO Cities Project undertakes research towards the mitigation of the risks posed by a range of geo-hazards to Australian urban communities. Extensive use of GIS has been made to drive analysis and assessment. *Risk-GIS*, as it has been christened in the *Cities Project*, is a fusion of the decision support capabilities of GIS and the philosophy of risk management. An interactive online mapping system for Geoscience Australia's Community Risk in Cairns project is available online as well as an advanced mapping system for experienced GIS users.

Source: <http://www.agso.gov.au/pdf/UC0001.pdf>

Bern – risk maps/hazard maps

Since 1998, the canton of Bern, in Switzerland, has had at its disposal a planning tool which indicates potential risk areas. The maps are designed using computer modelling and GIS. The maps are not expensive and allow a complete overview of the canton based on a uniform set of criteria. The risk areas cover approximately 44 per cent of the territory, mostly in non-residential areas. However, about 8 per cent inhabitants are in potential risk zones.

- **Exposed areas.** These are areas, which could potentially be affected by mud flow, avalanches, stone falls and landslides.
- **Vulnerable assets.** These include habitats, railroads, and all roads serving residential areas.
- **Potential impact zones.** The overlap between the exposed areas and the vulnerable assets.
- **Protection forest.** In this particular case, these are forests that play an important protective role for residential areas and communication networks.

One particular hazard is not modelled: risk related to floods, which cause severe social and economic impacts. The type of impact related to floods depends heavily on flows that are too low to be currently modelled satisfactorily.

Legend: (Original in French)

Potential hazards

- Sector exposed to mud flows and other flash floods
- Sector exposed to avalanches
- Sector exposed to stone falls
- Sector exposed to deep landslides
- Sector exposed to average to deep landslides

Vulnerable assets

- Residential area
- Main roads
- Access roads
- Railroads

Forest

- Forest with an important protection function
- Forest with a protection function
- Other forests
- Exposed zones represented in a simplified manner

Source: Office des forêts du Canton de Berne, Switzerland, 1999



Laves torrentielles et avalanches: zones exposées et biens menacés



Chutes de pierre, glissements de terrain et dolines: zones exposées et biens menacés

Dangers potentiels

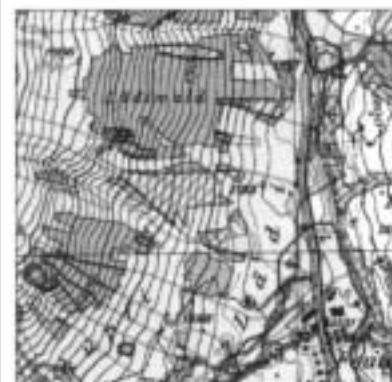
- Secteur exposé aux laves torrentielles
- Secteur exposé aux avalanches

- Secteur exposé aux chutes de pierre
- Secteur exposé aux glissements de terrain d'une grande profondeur
- Secteur exposé aux glissements de terrain d'une profondeur moyenne à grande

Biens menacés

- Habitation occupée à l'année
- Route cantonale
- Accès à une habitation
- Ligne de chemin de fer

Dans le canton de Berne, les forêts couvrent environ 1600 kilomètres carrés, dont environ 400 (soit un quart de la superficie totale) ont une fonction directe de protection contre les avalanches, les chutes de pierre, les torrents ou les glissements de terrain.



Forêts

- Forêts ayant une fonction protectrice particulièrement importante
- Forêts ayant une fonction protectrice (déclivité >40%)
- Autres forêts
- Zones exposées représentées de manière simplifiée (contours seulement)

up-to-date methodologies and technologies were employed. These risk assessments have also used a multidisciplinary and multi-institutional approach in a proactive manner. Examples of these risk assessments are included in the box below.

Risk assessments undertaken in Fiji have been based on detailed hazard and vulnerability assessments, integrating the scientific geological and meteorological (where applicable) information with information on the built environment (building stock, infrastructure, critical facilities and lifelines) and the natural environment. Modern international methodologies have been employed, including ground surveys, remote sensing and GIS mapping. The results and outputs have had major implications in many practical applications for disaster management, such as in helping to formulate building codes, training of emergency services personnel (for example: Suva Earthquake Risk Scenario Pilot Project, SERMP, for the City of Suva). They have also had regional significance in that these initiatives are being used as the basis of similar studies in other Pacific Island Countries. Examples of these risk assessments are:

- Suva Earthquake Risk Management Scenario Pilot Project (SERMP) Undertaken for the City of Suva (1995-1998) and involved an earthquake and tsunami exercise "SUVEQ 97" (based on SERMP and the devastating 1953 Suva earthquake and associated tsunami), and was included in the activities of the UN IDNDR RADIUS programme (CERA, 1997a, b).
- Taveuni Volcano: Comprehensive study of the potential for an eruption which involved international scientists (consultants) with senior Government officials and infrastructure agencies (Cronin, 1999a, b; Cronin and Kaloumaira, 2000; Cronin and Neall, 2000).
- Flood Mitigation: Comprehensive studies in known flood ravaged areas on the Island of Viti Levu (western, northern and south eastern regions) (Yeo, 2000, 2001).

Methodological challenges

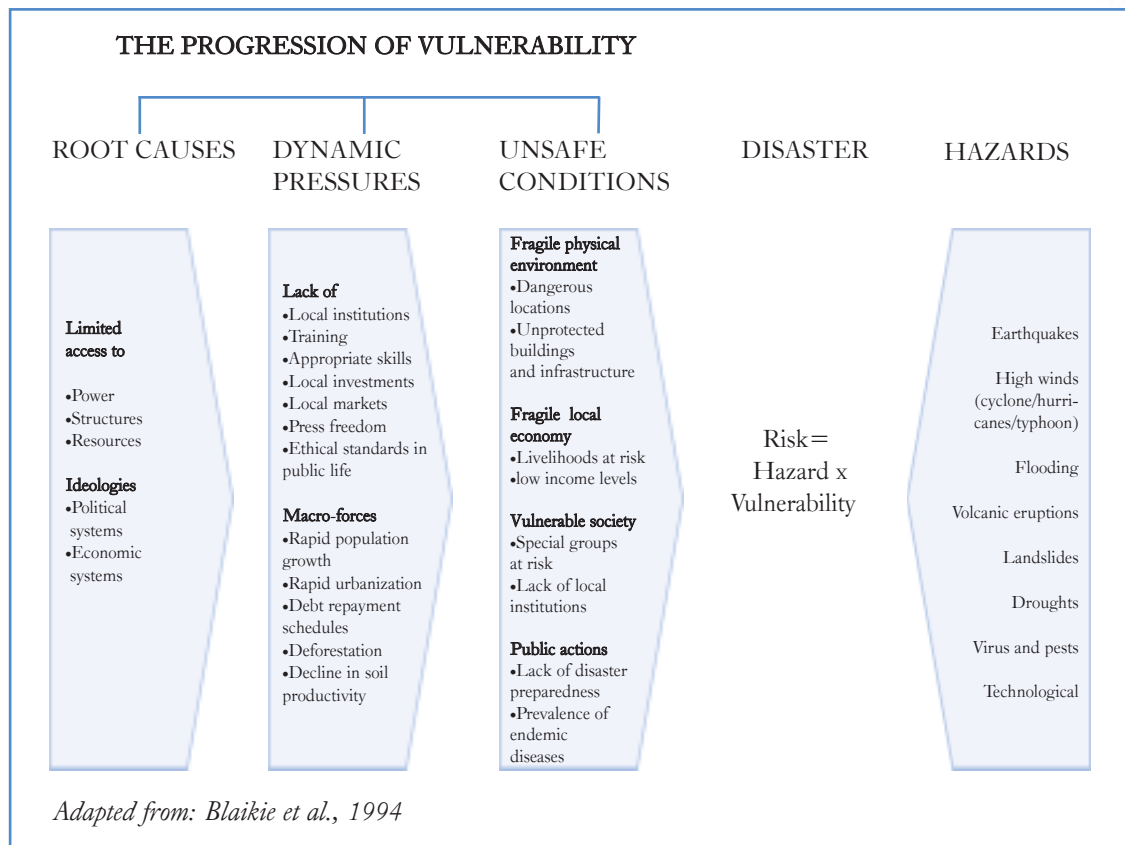
While hazard mapping and physical aspects of vulnerability analysis have been substantially facilitated and improved due to the use of GIS techniques, the inclusion of social, economic and environmental variables into GIS's conceptual models, remains as a major methodological challenge. The need to assign a quan-

tifiable value to the variables analysed into the spatial models used by GIS is not always possible for some social/economic dimensions of vulnerability – for instance, how to quantify the ideological and cultural aspects of vulnerability. Moreover, the diverse scales – individual, family, community, regional – at which different dimensions of socio-economic vulnerability operate, makes the spatial representation through these techniques, very difficult.

The quality and detail of the information required by the analysis facilitated by GIS is, in many cases, inexistent, especially in LDCs and other developing countries. In general, the quality and availability of statistical data sets limit the information for GIS analysis to low resolution outputs. The use of GIS for vulnerability/capacity analysis is still at an embryonic stage, in comparison with its wide use in hazard mapping. Several research initiatives are aiming to bring solutions to the current methodological constraints, especially the quantification of social aspects of vulnerability. Still, the socio-economic vulnerability assessments rely on more conventional ways, which indeed provide other opportunities and advantages, such as the active involvement of the community at risk in exercises as community based mapping and assessments.

Generally speaking, the physical aspects of vulnerability assessment are tailored from exposure to hazards criteria, providing answers to the questions of what is vulnerable and where is it vulnerable. The attempts to assess socio-economic aspects of vulnerability intend to answer the questions who is vulnerable, and how have they become vulnerable. Attributes of groups and individuals, such as socio-economic class, ethnicity, caste membership, gender, age, physical disability, and religion are amongst the characteristics that have been linked to differential vulnerability to hazards.

The development of models and conceptual frameworks provided a basis for vulnerability analysis in relation to specific hazards. *Pressure and Release*, and *Access* models, presented in the mid 1990s (see diagram), provided a good basis for the analysis and further identification of specific vulnerable conditions. These models linked dynamic processes at different scales, and different access to resources profiles, with vulnerability conditions.



The validation of proposed models and frameworks for vulnerability analysis have been, in most cases, the information gained by occurrence of the disaster itself. The analysis of the damages experienced in disasters constitutes a major source of information for vulnerability/capacity identification. The damage revealed in disasters provides the empirical evidence of where and for whom potential risks becomes a palpable reality.

As opposed to inductive analysis used in GIS techniques – where the level of risk is induced by integrating layers of information, historical analysis of disaster data provide the information to deduce levels of risk based on past experiences. In addition, historical disaster databases are essential to identify the dynamic aspects involved in vulnerability, providing the criteria to assign relative weights to different dimensions of vulnerability in risk assessment exercises. In this context, the refinement, maintenance and systematic feeding of disaster data sets are vital for risk assessment as a whole. The insurance industry's approach to disaster risk is based on this kind of data. Some of these issues are being addressed by the ISDR Inter-Agency Task Force Working

Group 3, on Risk, Vulnerability and Impact Assessment.

Droughts have been proved to be a particularly difficult task for risk assessment, as discussed earlier in this chapter (*see also chapter 5.6, Early Warning Systems*). Risk assessment tools developed for food security issues provide conceptual inputs as well as primary data, related to vulnerability to droughts. In that regard, the *WFP* and *FAO* work with other UN agencies, national governments, and NGO partners to integrate vulnerability analysis and mapping techniques. Nevertheless, a food security approach is based in a slightly different understanding of risk, where food insecurity is the outcome, and drought is one of the vulnerability factors. The *Global Risk Vulnerability Index*, being produced as part of the *World Vulnerability Report* of UNDP, is engaged in exploring ways to integrate drought data in a comprehensive risk index.

The *Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters, RADIUS*, provides a good example of comprehensive hazard-specific tools that contribute to define

ISDR working group on risk, vulnerability and impact assessment (WG3)

Mobilised in 2001 and convened by the office of UNDP's Bureau for Crisis Prevention and Recovery (BCPR) in Geneva, WG3 of the Inter-agency Task Force on Disaster Reduction consists of over twenty members representing UN agencies, academic institutions, international NGOs and related regional and national bodies world-wide. The role of WG3 has primarily been a forum for dialogue and platform for advocacy, with collaborative activities now underway. Meeting twice annually, WG3 acts as a networking system for members and external participants allowing sharing of information regarding various conceptual models and related methodologies coming out of leading edge work, as well as on the challenges and lessons learned from practical applications in the field.

Playing an advocacy role in keeping with the relevant priorities of ISDR-IATF, WG3 focuses on understanding the needs for effective risk management, particularly from the local and national levels, on small and medium scale disasters and on the socio-economic and environmental risks and associated impact of disasters. Further, WG3 advocates the importance of considering the practical applicability of data, concepts, models and mechanisms for reducing risk as well as the need for continual linking of disaster risk management to development planning and vice versa.

Currently the WG3 is undertaking collective work in key technically-focused areas, including: a) information exchange and documentation; b) indicator, models and data sets for vulnerability indexing; c) tools and best practices for risk, vulnerability at the local and urban level; d) improving disaster impact analysis; and e) an aggregated analysis linking climate and disaster databases.

More information is available under the <http://www.unisdr.org/wgroup3.htm>.

urban risk scenarios. The IDNDR secretariat launched the RADIUS initiative in 1996. It aimed to promote world-wide activities for reduction of urban seismic risk (see box below).

In the Americas, vulnerability assessment and techniques (VAT) workshops are being held under the auspices of OAS. They provide an opportunity to explore methodological challenges and applicability of risk assessments. The technical information and comments generated by this and similar activities support the hemispheric policy work carried out by the Working Group on Vulnerability Assessments and Indexing (VAI) of the Inter-American Committee for Natural Disaster Reduction, also a member of the ISDR Inter-Agency Task Force.

Participatory vulnerability and capacity assessment methodologies

The relationship between vulnerability and capacity has been increasingly expressed in risk assessment methodologies in terms of Vulnerability and Capacities Assessment (VCA). Work has been done to develop, test and validate tools, methodologies and other instruments for factoring in issues related to social inequity, including gender analysis, into risk management at the local level. These aspects include participatory diagnosis, training methods, and a number of analytical frameworks such as the Capabilities and Vulnerabilities Analysis (CVA) which examines peoples strengths and abilities, as well as their susceptibilities, and the Socio-Economic and Gender Analysis (SEAGA), which look at disadvantaged social groups, incorporating

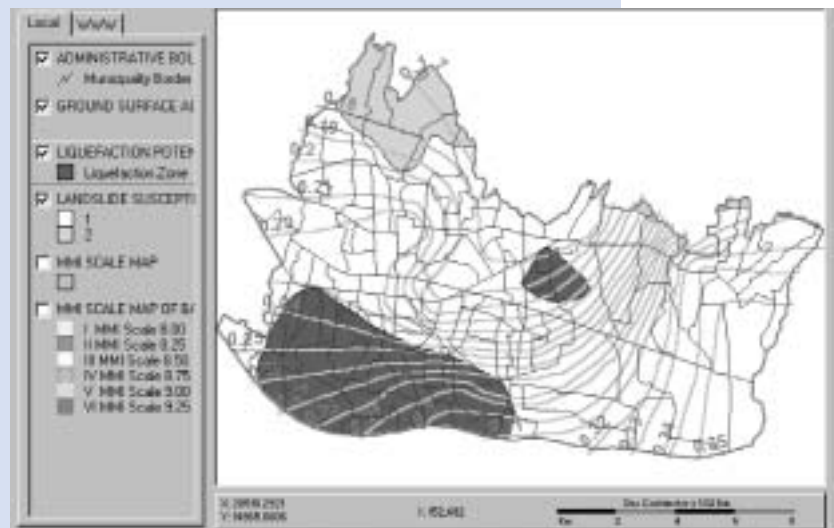
The RADIUS Initiative has achieved four main objectives:

- It developed earthquake damage scenarios and actions plans for nine case study cities around the world.
- It produced practical tools for estimation and management of urban seismic risk.
- It raised public awareness of seismic risk among members of society.
- It promoted information exchange for seismic risk mitigation at city level.

The seismic damage scenarios developed for the nine cities describe human loss, damage to buildings and infrastructure, and their effect on urban activities. The following cities participated: Addis Ababa, Ethiopia; Antofagasta, Chile; Bandung, Indonesia; Guayaquil, Ecuador; Izmir, Turkey; Skopje, Macedonia; Tashkent, Uzbekistan; Tijuana Mexico; and Zigong, China. The action plans propose new priorities for urban planning and for improvement of existing urban structures and emergency activities. The experiences of these nine cities were incorporated into a practical manual for damage estimation and guidelines for RADIUS-type projects, applicable to cities anywhere. With the tools, cities can conduct similar projects to estimate earthquake damage, and to prepare a risk management plan on their own. In addition, a comparative study was conducted to develop greater understanding of various aspects contributing to seismic risk, identify solutions and share risk management practices. Over 70 cities worldwide participated in this study on “Understanding Seismic Risk around the World.” More than 30 cities joined RADIUS as associate cities.

Their reports and the developed tools are available on the RADIUS web site

<http://www.geohaz.org/radius>, that functioned as an interactive medium to exchange experiences and information with RADIUS participants and concerned people worldwide.



A recent evaluation of RADIUS found that significant progress has been made in the management of the earthquake risk in RADIUS cities. There has been an important increase of public awareness about the need to reduce urban risk, and new risk management programmes have begun since the project's completion. According to the analysis, the cities believe that RADIUS contributed significantly to the progress achieved in each city. In several RADIUS cities, new risk management organizations have been created, or existing ones have been restructured, to promote, monitor, and report the implementation of the recommendations produced by the project.

Source: ISDR, Kenji Okazaki, UNCRD



them into the development process as effective change agents, rather than only as beneficiaries. IFRC has been very proactive in promoting a vulnerability/capacity approach.

VCA is as a key tool used by IFRC for risk analysis. More than 40 exercises have been undertaken by National Red Cross and Red Crescent Societies. Among these is that which was done in Palestine in 2000, which was deemed a success, and enjoyed maximum participation from a wide cross-section of actors. Based on the realisation that this tool is not solely for disaster preparedness; and was more geared at overall capacity building, an interdisciplinary approach (involving health, organizational development, and related programmes within the Red Cross/Red Crescent, and other partners) has been adopted. This has formed the basis for exercises, which will be implemented in 2002 in five North African countries, Mongolia, and other areas in East Asia. The lessons from this new approach will be used in carrying out other exercises in 2003. In order to further develop the mastery of this tool, a Training of Trainers workshop has been developed by IFRC. IFRC published a guide, *Vulnerability and Capacity Assessment*, in 1999 and recently, in collaboration with UNICEF, a report called *A Participatory Action Research Study of Vulnerabilities and Capacities of the Palestine Society in Disaster Preparedness*.

The work carried out by *Ecociudad*, a Peruvian NGO, provides another example of vulnerability/capacity mapping, where communities have had active participation (see Box next page). This local NGO working with environmental management issues related to disaster risk reduction, has supported community based risk-mapping in Caquetá, a quarter of Lima, Peru, and one of the more threatening landscapes found in the neighborhood of Lima, Peru (www.unchs.org/rdmu/).

In 2001, Emergency Management Australia (EMA), under the Government's Attorney-General's Department, in conjunction with a number of related international and national agencies, released the findings of a study on the assessment of personal and community resilience and vulnerability. The need for such an undertaking followed a series of events in Victoria, Australia, the most significant being the January 1997 wild land fires in the Shire of Yarra Ranges on the outskirts of Melbourne, and the June 1998 floods in the Shire of East Gippland. The study outlines exceptionally comprehensive and operationally-oriented guidelines on the concepts and processes of vulnerability and resilience for practical application in community risk assessment. The

Contextual aspects	Analysis of current and predicted demographics. Recent hazard events; economic conditions; political structures and issues; geophysical location; environmental condition; access/distribution of information and traditional knowledge; community involvement; organizations and management capacity; linkages with other regional/national bodies; critical infrastructures and systems
Highly vulnerable social groups	Infants/Children; frail elderly; economically disadvantaged; intellectually, psychologically and physically disabled; single parent families; new immigrants and visitors; socially/physically isolated; seriously ill; poorly sheltered.
Identifying basic social needs/values	Sustaining life; physical and mental well-being; safety and security; home/shelter; food and water; sanitary facilities; social links; information; sustain livelihoods; maintain social values/ethics.
Increasing capacities/reducing vulnerability	Positive economic and social trends; access to productive livelihoods; sound family and social structures; good governance; established networks regionally/nationally; participatory community structures and management; suitable physical and service infrastructures; local plans and arrangements; reserve financial and material resources; shared community values/goals; environmental resilience.
Practical assessment methods	Constructive frameworks; data sources include: local experts, focus groups; census data; surveys questionnaires; outreach programmes; historical records; maps; environmental profiles.

Ecociudad - participatory risk-assessment in Peru

Lima is situated along the boundary of two tectonic plates, making it highly prone to earthquakes. An ever-present risk of fires, landslides and flash flooding result in death and destruction every year. These inner-urban risks have been increasing both in their frequency and severity as a result of uncontrolled urban growth from the rapid increase in migration. The experience of Ecociudad highlighted a number of high-risk concerns in the local community:

- Houses located on the banks of a river are exposed to the threat of collapse in the event of a flood or landslide.
- Human settlements are situated in numerous areas prone to landslides and subject to periodic earth tremors.
- Informal markets and more established commercial centres are densely crowded and highly vulnerable to fire.

Community meetings were then convened to map the threats, vulnerabilities and capacities based on participation of the inhabitants and their local knowledge. This process has led to the establishment of volunteer brigades specialized in emergency rescue, and the settlements located along the river are currently being relocated by a neighborhood committee working in collaboration with local and central government authorities.

chart below reflects how these guidelines are directed towards ascertaining a high resolution in community risk assessment.

Objective information ascertained from risk analysis has been improved, especially in the identification and monitoring activities involved in hazard assessment. However, some phases in risk assessment remain weak. In par-

ticular, incorporating people's risk perceptions, and the socio-economic and environmental contexts where they live, is essential in the identification of risk scenarios. New trends in hazards and vulnerability also challenge the procedures and conventional methodologies, and call for a truly integrated, comprehensive and very dynamic risk assessment.

Preparing risk maps - community tools that build awareness and invite participation.



The winners of the ISDR risk map contest for children and communities in 2001 was the Shree Bal Bikash Secondary School in Kathmandu District, Nepal. Children from Piura, Peru, won the second prize. Many interesting examples were received. These efforts show how risk assessments prepared by people working together can become powerful educational tools to raise the level of public awareness about disaster risks that they all share.



Future challenges and priorities

The notions of hazard, vulnerability and capacity form the basis for an effective strategy of risk reduction and the operational basis for a culture of prevention.

The following challenges and priorities are critical areas of concern for the whole disaster reduction enterprise. These are:

- Risk assessments for decision making.
- Terminology, data and methodology.
- Higher visibility and priority to reduce vulnerability and strengthen capacities.
- Addressing new trends in hazard and vulnerability.

Risk assessments for decision making

An overall challenge is to review and document how risk assessments have contributed to modify risk and how they are being utilised in the decision making process.

Terminology, data and methodologies

Data is the primary input for identifying trends in hazards, vulnerability, as well as feeding the risk assessments and disaster impact analysis. For many countries, data relevant for risk analysis are unavailable, or their quality and accuracy do not reflect a comprehensive picture of the situation at hand. There is a need to work towards the standardisation and systematisation of all issues related to the accuracy/technical soundness, political neutrality, methodologies and processes related to the collection, analysis, storage, maintenance and dissemination of data.

In terms of methodologies, there are many different conceptual models attempting to examine the same things. Still, one of the major issues, is how hazards, vulnerability and risk assessments can actually be used, in practice, to reduce risk. Mechanisms of integration are needed so that issues and proposed remedial initiatives are not fragmentary when presented to decision-makers.

Higher visibility and higher priority to reduce vulnerabilities and strengthen capacities

Reducing vulnerability to risk still falls mainly under the responsibility of the public authorities. Data regarding disaster impact, especially concerning small and medium scale disasters and of the social and environmental considerations, is still lacking. Political authorities usually see economic considerations as highly influential in their decision making. Without


the quantitative measurement on a realistic and all encompassing picture of risk, it is difficult for political decision-makers to acknowledge and factor in these considerations into their legislative mechanisms and into development planning efforts. Following this, fiscal commitments need be specified in national budgets.

The acknowledgement of capacity, as a key factor in the disaster risk formula, needs to be followed by the further enhancement of a conceptual framework to assess this factor. The incorporation of vulnerability and capacity into tools such as risk indexes, along with clear targets or benchmarks and indicators, will engage the work towards highlighting disaster risk efforts. The Global Risk Vulnerability Index under development by UNDP, as well as the framework to monitor progress on risk reduction, being developed by ISDR, are good examples of current efforts towards that objective.

Addressing new trends in hazards and vulnerability

At this point, recognition and in depth analysis of the changing nature of hazards and vulnerabilities is needed. The influence of ecological imbalances such as climate change is affecting the frequency and intensity of hazardous natural phenomenon. Additionally, environmental degradation is exacerbating the impact of natural hazards. Risk assessments need to reflect the dynamic and complex scenarios to properly feed into disaster risk reduction strategies. Multi-hazards and comprehensive vulnerability/capacity assessments that take into account the changing patterns in disaster risk are departing points for raising risk awareness at all scales. Conventional ways to identify, monitor, evaluate, cope and recover from risks are currently challenged with emergent new trends in hazards and vulnerability.

The emergent trends in hazards and vulnerability described in this chapter accounts for a major and new source of uncertainties to the overall assessment process of disaster risk. These changes affect not only the formal procedures of risk assessment in place, but the prevailing patterns of risk perception too. Particular knowledge or experience capitalised by communities and people, by means of long exposure to classical sources of hazards, have now been challenged by complex and new forms of danger. The repercussions of environmental degradation on current vulnerability and hazard patterns and the increasing exposure to technological hazards, as well as new forms of unprecedented hazards, raise a different range of concerns. An integrated and effective process of risk assessment needs to engage these challenges to truly provide the foundation for disaster risk reduction in the 21st century.



Chapter 3

Policy and public commitment: the foundation of disaster risk reduction

- 3.1 Institutional frameworks: Policy, legislation and organizational development for national and local decision-making
- 3.2 Regional cooperation, interaction and experience
- 3.3 Community action



Community scale model to identify hazards and vulnerabilities from Canton Daule, Ecuador, Red Cross, Guayas

3.1. Institutional frameworks: Policy, legislation and organizational development for national and local decision-making

Disaster risk management needs to be motivated and based within governmental responsibilities, but its success cannot be accomplished without the benefits of widespread decision-making and the participation of many others. Leading policy direction is crucial and legal foundations assure a continuing legitimacy, but it is the professional and human resources delivered on the ground that are a measure of success. For this to happen, there must be a systematic approach to relate local decision-making processes with larger administrative and resource capabilities such as those devised in provincial or state and national disaster plans and risk reduction strategies.

The various roles which policy determination, legal processes and the resulting evolution of organizations play in creating a sustained, public administration environment sensitive to the identification and management of risk are reviewed in this section. As both conditions and needs vary with geography, as well as with a wide range of professional interests involved, some of the selected examples of these institutional frameworks are presented in broadly described regions, while others will reflect more topical emphasis. In all the cases though, the institutional processes involved and organizational lessons cited may hold a much wider appeal and relevance to emerging initiatives elsewhere. The discussion proceeds through the following headings:

- Introduction to emerging institutional frameworks for disaster reduction
- Policy frameworks in practice
- National planning processes, with multi-sectoral responsibilities and local participation
- Risk reduction plans, linked to specific responsibilities, policies, and practices

Introduction to emerging institutional frameworks for disaster reduction

The IDNDR programme not only provided an institutional framework for countries, but also introduced basic concepts of disaster reduction to administrators and professionals. It started the task of shifting policy emphasis from post-disaster relief and rebuilding to a more proactive approach of disaster preparedness and mitigation.

This began a new era in disaster and risk reduction concepts, with an important role assigned to national planning and legislation. Many countries prepared national action plans for disaster risk management and presented them to the World Conference on Disaster Reduction held in Yokohama, Japan, in 1994. Subsequently countries have been able to report on their activities at regional or sectoral meetings and at the concluding IDNDR Programme Forum in 1999.

For a long time, the state was considered the centre of all authority as well as action in deal-

ing with disasters. Communities were considered generally unaware of the hazards they faced. As a result, disaster management was most often understood as providing relief to victims, aiding recovery following an event, and rebuilding damaged infrastructure. As people tended not to think so much about disaster reduction strategies beforehand or how to reduce risk to disasters, politicians and official authorities have tended to rely heavily upon emergency assistance whenever the need arose. These outlooks also have been perpetuated by the extent of international funds and local emergency allocations that easily become available *after* a disaster rather than before.

Historically there have been many fewer resources devoted to routine hazard identification and assessment activities or to support sustained risk management strategies in areas of known and recurrent natural disaster risks. This may result from an institutional lack of appreciation for public safety and the economic values of prevention in contrast to the cost of replacing lost assets. Alternately, it may reflect



the persistent difficulty in demonstrating cost-efficiencies involved in saving lives and public property from disasters before they occur. Nonetheless, it remains that the relative economies of disaster reduction are most commonly aired in public discussions following disasters.

While disaster management and response coordination can benefit from centralized command there is a need to decentralize disaster risk reduction. Along with the decentralization of power and devolution of governing authority, disaster risk reduction at the local community level needs to be encouraged, and supported. The decentralization of responsibility for disaster risk reduction has to be coordinated by municipalities, townships, wards or local communities. Mutual understanding and rules and regulations should be explicit, transparent and uniform. This requires a new structural arrangement in which national authorities of countries, UN agencies, bilateral development agencies and financial institutions implement projects in risk reduction not only with national governments but also with local authorities, the pri-

vate sector, academic institutions, community-based organizations and NGOs.

However, there are currently few local institutions ready to fill the vacuum to assist communities in owning and internalising the process of risk reduction, in terms of concept, knowledge, and implementation. Almost all countries or local communities have a designated authority responsible for responding to crisis situations when they happen; many fewer have a recognized office or agency charged with monitoring potential risks to the society and motivating concerted public and private action to minimize their potential consequences.

Such a change in the emphasis of governmental functions requires that a consensus be developed on the respective roles of government agencies, commercial interests, communities and individuals themselves. Governments have vital roles to play in disaster risk management that must vary according to each of their respective needs and conditions, but there is now widespread recognition that they must focus their limited resources and serve as co-ordinating bodies if they are to become more effective.

The following functions are important means by which governments can integrate disaster risk awareness into official responsibilities. They also can be used to involve more people and additional interests in managing those risks:

- Generate and disseminate basic public information widely about the most likely hazards to affect a country or specific community, along with measures on how to reduce the risk
- Develop integrated professional and institutional abilities for the anticipation, assessment, management, and response aspects of disaster risks within the ongoing social, economic and environmental dimensions of the society.
- Support opportunities that enable scientific, technical and academic institutions to contribute to national disaster risk management policies and practice, and convey the utilisation and application of research findings.
- Encourage the combined participation of government agencies, technical specialists and local residents in the conduct of risk assessments.
- Develop and ensure the public understanding, acceptance and use of standards and codes designed for the protection of private and public assets and critical infrastructure.
- Promote and encourage public participation in the design and implementation of risk and vulnerability strategies at local and national levels.



Policy frameworks in practice

● Asia

Disaster risk management is a concept that is interpreted differently in various Asian countries. There is a wide variation among the primary ministries or national agencies designated to assume disaster management responsibilities in different countries. This reflects either the predominant types of hazards which threaten individual countries, or else stems from an historical outlook of what has commonly constituted disaster management responsibilities. Until a recent change taking place in 2002, for almost 50 years the central national authority for disaster management in India had been located within the Ministry of Agriculture, reflecting that country's historical concerns with flood, drought or famine. As elsewhere, until recently, most government institutions tended to concentrate on the emergency services associated with post-disaster rescue, relief, reconstruction and rehabilitation, as well as maintaining public law and order during times of crisis.

Concepts of risk management have begun to take hold in some Asian countries at national levels. Thailand is poised to revamp its disaster management system and plans to set up a new department of disaster management in the Ministry of Interior from October 2002. Both Laos and Cambodia have established or reconfigured their respective national disaster management offices with encouragement and support from UNDP and other international organizations. The Philippines is considering new legislation to widen the scope of its existing Office of Civil Defence and the *National Disaster Coordinating Council*.

Viet Nam has undertaken a major sustained effort to formulate a 20 year strategic plan for disaster risk management. This effort has been steered largely by in-country expertise and was reviewed in an international consultation held in March 2002. Following the establishment of its *Disaster Management Bureau* in the renamed *Ministry of Disaster Management and Relief* in 1992, the government of Bangladesh is proceeding to develop and progressively implement a comprehensive disaster management program during 2000-2002. Increasingly, more Asian countries are also including some

reference to disaster risk reduction in their national development plans. Over the last decade, UNDP has supported capacity building projects for disaster risk management in over ten Asian countries.

Two additional examples can be cited from countries in Asia, which together account for almost a third of the world's population: India and China. These countries share many of the same types of hazards spread over vast land areas and have adopted approaches for centuries that have taken risk into account in a variety of technical endeavours. While both countries are populated by people with many different cultural outlooks, each of them has different structures of government. Tellingly, they have each demonstrated renewed commitments in recent years to reorient their national strategies of disaster management to take greater account of the benefits to be derived from disaster risk reduction.



Case: India

As the Indian sub-continent is highly vulnerable to natural and related disasters, with losses mounting every year, government authorities in India have recognized the pressing importance of developing more effective disaster management policies. At the operational level, there have been equal concerns to strengthen related organizational arrangements that can lessen the widespread impacts of disasters such as by updating state codes, manuals and disaster plans on the basis of experience gained and taking account of technological developments. Initiatives have been taken to conduct comprehensive revisions of disaster policies giving greater attention to reducing risk factors in the state of Maharashtra following the devastation

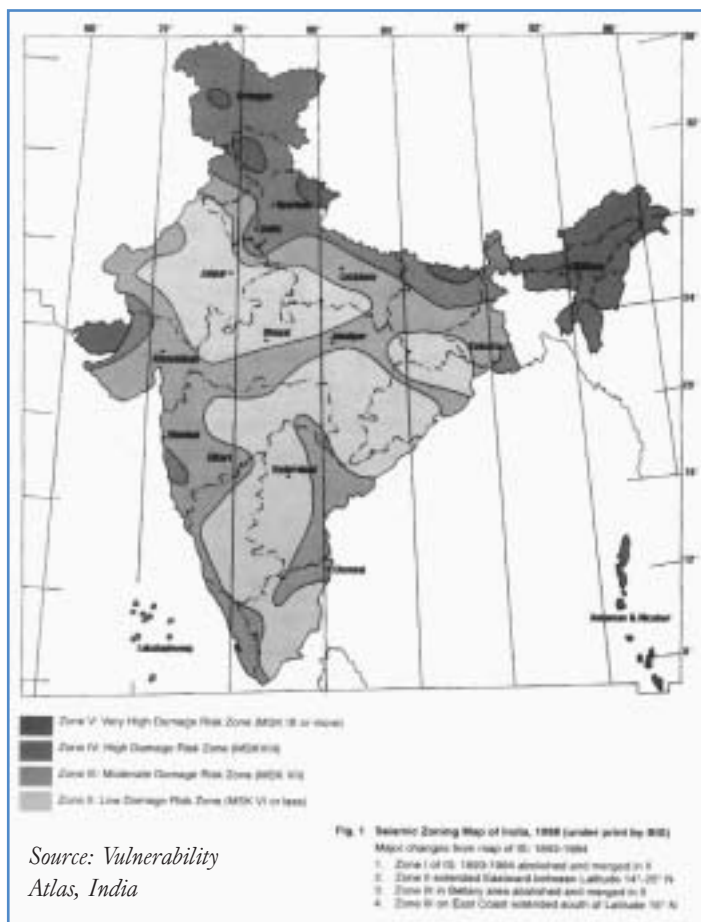
of the Latur earthquake in 1997 and in the state of Uttar Pradesh in 1999. The creation of the new state of Uttaranchal has provided the opportunity to reconsider the most appropriate forms of disaster management structures for its mountainous topography. The rapid and severe repercussions of the more recent destruction resulting from the 1999 cyclone in the state of Orissa, and then the Bhuj earthquake in 2001 in the state of Gujarat have spurred a similarly intensified commitment to alter the long-stand-

In proceeding beyond its original mandate confined only to the preparation of plans for natural disasters, the HPC-DMP recommended that the human dimension of disasters also needed to be included in adopting a more holistic approach to disaster management planning. As a result, additional considerations will be extended to include forecasting and warning systems, public awareness, proactive measures to reduce risk in development programmes, development of human resources, information technology, networking and coordinating organizational relationships, and updating building codes and practices.

A *National Centre for Disaster Management* has been engaged to undertake human resource development studies, to develop a database and to provide documentation in the area of natural disaster mitigation and preparedness. These institutional developments and expanded outlooks go well beyond the more immediately obvious concerns first associated with the need for updated emergency control rooms and improved response mechanisms that will also be considered in the comprehensive review.

The HPC-DMP has demonstrated a high-level government commitment in forming a *National Committee on Disaster Management* constituted under the chairmanship of the prime minister and comprising the heads of all the national and provincial political parties. The committee, which also includes technical specialists, respected academicians and key civil servants, has been tasked to suggest short, medium and long-term steps for strengthening relief and rehabilitation capabilities and to identify measures that can reduce natural calamities in the future.

The work program is striving to involve an expanded range of professional interests ranging from the responsibilities of local government, revenue allocation and insurance, through the practice of engineering, public works, education and public administration. More than 30 different hazards have been identified by the HPC-DMP, and nodal ministries have been engaged to work on national plans for the potential disaster risks related to water and climate, geology, industrial and nuclear activities, transportation accidents and biological threats. Even though the HPC-DMP's mandate is to produce plans, it has embarked on an inclusive planning



ing relief commissioner system and to revise national policies of risk reduction. A *High Powered Committee on Disaster Management Plans (HPC-DMP)* has been constituted with the approval of the Prime Minister to:

- Review existing arrangements for preparedness and mitigation of natural and human induced disasters including industrial, nuclear, biological and chemical disasters.
- Recommend measures for strengthening organizational structures.
- Recommend a comprehensive model for disaster management at national, state and district levels.

process that emphasizes the participation of all relevant organizations and sectors. This systematic approach devolves disaster management planning activities from strictly a national concern to one involving state, district and local officials.

A decision was taken by the Indian government in early 2002 to alter almost 50 years of practice by relocating all matters regarding disaster and risk management to the Ministry of Home Affairs. This reflects a departure from the previous association of natural disasters with the predominant concerns of food supplies and agriculture and signals a promising opportunity to engage many additional functional responsibilities and authoritative aspects of government. As the influential Ministry of Home Affairs is directly responsible for the coordination and management of the operational aspects of government, and its influence proceeds from national direction of the civil service all the way down to local levels of implementation of government policies, this is an important step to integrate disaster risk management issues more fully into many more national planning processes.

Case: China

China presents another approach yet also displays similar emphasis. During the course of the IDNDR, the Chinese government recognized that working for disaster reduction would require a long-term commitment and it has worked with dedication and political commitment at the highest levels of responsibility to fulfil those objectives by actively responding to the direction of UN/ISDR.

The Chinese government established the *Chinese National Committee for International Disaster Reduction (CNCIDR)* in October 2000 consisting of 30 official agencies, including the State Council, ministries, national committees and bureaus, the military services and additional social groups. CNCIDR is an inter-ministerial coordinating institution led by a State Councilor responsible for designing a national disaster reduction framework, developing guiding policies, coordinating relevant departments in the conduct of specific programs, and supervising disaster reduction works undertaken by local

governments. An additional advisory group of 28 senior experts in relevant fields has been formed to provide guidance to the national committee especially on applying science and technology in realizing disaster reduction initiatives. The office of CNCIDR and its secretariat are located in the Ministry of Civil Affairs.

By embracing the importance of disaster reduction activities, China has proceeded to integrate the subject into overall national economic and social development planning. The core element of this process is the progressive implementation of the *National Disaster Reduction Plan of the People's Republic of China (NDRP)* running from 1998 to 2010. The NDRP was launched by the Chinese government in April 1998, and significantly, it was formulated on the basis of the overall national development policies reflected in the "Ninth Five Year Plan for National Economic and Social Development", and the "2010 Prospective Target Outline" for national accomplishments. The formulation of the plan received important support and technical assistance from UNDP, further demonstrating the essential links between disaster risk reduction and national development interests.

It is very important for China to form an overall legislative system that relates to disaster reduction, and the experience of other countries would be invaluable. To do this will require financial and technical support from UNDP and other channels.

China response to ISDR questionnaire, 2001

The NDRP was based on several fundamental policies that demonstrate both the breadth and the depth of interests that have been marshalled to develop and implement a national strategy for disaster reduction. The primary orientation of the strategy of disaster reduction is to serve the advancement of national economic and social development. In this respect, a principle has been formulated to assign the top priority to disaster reduction activities, while also recognizing that there will still be the requirement to combine these with disaster response and emergency relief efforts at the time of crisis. A focus is to be placed on key elements of disaster reduction work, while keeping a view throughout on the long-term strategic objectives of disaster reduction.



The roles of science, technology and education are considered to be of particular importance in building disaster reduction into a national concept. To succeed, it will be essential to encourage the involvement of all elements from the national and local governments and the fullest possible participation from all the professions and trades, working together. It will also remain important for China to be closely involved with international developments in disaster reduction and therefore must strive to strengthen its own efforts of international exchanges and multinational cooperation in the field.

Objectives outlined by the NDRP include efforts to:

- Develop a set of projects which are of importance to advancing the social and economic development in China.
- Increase the application of scientific and technical experience and the benefits of new achievements in disaster reduction work.
- Enhance public awareness and knowledge about disaster reduction.
- Establish comprehensive organizational abilities and operational structures for realizing specific activities in disaster risk reduction.
- Reduce the impact of natural disasters on national economy and social development, as measured by an obvious reduction in the direct economic losses caused by natural disasters.

The NDRP has also outlined specific tasks, measures and key activities that should be pursued nationwide. In this respect, one of the most important works for CNCIDR is to implement the plan first at provincial levels, and then also at local levels of responsibility. Several provinces have issued mid-term plans on disaster reduction in their specific areas, as can be seen in the Provinces of Guangdong, Jiangxi, Yunnan, and Shanxi. In others, such as in Heilongjiang, the national government is working closely with the provincial authorities to initiate a local program strategy.

In order to further the implementation of the NDRP, the CNCIDR is organizing a number of meetings at senior levels to share experiences among the provinces and to discuss the guidelines on forming local disaster reduction plans with officials drawn from different sectors.

China's response to the ISDR secretariat questionnaire in 2001 also cited that one of the most important issues to be addressed was to improve capacity building, especially in terms of early warning systems, the development of resilient infrastructure and the application of technologies to form a safer society.

In many Asian countries, however, a lack of uniformity in policy approaches remains regarding the various aspects of disaster management allocated among different ministries. This also poses additional hindrances for improving regional or sub-regional cooperation. It is unlikely that the Home Ministry of Nepal, the national focal point, could have developed the degree of interaction and understanding desired with its comparable national disaster focal point in India, previously located in the Ministry of Agriculture.

The prominent involvement of the water authorities, and the additional policy concerns of the Ministry of Disaster Management and Relief in Bangladesh further complicate the potential for effective relationships in such matters. This would be useful since the cause and progress of floods can easily affect all three countries. Furthermore, all three countries have additional ministries and related technical agencies concerned with water resources as well as environmental affairs. This represents a serious and growing impediment as one accepts that many natural hazards and disaster conditions affect more than one country, or involve the skills and technical abilities of many professions.

These conditions underlines the challenges posed when decisions taken in one location can easily impact the scale of consequences in neighbouring countries, or even among different socio-economic segments of the population in the countries. More informed and considered efforts are required to bring these various professional specialists and civil authorities together, other than just through occasional international meetings, if a coherent disaster risk management strategy with local public relevance is to be realized in practice.

In recent years, many countries in Asia have updated existing acts and regulations related to disaster management. The following table demonstrates the current state of administrative and legal arrangements for disaster risk management throughout the region.

Country	Focal point for disaster management	National action plans	State and provincial disaster reduction plans
Bangladesh	Ministry of Disaster Management and Relief, Disaster Management Bureau	<ul style="list-style-type: none"> • National Disaster Management Plan • Standing Orders on Disaster 	<ul style="list-style-type: none"> • Operation Sheba: relief and rehabilitation plan for districts of Chittagong, Cox's Bazar, Noakhali, Feni, Laxmipur, Rangamati, Khagrachhari, Bandarban. • Flood Action Plan
Bhutan	Ministry of Home Affairs	<ul style="list-style-type: none"> • No plan exists. Disaster management issues are contained to a limited extent in the National Environmental Strategy of 1989 and in Bhutan Building Rules of 1983. 	
Cambodia	National Committee for Disaster Management	<ul style="list-style-type: none"> • No plan exists except the five year strategy plan for the development of the National Committee for Disaster Management. 	
China	China National Committee for International Disaster Reduction	<ul style="list-style-type: none"> • The National Natural Disaster Reduction Plan of the People's Republic of China • Laws of People's Republic of China on Protecting against and Mitigating Earthquake Disaster 	
Hong Kong		<ul style="list-style-type: none"> • Hong Kong Contingency Plan for Natural Disasters 	
India	National Committee on Disaster Management, Ministry of Home Affairs	<ul style="list-style-type: none"> • High Powered Committee Disaster Management Plans • National Contingency Action Plan • Drought Contingency Plan 2000 	<ul style="list-style-type: none"> • Action plan for reconstruction in earthquake affected Maharashtra. • Anti-disaster plan for the state of Tamil Nadu. • Cyclone contingency plan of action for the state of Andhra Pradesh. • Action plan for reconstruction in earthquake-affected state of Gujarat. • Contingency plan for floods and cyclones in Chennai. • District disaster management action plan for Nainital. • Village Contingency Plan, 2002 (OXFAM Trust, Hyderabad).
Indonesia	National Natural Disaster Management Coordinating Board (BAKORNAS PB), Ministry of Peoples' Welfare and Poverty Alleviation	<ul style="list-style-type: none"> • National Action Plan 	<ul style="list-style-type: none"> • Forest fire and haze disaster in Mount Merapi disaster management. • Tsunami disaster in Banuwangi.



Country	Focal point for disaster management	National action plans	State and provincial disaster reduction plans
Iran	Ministry of the Interior		<ul style="list-style-type: none"> UN System Disaster Response Plan (involves several ministries and the Red Cross & Red Crescent).
Japan	Cabinet Office	<ul style="list-style-type: none"> Disaster Countermeasure Basic Act, (basic plan for disaster reduction) 	<ul style="list-style-type: none"> Operational plans for disaster reduction, local plans for disaster reduction.
Kazakhstan	Emergency Agency of the Republic of Kazakhstan	<ul style="list-style-type: none"> National Plan 	
Korea, DPR	Ministry of Government Administration and Home Affairs		
Korea, Rep of	Korean National Disaster Prevention and Countermeasures Headquarters	<ul style="list-style-type: none"> Natural Disaster Countermeasure Act Fifth Basic Disaster Prevention Plan 	
Kyrgyzstan			
Lao PDR	National Disaster Management Office, Ministry of Labour and Social Welfare	<ul style="list-style-type: none"> Disaster Risk Management Plan 	
Malaysia	Central Disaster Management and Relief Committee, Inter-Ministerial Committee	<ul style="list-style-type: none"> National Haze Action Plan Flood Action Plan 	
Maldives	Ministry of Planning and Environment and National Council for Protection and Preservation of the Environment	<ul style="list-style-type: none"> National Action Plan 	
Mongolia	State Permanent Emergency Commission	<ul style="list-style-type: none"> Civil defence law Law on environmental protection Law on water Law on air Law on hydro-meteorological and environmental monitoring 	
Myanmar	Central Committee for Disaster Prevention and Relief, Ministry of Home and Religious Affairs		
Nepal	Ministry of Home Affairs	<ul style="list-style-type: none"> National Action Plan for Disaster Management 	<ul style="list-style-type: none"> Emergency preparedness and disaster response plan for the health sector

Country	Focal point for disaster management	National action plans	State and provincial disaster reduction plans
Pakistan	Disaster Preparedness and Relief Cell in Cabinet	<ul style="list-style-type: none"> • National Disaster Plan • Karachi Emergency Relief Plan 	<ul style="list-style-type: none"> • Model district plan - disaster relief cell • Punjab provincial flood action plan • Earthquake plan for towns and cities in the seismic regions • Sind provincial disaster plan • Disaster preparedness plan Kasur Tehsil
Philippines	National Disaster Coordinating Council, Office of Civil Defence, Ministry of Defence	<ul style="list-style-type: none"> • National Calamities and Disaster Preparedness Plans 	<ul style="list-style-type: none"> • Contingency plan for Taal • Regional disaster preparedness plan for Tacloban City • Contingency plan for Mayon volcano
Singapore	Ministry of Home Affairs, Singapore Civil Defence Force and Singapore Police Force	<ul style="list-style-type: none"> • Civil Defence Act • Emergency or Contingency Plan • Fire Safety Act • Civil Defence Shelter Act 	
Sri Lanka	National Disaster Management Centre, Ministry of Social Services and Housing Development	<ul style="list-style-type: none"> • National Disaster Management Plan 	<ul style="list-style-type: none"> • Coastal environmental management plan for the west coast of Sri Lanka • Major disaster contingency plan
Tajikistan	Ministry of Emergency Situations and Civil Defence	<ul style="list-style-type: none"> • Joint plan with Russian Federation until 2005 	
Thailand	National Civil Defence Committee, Ministry of Interior	<ul style="list-style-type: none"> • National Civil Defence Plan 	
Turkmenistan			
Uzbekistan		<ul style="list-style-type: none"> • Disaster Management Plan 	
Vietnam	Department of Dyke Management and Flood Control (DDMFC) of the Ministry of Agriculture and Rural Development. Secretariats of the Central Committee for Flood and Storm Control responsible for emergency responses to disastrous events.	<ul style="list-style-type: none"> • Strategy and Action Plan for Mitigating Water Disasters in Vietnam 	

● The Americas

A major shift is now taking place in many countries in the Americas, from the north to the south. As mentioned in Chapter 1, the combination of extremely severe social, economic and environmental consequences associated with several disasters in the final years of the 1990s provided stark and unavoidable lessons to leaders in the region.

Both official and public outlooks about disasters in Latin America and the Caribbean countries prior to 1990 concentrated almost exclusively on developing humanitarian response and improving preparedness capacities, linked to civil defense or military institutions.

The 1990s would see some important institutional changes in emphasis and priorities, starting already in 1985 in Mexico and Colombia after a major earthquake and volcanic eruption respectively. Disaster reduction issues, expressed through terms of prevention and mitigation and given a higher status in political and technical discourse, although this was not transferred into significant changes or real action during much of the decade. Most official disaster organizations created prevention offices in name, but their roles were limited essentially to strengthening efforts in disaster preparedness, conducting basic hazard mapping or promoting early warning systems at national scales. Few human or financial resources were committed and existing legal and institutional arrangements impeded any major changes. This is now slowly changing supported by a regional process, as discussed in section 3.2.

Case: Central American countries

Linking risk reduction with development policies and environmental concerns is common in several Central American countries, especially where the severe effects of hurricane Mitch decimated earlier investments made in national development.

In 1996, Guatemala reformed its disaster legislation and created the *National Coordinator for Disaster Reduction (CONRED)* comprising a supervisory council of representatives from different development departments, disaster

response agencies, and civil society. While serving neither as a single organization nor a system, CONRED was given an expanded range of responsibilities in the field of risk reduction, and has provided a focal point for expanded attention to risk issues. By working together with the Ministry of Planning, a *National Risk Reduction System* is being established and efforts are underway to incorporate multi-sector risk reduction strategies into the country's *National Poverty Reduction Plan*. These activities complement the longstanding *Disaster Response Division and an Emergency Operations Centre*.

In recent years, aided by UNDP, Nicaragua has developed an expanded approach for a *National Program for Risk Reduction* and has designed a new disaster risk management strategy. First, studies were commissioned to analyse the Nicaraguan legal framework for disaster management and the implications regarding government, municipalities, the private sector and citizens. Early in 2000, the Nicaraguan National Legislative Assembly passed a new law creating the *National System for Disaster Prevention, Mitigation and Attention* and officially established the *National Risk Reduction Plan* as a central operational instrument. As seen elsewhere, the institutional concept was built upon a broad and comprehensive approach to risk reduction issues, but one that is intended to be implemented on a decentralized basis. The strategy and the legislation are considered by some commentators to be the most advanced examples for disaster reduction in the region at the present time. Both Swiss bilateral development assistance and World Bank support have been enlisted to strengthen the provision of technical abilities and to augment human resources. While the implementation of the process can benefit by drawing on the combined experiences of the *Civil Defence Organization* and the *Nicaraguan Institute for Territorial Studies*, the key to future success will be the extent to which productive relationships can be forged with other key government departments and development agencies.

Case: Canada

In part spurred on by the social and economic consequences of a particularly severe ice storm in 2000, the Canadian Prime Minister

announced the creation of the *Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP)* in February 2001. The office was established to enhance the protection of Canada's critical infrastructure from disruption or destruction, and to act as the government of Canada's primary agency for ensuring national civil emergency preparedness. Critical infrastructure (which includes energy and utilities, communications, services, transportation, safety and government) constitutes the backbone of the nation's economy, and is essential to the health, security, safety and economic well-being of all Canadians and to the effective functioning of government.

The Minister of National Defence is responsible for this organisation, which encompasses all the responsibilities of the previously named *Emergency Preparedness Canada (EPC)*. With a necessarily broader mandate than the EPC, OCIPEP takes an all-hazards approach, recognizing that different hazardous events can have similar impacts. The office provides national leadership to help ensure the protection of infrastructure, in both its physical and cyber dimensions, regardless of the source of the threat. This includes developing and promoting activities which reduce vulnerabilities against various threats and thus mitigate the impacts of disasters.

OCIPEP seeks to enhance the capacity of individuals, communities, businesses and governments in Canada to effectively manage risks to their physical and cyber environments. Although OCIPEP is a new organization, its responsibilities relating to civil emergency preparedness and planning have a long history. Through the former EPC, a great deal of experience in preparedness, response and recovery activities have been gained, resulting in Canada's increasingly comprehensive ability to cope with emergency situations. Mitigation, while an important part of disaster management, has largely been an implicit requirement. There have always been efforts across the nation to mitigate disasters, including land use zoning guidelines and structural protective features such as the Red River Floodway in Manitoba. These mitigating actions have a common thread: they reduce the probability of a calamity or limit the effect of a disaster should it happen.

However, it had been recognised by various groups and individuals, that there existed a need to address hazard mitigation in Canada in a more explicit and systematic way. A National Mitigation Workshop was hosted by EPC and the Insurance Bureau of Canada in 1998, attended by academic, private sector and government representatives. It concluded that a comprehensive national mitigation initiative would be a positive step towards the long term goal of reducing vulnerabilities to, and losses from, disasters. These ideals have been reinforced by participants of the ongoing *Canadian Natural Hazards Assessment Project (CNHAP)* in which a community of scientists, scholars and practitioners in the natural hazards and disasters field came together early in 2000 to begin a major new examination of the national understanding about the causes and consequences of natural hazards and disasters.

In light of a number of multidisciplinary discussions regarding emergency management and disaster reduction, the Government of Canada announced in June 2001 that OCIPEP will lead consultations on the development of a *National Disaster Mitigation Strategy (NDMS)*. These consultations will include all levels of government, private sector and non-governmental stakeholders, in order to solicit their input and participation in defining the framework for this new national strategy. This important step is being taken in the recognition that new measures should be developed "to save lives, reduce the impact of disasters and the resulting damages and costs to the Canadian public".

As a part of this process OCIPEP intends to issue a discussion paper to help stimulate discussions regarding the NDMS, in the hopes of obtaining views from various stakeholders on the possible scope, policies and mechanisms for coordinating and implementing a national strategy. Meanwhile, the federal government continues to conduct interdepartmental discussions about federal mitigation activities, through an Interdepartmental Mitigation Coordinating Committee. Participants include representatives from all relevant federal departments who are reviewing preparedness and mitigation initiatives and conducting analysis to identify areas where additional attention is needed.



Case: Colombia

The *National Plan for the Prevention of Disasters*, promulgated in Colombia in 1998, gave little attention to anticipatory measures or specific risk reduction practices during non-crisis situations. More recently, however, the *National Council for Social and Economic Policy* has incorporated disaster reduction measures explicitly into the individual sectoral plans of the National Development Plan. Accordingly, in 2001, the National Council for Social and Economic Policy developed a strategy to initiate the short-term and medium-term execution of the *National Disaster Prevention and Management Plan*.

A shift in political approach

Following the eruption and mudslide of Nevado del Ruiz in 1985, **Colombia** has been a pioneer in promoting a systematic approach to integrated disaster management. The creation of a National System for Prevention and Response to Natural Disasters in 1989 demonstrated a shift in institutional responsibility for natural disasters, from a strong focus on response to one of more preventive action.

The 1999 earthquake in Armenia, in the coffee belt of Colombia, and the creation of FOREC for the reconstruction effort (Sasakawa Award 2000, see chapter 4.2), provided the opportunity to further enhance institutional and technical capabilities. The experience of FOREC has become a very relevant model and success story useful as a reference for similar situations in other places.

The strategy is an example of a comprehensive initiative to improve the National Plan for the Prevention of Disasters. It “outlines the work to be advanced for the following three years and establishes the first steps for the consolidation of the National Plan in the medium-term. It identifies the objectives of action and the responsible individuals, expediting the National Plan’s work in mitigating natural disasters and their levels of risk in Colombia. Additionally, this national effort seeks to meet the goals of the UN-ISDR and to comply with the initiatives of the Meeting of the Americas in the framework of the Andean Community.”

The National Council for Social and Economic Policy has cited four accomplishments

that have to be met if its strategy is to be implemented successfully:

- Strengthen public awareness campaigns on natural disasters.
- Initiate regional and sectoral planning for disaster prevention.
- Institutionalize the national disaster prevention and management plan.
- Communicate the national plan to the public and to the authorities.

This updated and revitalized strategy was approved by the President of Colombia as well as by the country’s National Planning Department and all the relevant ministries of interior, economic development, finance and public credit, agriculture and rural development, education, health, environment, energy, communications, transportation, labour and social security, culture and national defence. Most importantly, this strategy is linked to budgetary allocations within the respective institutions.

One example of the strategy’s implementation in practice can be seen in the city of Manizales where a local environmental action plan has been established through widespread consultation with the community. The plan is integrated into the municipality’s development plan and budget, and includes specific measures to reduce the risk of landslides and seeks to relocate the population living on steep slopes. These programmes are also linked to the development of ecological parks some of which are located on slopes too dangerous for settlements, and others have been integrated into the city’s watershed thereby protecting their important economic functions.

Case: Bolivia

In Bolivia too, a comprehensive national policy for prevention and risk management has been established recently. Consistent with the intentions of the *Andean Regional Programme for Risk Prevention and Reduction (PREANDINO)*, the Minister of Sustainable Development and Planning has announced the government’s commitment to formulate policies and strategies for the incorporation of disaster prevention in the planning system through the *National Plan for Prevention and Risk Mitigation*. It is anticipated that mechanisms will be

established with necessary legislation in order to introduce elements of prevention with the various sectoral initiatives. In this regard, the work of prevention may be considered as complementary to the objectives of sustainable development.

The government has recently been pressing ahead with several national programmes aimed at incorporating prevention into the management of development activities, such as the *Programme for Risk Prevention and Reduction* financed by UNDP and the World Bank. Another programme financed by the German Agency for Technical Cooperation (GTZ) is the *Local Risk Management Programme*. In housing, the *National Housing Subsidy Programme*, financed by employer contributions, includes a *Prevention and Risk Mitigation Sub-Programme*. The Ministry of Agriculture, live-

stock and rural development is implementing a *National Food Security Monitoring and Early Warning System*, which will be responsible for monitoring the impact of natural disasters on agricultural production. UNESCO, working jointly with this ministry, is also progressing in its support for a programme linking developmental issues and the risk issues associated with the El Niño phenomenon.

Risk management has also been introduced in a guide to adapting municipal development plans, which is to be implemented in 30 pilot municipalities. These will ensure that municipal plans for risk prevention and mitigation will be in line with national and sectoral policies. Manuals are being prepared on how to draw up municipal plans for risk prevention and mitigation in relation to town and country planning, human settlements and environmental management.

Institutional Framework	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
<p>Bolivia</p> <p>A national policy for prevention and risk management was established in 1999. Official statements on prevention at national level are ad hoc and relate mainly to prevention programmes during rainy periods or associated with health and agricultural campaigns. With reference to the PREANDINO, the Minister of Sustainable Development and planning (MDSP) has announced the government's commitment to formulate policies and strategies that incorporate prevention into the planning system through the national plan for prevention and risk mitigation.</p> <p>Formal decisions: The MDSP has been made legally responsible for the development of prevention policies. Some ministries such as housing have incorporated this policy in some of their normal activities.</p>	<p>The government has recently advanced several national programmes to incorporate prevention into development practices, such as the Programme for Risk Prevention and Reduction financed by UNDP and the World Bank. Another programme, financed by GTZ, is the Local Risk Management Programme. In housing, the National Housing Subsidy Programme, financed with 2 per cent of employer contributions, includes the Prevention and Risk Mitigation Sub-Programme. The Ministry of Agriculture, Livestock and Rural Development is implementing the National Food Security Monitoring and Early Warning System, which is responsible for monitoring the impact of natural disasters on agricultural production. PREANDINO promotes the coordination of all initiatives, for which it is supposed to establish frames of reference through the national plan, by identifying policies, programmes and projects of national interest and defining policies to frame national measures. UNESCO, jointly with the MDSP, is supporting a programme in connection with the El Niño phenomenon.</p>	<p>There are plans in the health and agricultural sectors but they are focussed mainly on relief. In the health sector, there is a preparedness and response plan and in agriculture, the ministry has drawn up an agricultural emergency plan. National and sectoral plans initiated within the context of PREANDINO are being prepared. There has not yet been any progress with land use plans.</p>	<p>Proposals for prevention have not yet been incorporated in the development plans because they have been formulated only recently. Some sectoral measures, as in agriculture, include proposals for reducing vulnerability. They have not, however, been integrated into plans for development. Guidelines are being prepared to incorporate prevention into local plans.</p>

Institutional Framework	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
<p>Colombia</p> <p>There has been a national policy on prevention and risk management since 1989, encompassed in Presidential Directive No. 33 of 1990 and Education and Health Ministry Orders No. 13 of 1992 and No. 1 of 1993.</p> <p>Formal decisions: The National Plan for Disaster Prevention and Management was established in Decree 919 of 1989 and Decree 93 of 1998. The present government's national development plan includes a chapter on prevention and risk mitigation. The prevention decision is a state decision. The policy is maintained even though national governments change.</p>	<p>Until very recently there was no commitment at high political levels to promote the preparation of departmental and municipal disaster prevention and management plans. Presently, in the context of PREANDINO, there is considerable commitment by the National Planning Department and some deputy ministers. This is reflected in the National Economic and Social Policy Council and in plans which will provide for a national effort to consider prevention in development plans and actions. In higher education, risk management issues are being promoted as an element of the basic syllabus.</p>	<p>There are specific plans, such as the plan for the El Niño phenomenon and specific contingency plans. Little attention is given to undertaking planning exercises during periods of no apparent threat. Plans are more typically considered in new situations when a phenomenon is imminent.</p>	<p>Prevention has not been incorporated in the sectoral plans or in the National Development Plan. Within individual sectors, energy and health have shown progress, in the latter case, mainly at decentralized levels. Most departments and capital cities included the subject in the government plans during changes of administration in 2001. Many references are, however, strictly rhetorical declarations. Presently within the PREANDINO, all the institutions are working on preparations for a National Economic and Social Policy Council, with specific prevention proposals being considered in each development area.</p>
<p>Ecuador</p> <p>In recent years, official statements have been made showing the government's commitment to furthering prevention and risk management policies, mainly at vice-presidential and some decentralized levels, in connection with the problems of disasters. Within that framework, the national government has decided to strengthen the process of incorporating prevention in development through the participation of both national and sectoral working groups, no formal decision yet.</p>	<p>There has been no official promotion of prevention programmes. However, there is support for high-level initiatives promoted by international organizations.</p>	<p>Formally, there are no prevention plans. National and sectoral risk prevention plans are underway.</p>	<p>The President's Planning Office has integrated prevention issues into the national planning system. Although the National Plan was drawn up prior to these efforts, its incorporation is being promoted for inclusion in the plans of decentralized jurisdictions. This includes terms of reference for provincial development plans, which already include risk prevention aspects in the strategic planning process. However, plans are yet to be finalized.</p>
<p>Peru</p> <p>There have been no official statements on prevention during the past decade. Only prior to the 1997-98 El Niño episode were a few statements issued about actions taken to prevent damage. Currently, the subject has not been mentioned in official speeches, nor has it been mentioned in connection with the environment.</p> <p>Formal decisions: There are no formal decisions on prevention. However, the launching of the PREANDINO pro-</p>	<p>The Executive Committee for El Niño Reconstruction launched an Urban Mitigation Study Programme. Although lacking in legal endorsement, fifteen cities were studied with UNDP support until February 2001. PREANDINO promotes the incorporation of prevention in national and sectoral development planning.</p>	<p>There are no prevention plans. PREANDINO committees are preparing diagnostics for sectoral plans. There has been little progress with the National Prevention Plan, due to political changes.</p>	<p>There have been some very limited attempts to incorporate prevention issues within specific sectors. An institutional limitation is the country's lack of national planning bodies, although other channels have been identified through the public investment structures working with individual projects. There are local experiments in planning and the development of projects, for example, in the</p>



Institutional Framework	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
<p>gramme has been approved and organizations in four sectors have been invited to participate. This decision is not backed by legislation. Individual sectors formally decided to establish sectoral committees. There has been a National Civil Defense System (INDECI) since 1972 with responsibility for prevention, emergencies and rehabilitation. In 1997, the government decided to reactivate the multi-sectoral ENP Study Committee, a body that coordinates scientific institutions. This has been maintained and the decision has proven to be a good one. In 1998, the government transferred responsibility for mitigation work on rivers from INDECI to the ministry of agriculture.</p>			<p>basin of the River Rimac where Lima and eight other district municipalities have mitigation plans, emergency contingency plans and risk studies with microzoning maps. These municipalities regularly update their plans and keep the public informed in what is the most advanced experiment in local work. Lima and eight other district municipalities have mitigation plans, emergency contingency plans and risk studies with microzoning maps.</p>
<p>Venezuela</p> <p>Following the devastating mudslides in Vargas State in 1999, reference to prevention concepts being incorporated as part of development policy began to appear in national and municipal statements. The subject was also one of the main concerns of senior government spokesmen involved with reconstruction programmes. In general, official statements are made when events occur, and in connection with emergency operations if there are landslides.</p> <p>Formal decisions: Important steps are being taken to incorporate prevention in development processes. This is most evident in the health sector which has been attentive to these matters for some time, and has set up a maintenance programme for incorporating changes in school buildings. Immediately after the Vargas events in 1999, the ministry of science and technology (MCT) formally institutionalized a disaster risk management policy with tools for its implementation. Financing was provided to support risk management, preparedness and disaster relief strategies. The national government joined PREANDINO to coordinate and promote these activities at all levels, and is now working within that framework to define strategies. Some municipal bodies, such as those of Chacao, Sucre, Baruta, Maracaibo, Valencia and Alcaldia Mayor have formally decided to proceed with the incorporation of prevention in development management, even if in an isolated fashion.</p>	<p>The MCT has set up the Risk Management and Disaster Reduction Programme which takes an integral approach to support the inclusion of risk management into development planning and sectoral and local actions, despite its emphasis on scientific development and the introduction of technologies into all risk management and disaster relief processes. PREANDINO implemented a programme in December 2000 with objectives to coordinate the handling of disaster risks, to incorporate risk reduction issues into development policies and to support national, sectoral and local exchanges among countries. There are other sectoral programmes such as one to reduce vulnerability to socio-natural disasters in the education sector and another in the ministry of the environment and natural resources to prepare risk maps for land use planning.</p>	<p>There are no prevention plans but national and sectoral plans are in the process of being completed. There are some territorial initiatives but no prevention plans exist for municipalities.</p>	<p>A start has been to incorporate prevention issues in the National Development and Social Sector Plan as well as in a few regional plans that are under preparation. Initiatives in the utilities sector have partially incorporated prevention within certain subsectors such as hydroelectric power generation and in thermal power generation. Only very few municipalities have seismic microzoning and geodynamic risk maps for use in new techniques for municipal planning.</p>



Source: *Disaster Mitigation for Sustainable Livelihoods Programme, University of Cape Town*

● Africa

Case: South Africa

A methodical, if protracted, effort to develop a comprehensive national strategy for disaster risk management has been pursued in South Africa by reforming organizational structures and creating new legislation concerning disaster risk management. As so often happens, it was after a severe crisis – flooding in the Cape Flats in 1994 – that the government resolved to assess South Africa's ability to deal with disaster risk management. This initially involved a complete review of disaster management structures and policies. A year later, the cabinet recommended that a formal structure for disaster management be established. An initial National Disaster Management Committee was formed in 1996 with the intended function of coordinating and managing national disaster management policy. As that body never came into its own right, by mid-1997 the government approved the formation of an alternate Inter-Ministerial Committee for Disaster Management (IMC).

At this stage, a decision was taken to produce a *Green Paper on Disaster Management* for all levels of government (national, provincial and local) as the first tangible step to establish a formal disaster management policy for the country. It was tabled in February 1998 with the aim to ensure that a comprehensive disaster management system could be realized and implemented by means of a national strategy that would be more fully elaborated in a subsequent policy *White Paper on Disaster Management*. The *Green Paper* provided an important conceptual framework for disaster management and risk reduction. A year later in January 1999, the *White Paper* was able to build on these views by emphasizing the risk and disaster reduction issues highlighted by the international and regional trends at the time. The *White Paper* was developed within the framework of the IDNDR, and importance also was given to developing joint standards and common practices among the other 13 countries of the *Southern African Development Community (SADC)*.

Key policy proposals contained in the *White Paper* included:

- Integration of risk reduction strategies into development initiatives.
- Development of a strategy to reduce the most vulnerable communities.
- Legal establishment of a National Disaster Management Centre (authority).
- Introduction of a new disaster management funding strategy.
- Introduction and implementation of a new Disaster Management Act.
- Establishment of a framework to enable communities to be informed, alert and self-reliant and be capable of supporting and cooperating with government in disaster reduction activities.
- Establishment of a framework to coordinate training and community awareness initiatives.

Meanwhile, in order to address South Africa's immediate needs, an interim disaster management authority was composed with representatives from ten national departments. This was later converted into a *National Disaster Management Centre (NDMC)*. However, despite the fact that it has been operational since 1999, it has yet to become a statutory institution. An *Inter-Departmental Disaster Management Committee (IDMC)* was also established in the same year to ensure better coordination among government departments at national level. This, however, was intended as an interim measure until such time when the planned statutory structures contained in a Disaster Management Bill could become functional under a new Disaster Management Act.

Following the issuance of the *White Paper*, the first Disaster Management Bill was published for public comment in 2000. However, the initial enthusiasm and momentum shown by the government seemed to decline with numerous postponements of the tabling of the bill. After another severe crisis – this time, the devastating floods in parts of Southern Africa in 2000 – political priorities changed as the importance of disaster management policy and legislation resurfaced. The National Council of Provinces called for a disaster management conference in May 2000 to consider disaster management and reduction on a regional basis. After this conference, encouraged by funding from a bilateral disaster assistance agency, the South

African legislative process regained momentum and the bill was finally tabled for debate, with approval anticipated during the latter part of 2002.

During its lengthy review, the *Disaster Management Bill* has moved away somewhat from the earlier policy emphasis envisioned in the *Green* and *White Papers* and instead has focussed more attention on inter-governmental structures and related operational frameworks. The bill provides guidance with respect to the legal establishment of the NDMC, the duties and powers of national, provincial and local instruments of government and funding for post-disaster recovery and rehabilitation. The rationale behind the robustness of the bill is to ensure that clear and unambiguous guidelines can be given through regulations once the legislation is promulgated. The bill also provides for an *Inter-governmental Committee on Disaster Management* to consist of cabinet members involved in disaster management, members of the Executive Councils from the nine provinces of the country and representatives of local government. A further structure proposed in the bill is the *National Disaster Management Framework*, which will outline coherent, transparent and inclusive policies on all aspects of disaster management including training and capacity building.

Expected to become law during 2002, the Bill calls for the establishment of disaster management centres at all levels of government, and also establishes procedures for the collection and dissemination of risk assessment data and information. One of the explicit functions of the centres will be the assessment of disaster risks, with the requirement that each one also serve as a repository and conduit for information relating to all aspects of disasters, impending disasters and disaster management. The overall thrust is one that can develop a national disaster management framework that would reflect a balanced consideration of the different kinds of disasters, and the varying severity or magnitudes that occur in southern Africa. Emphasis has also been given to measures that could reduce the vulnerability of disaster-prone areas, communities and households. The anticipated *Disaster Management Act* is expected to open up new avenues for greater commitment to be made by provincial and local government authorities to undertake risk assessment activities.



The NDMC has been conceived to be responsible not only for pre-disaster activities, risk and vulnerability reduction but also for post-disaster rehabilitation and recovery actions. A predominant part of the methodology underlying the NDMC is the management of actual disaster situations through all aspects of the disaster management cycle. Emphasis is also placed on the important role of the NDMC in the areas of training and community awareness. Consistent with regional trends, the NDMC and the IDMC are to be actively involved in the SADC initiative to establish a regional disaster management coordinating framework.

Case: Mozambique

One of the principal challenges for evolving government institutions in Mozambique has been the recurrent need to respond to emergency conditions. Since its independence in 1975, considerable resources have been channelled into disaster management, and institutions have continually evolved to deal with new and challenging conditions. This hard-won experience has produced a seasoned cadre of disaster managers throughout the government and a well developed inter-ministerial structure for the coordination of disaster management.

It is much to the government's credit that for some time it has recognized the importance of shifting its emphasis in disaster management from immediate response and rehabilitation needs to the long-term values of mitigation and risk reduction. In the last few years, there has been a dedicated effort supported by the highest levels of government to bring together this experience and establish formal structures and procedures that can build capacities for improved disaster risk management in the future.

From as early as 1981, the Government of Mozambique was attentive to the need to address the consequences of risk on the society. A Department for the Prevention and Control of Natural Disasters (DPCCN) was established with the objective of promoting early warning and mitigation activities. During a period of complex national emergency from about 1982 to 1994 DPCCN became a principal conduit for international aid to people dis-

placed by conflict and the victims of repeated floods and droughts, with logistics becoming its predominant activity. With improved conditions and changing needs in the country, a process was begun in 1996 supported by the WFP as DPCCN's principal international partner, to formulate a coherent *National Disaster Management Policy* and to reorient disaster management towards risk reduction activities.

During the closing years of the 1990s, this involved sustained efforts to reinvent institutions and revise policies created in the prolonged period of permanent emergency, as well as to stimulate an evolution in attitudes, both within government and in the population as a whole. As expressed in current national policies, the primary objective has been to break the vicious cycle of continually expending scarce resources in emergency response and reconstruction, only then to become vulnerable and unprepared for the next catastrophic event.

In 1999, with the approval of the Council of Ministers, the Mozambican government created new institutions to give greater coherence and a clear mandate for government structures dealing with disasters. The *Coordinating Counsel for Disaster Management (CCGC)* was composed at the ministerial level as the principal government body for coordinating disaster management in all its phases. A *National Institute for Disaster Management (INGC)* was created to serve as its permanent technical support unit, with the director of INGC chairing an additional multi-sectoral *Technical Committee for Disaster Management (CTGC)* to assure strong coordination and collaboration in planning, mitigation, and response activities.

A proposed *National Law on Disaster Management* will serve as a legal mandate for the implementation of policy, with the principal objective stated in the first article, "to avoid the occurrence or minimize the effects of disasters". In particular, it gives the *National Disaster Management Plan*, as approved by the Council of Ministers, the force of law. While yet to be finalized, the national policy will entail a framework for the coordination of government entities, the participation of civil society and collaboration with the private sector in all aspects of disaster management. In addition, the law will establish sanctions for individuals or organizations violating the provisions of a declared state of emergency.

● Pacific

Case: The Pacific island countries

Examples of how certain Pacific small island developing states have sought to incorporate some of these measures into their national platforms, policies and development strategies are summarized in the following table. The exam-

ples drawn from Fiji, Cook Islands and Vanuatu focus on the organizational frameworks and policy aspects those countries have pursued with respect to incorporating disaster risk reduction into larger national interests. They should not be taken as being comprehensive or exhaustive themselves or of the region as a whole.

Recommendations for sound disaster risk management

A good example of how disaster risk management functions can be structured within a national policy framework is cited below. It is from Te'o I.J. Fairbairn, (UNDHA-SPO, 1997) as presented in the Pacific Regional Report prepared for the ISDR secretariat. The reasoning illustrates well the key issues at stake when trying to assimilate disaster reduction into accepted government policy. While the examples were conceived with specific reference to island state requirements, they also offer conceptual clarity for other states. Information in square brackets has been added by the authors of the present Global Review.

“There must be a commitment to implementation of particular measures of risk reduction measures incorporated within the ongoing practices of national economic planning and development.

Certainly a major requirement, if not even the primary one, is to promote a clearer understanding among policy makers – and the general public – of the often severe and potentially far-reaching economic consequences of natural disasters. It is crucial that policy-makers in particular comprehend how such events seriously can undermine longer-term growth prospects and threaten the social dimensions of individuals' well-being. Failure to appreciate these consequences can exact eventual or irreparable political costs.

A second crucial prerequisite is to ensure that disaster risk management issues are integrated within the overall national development planning framework. Such an embodiment of risk awareness and evaluation can ensure that those issues are applied across sectoral, ministerial, and jurisdictional lines of interest or responsibility, are multi-disciplinary in nature, and are properly included in the design of major development projects. Taken together, the interaction of multiple commitments can also contribute to risk reduction becoming a non-partisan issue, with its constituencies transcending any short-term political interests or the lifespan of individual governments.

Other major requirements for enhancing a Pacific small island states' commitment to disaster risk reduction capabilities include mechanisms to:

- Strengthen the institutional and organizational frameworks at both national and community levels for managing and coordinating disaster-related issues.
- [Strengthen national institutions by increasing their exposure to, and collaboration with, relevant regional and international entities.]
- Adopt appropriate procedures for monitoring and evaluating disaster events, especially in relation to analysing their social [environmental] and economic consequences over time.
- [Similarly adopt appropriate procedures for monitoring and evaluating the consequences of developmental choices on disaster impacts].
- Increase available information and facilitate database access about the social, [environmental] and economic aspects of natural disasters, as a potentially valuable tool for planning and management purposes.
- Promote greater uniformity in the methodology and techniques used to assess both the direct and longer-termed economic [and environmental] costs of disasters to countries throughout the region.
- Develop comprehensive and integrated land use and water management strategies capable of alleviating flooding, promoting water conservation and environmentally sound land use practices.
- Diversify agriculture through such practices as planting hardy crop varieties, early maturing crops, and encouraging the continued cultivation of various traditional root crops.
- Encourage the [identification and] use of traditional mitigation and coping practices as means for achieving greater community self-reliance in dealing with disasters.
- Facilitate the post-disaster recovery of the private commercial sector through measures that provide tax and related financial incentives.
- Establish effective mechanisms for enlisting the joint support of external donors to strengthen national disaster reduction capacities, in addition to assisting with post-disaster relief and rehabilitation needs.”

Institutional frameworks	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
<p>Cook Islands</p> <p>NDMO coordinates disaster management.</p> <p>National and Island Disaster Management Plans call for the National Disaster Management Council to be responsible for policy issues.</p> <p>Establishment of a US \$30,000 disaster reserve within the Ministry of Finance.</p> <p>The Island Disaster Management stipulates for local government to be responsible for local disaster management activities.</p> <p>Red Cross disaster preparedness programme and first-aid training goes hand in hand with broader preparedness plans.</p>	<p>Introduction to disaster management training course implemented in every island of the Cooks reaching at least 35 per cent of the population of each island.</p> <p>Principles of disaster management integrated in the social science curriculum of the education system, so each child would learn of these principles in their school years.</p> <p>World Patent Coastal Protection Units protecting the airport from being inundated and minimizes tidal energy from surging into hotels on the beaches.</p> <p>Radios placed in emergency centres in the northern islands to receive national broadcasts from Rarotonga, enabling communities in the Northern Cook Islands to monitor weather and emergency warnings for the first time.</p> <p>Foreshore Protection Committee.</p> <p>EMWIN early warning system for tropical cyclone is in operation.</p> <p>Rarotonga Tourism Vulnerability Pilot Project</p>	<p>Cook Islands Building Code: a report on promoting codes, and their application was completed in April 1999.</p> <p>A Building Control Unit has been set up for compliance and enforcement by the introduction of commercially experienced construction personnel.</p> <p>Disaster Management Work Plan:</p> <ul style="list-style-type: none"> • National Disaster Management Plan for Cyclone Response Procedures • Tsunami Response Procedures. 	<p>Development is being undertaken at the national and political levels through an advocacy strategy, with comprehensive sectoral and societal involvement:</p> <ul style="list-style-type: none"> • Ministry of Transport in the prevention and response to oil pollution • Government Environment Services Unit in climate change • Natural Heritage Unit responsible for community consultation and promotion of biodiversity • NDMO in prevention, mitigation and preparedness activities. <p>Outer Island Development Projects (forestry on Mangaia Island, water reticulation systems, communication systems).</p> <p>Cook Islands government has ratified at least 25 environmental global conventions.</p>
<p>Fiji</p> <p>The national coordination policy is documented in the National Disaster Management Plan 1995 and the Natural Disaster Management Act 1998.</p> <p>From 1970 to 1989, emergency measures were handled by the national government.</p> <p>In 1990, the government designated the Ministry of Regional Development and Multi-Ethnic Affairs responsi</p>	<p>Suva Earthquake Risk Management Scenario Pilot Project (SERMP).</p> <p>Taveuni Volcano Risk Project: updates eruption information for use in preparing risk maps and in developing guidelines for development planning and emergency risk planning.</p> <p>Volcano Hazard Risk Mitigation in Fiji: mapping and understanding volcano hazards on the islands of Kadavu, Koro and Rotuma to</p>	<p>National Government Disaster Management Act</p> <p>National Disaster Management Plan</p> <p>Disaster Management Work Plan</p> <p>A National Building Code formulated in 1990, but yet to be legislated and implemented. Work is underway to accomplish.</p>	<p>A proactive approach to disaster reduction continues to be the cornerstone of Fiji's national effort.</p> <p>A major issue is the restructuring of the NDMO within the Ministry of Regional Development and Multi-Ethnic Affairs.</p>



Institutional frameworks	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
<p>ble for natural disasters and the Ministry of Home Affairs for human-caused disasters.</p> <p>NADMO at the Ministry of Regional Development and Multi-ethnic Affairs, manages and coordinates all activities.</p> <p>Established a National Training Advisory Committee.</p> <p>Fiji Meteorological Service, Mineral Resource Department and the Public Works Department are responsible for monitoring and detecting hazards affecting Fiji.</p> <p>The National Disaster Management Council established the Disaster Management Committee at National Divisional and District levels (DIS-MAC)</p>	<p>develop risk maps, development planning and volcano response plans.</p> <p>Ba Flood Preparedness: providing flood information and preparing flood response plans, conducting local education and awareness activities.</p> <p>Cyclone Preparedness at Community Level: Foundation for the Peoples of the South Pacific "Fiji's Awareness Community Theatre Cyclone Preparedness Programme" uses video and drama to better inform village communities.</p> <p>Construction of disaster resistant infrastructure: mitigation measures and strategies are considered at national level (Ministry of Regional Development and Multi-ethnic Affairs), and local levels (District and Divisional Development Committees). This risk management approach adopted throughout the country.</p> <p>PICCAP: Greenhouse Gas Inventories and Vulnerability and Adaptation Assessments. Climate change is integrated into disaster reduction agenda.</p>	<p>Support plans for Cyclone</p> <p>Operational Support Contingency Plan for Taveuni Volcano.</p>	
<p>Vanuatu</p> <p>NDMO coordinates disaster management. It is an information resource for the country at all levels of government (national, provincial, municipal councils, village councils), NGOs, the private sector and communities.</p> <p>Provincial governments must have disaster mitigation as a policy as per the National Management Act.</p>	<p>Professional development programme.</p> <p>Community resilience programmes (CHARM)</p> <p>Community-based volcanic risk reduction.</p> <p>Involvement of the private sector (Telecom Vanuatu, Unelco - power and water facilities).</p> <p>Building cyclone preparedness.</p>	<p>National Disaster Management Act No. 31 of 2000.</p> <p>National Disaster Management Plan.</p> <p>Disaster Management Work Plan.</p> <p>National Building Code (not yet enacted).</p> <p>Support plan for Ambae Volcano Operations.</p>	<p>In conjunction with the SOPAC-DMU CHARM Programme, Vanuatu is developing a new structure for its NDMO office.</p> <p>In 2002 the NDMO office will be relocated from the Department of Police and linked with the line ministries of the Government.</p>



Institutional frameworks	High-level programmes for promoting prevention	Prevention plans	Prevention in development plans and control mechanisms
	<p>Flood mitigation projects.</p> <p>NDMO have initiated a very active program on public education through the Teachers College in Port Vila and several high schools.</p>		<p>The National Disaster Management Act provides more power for NDMO to undertake its national responsibilities and for the six provincial councils to become more proactive in disaster management.</p> <p>Further important areas of public policy are now in progress, including the review and revision of the National Disaster Emergency Plan, development of support plans, institutional support for the NDMO and training and education programmes.</p>

● Caribbean

Case: Dominican Republic

Following the destruction caused by hurricane Georges across the Caribbean in 1998, the IADB and the World Bank provided almost US\$ 100 million to the Dominican Republic for reconstruction work. Reflecting on the magnitude of such losses and further motivated by the subsequent social and economic consequences of hurricane Mitch felt throughout the entire region, the IADB provided nearly US\$ 12 million in 2000 to the *Office of the Presidency* in the Dominican Republic for the development of disaster reduction sub-programmes.

These funds were targeted to help modernize the country's strategic approach and institutional frameworks for disaster risk management. The following year, three consulting consortiums developed a national hazard and vulnerability information system, trained trainers in community-level risk and environmental management, and conducted training in modern risk management techniques for civil servants. They also advised on the development of national public awareness campaigns and on the design of revised legal and institutional frameworks for risk management. Finance was provided to acquire materials and equipment needed by risk and disaster management organizations, including scientific institutions.

National planning processes, with multi-sectoral responsibilities and local participation

Authority and external resources normally flow from the apex of political power, while knowledge of the situation, information, local resources, and leadership all rise from the local community levels. Disaster planning will always be ineffective if confined to a process of central planning and command and control practices. In order to achieve effective local disaster plans it is essential that provincial, district and local level officials be given power and resources to manage effective disaster protection activities. However, such systems require national disaster risk reduction plans that are fully compatible with local level provisions. In many countries where power has been devolved to local levels of administrative responsibility, there can be unhelpful discrepancies between policies, laws and practices at the various levels of government.

Tools are required to create a “culture of prevention” against all forms of hazards within local communities. This requires the knowledge of practical and low-cost methods which address likely hazards that can be conveyed to a wide variety of participants including local leaders, community groups, trades people, commercial and financial interests and local government employees.

In Portugal we should be prepared for disaster and thus develop adequate policies, such as:

- Defining safety policies.
- Informing and educating the public concerning risks and the development of a civil protection culture.
- Improving risk mapping.
- Promoting the study of seismic impact and other risks facing communities and their social economic patterns.
- Improving the scope of emergency planning.
- Defining a national land-use policy.
- Developing a strategy to strengthen building structures.
- Providing the financial resources to facilitate compliance with existing codes.
- Protecting cultural assets.

Portugal response to ISDR questionnaire, 2001.

In **Canada**, provincial and municipal jurisdictions have legislation, programmes and activities that may not necessarily interface with national level disaster reduction issues. However, the implementation of disaster reduction measures is likely to occur at the municipal level, including legislation and enforcement.

Canada response to ISDR secretariat questionnaire, 2001.

In **Germany**, the most important risk reduction issue to be addressed concerns the harmonization of duties, responsibilities and legislation between the state government and the different local bodies. The key national issues are:

- Stronger commitment of the federal government to the coordination of civil protection activities.
- Stronger integration of disaster mitigation in regional planning by legislation.
- Stronger support for interdisciplinary scientific research centres for disaster prevention.

Germany response to ISDR secretariat questionnaire, 2001.

Case: New Zealand

In one exemplary case, taking a cue from the devastation caused by the 1994 earthquake in distant Northridge, California in the United States, the *Wellington City Council* in New Zealand, began a series of local and international consultations. By working closely with the fire service, city authorities sought to reduce their exposure to urban risks.

In reviewing their existing exposure to seismic risk, a consensus view emerged that the prevailing disaster management regime was focused almost exclusively on response and preparedness measures. Telling observations were made that indicated emergency managers were ill-placed bureaucratically and were therefore unable to contribute to important decisions regarding risk management programme. Their experience could seldom be taken into account when conducting vulnerability assessments, nor were they involved in the formulation of land-use policies.

Following recommendations, the city of Wellington and later the government of New Zealand embarked on the revision and implementation of a variety of legislative and policy reforms in disaster risk management. With the motivation to encompass an all-hazards approach to risk and to appeal to all segments of society, the following accomplishments have been achieved over the past several years:

- Broadened responsibilities for local authority emergency managers, with increased roles in the training and development of community capacities for risk identification, vulnerability reduction and disaster resilience.
- Decentralized Emergency Management Groups, with membership including neighbouring local authorities, emergency services and utility companies in order to ensure that while the national emergency management strategy is focused at the local level, there is improved cooperation and coordination of human and technical resources across the country.
- A comprehensive risk management strategy that integrates disaster management into environmental and community management practices at national and local levels.

Elsewhere in New Zealand, the *Auckland Local Authority Hazard Liaison Group*, was established four years ago by the Auckland Regional Council to enhance communications between local authorities on hazard management issues and to facilitate intra-council communication. It was composed mainly of planners and policy analysts drawn from the city, district and regional councils specifically “to recognize the link between hazard mitigation and land-use planning and the related need to develop tools to manage risk and improve communications among those people working in sustainable development and environmental management.”

Case: Switzerland

In Switzerland, long-standing federal forest law recognised the importance of forests with respect to reducing water runoff. Forests also were recognized as a means of protection

The Auckland Group developed a set of guidelines with the overarching goal to “minimize the risks to communities and the environment from the effects of a range of hazards, including (but not limited to) natural and technological hazards.” The guidelines are intended to address the following issues:

- Achieve consistency in the way that hazard information is collected, organized and used to influence decisions about managing risk among local government councils in the Auckland region.
- Ensure risk management issues are appropriately addressed in land-use and strategic planning.
- Maximize the effective use of hazard information to manage risk and to promote better public understanding of the local *hazardscape*.
- Encourage local authorities to reduce barriers to sound risk management and encourage effective risk communication practices.
- Minimize local authority liability through the effective capture and storage of hazard information.

The group has produced a technical publication to elaborate these issues, *Hazard Guideline 1: Hazard Identification and Information Management for Local Authorities*.

Source: The Australian Journal of Emergency Management, 2001-02.

against avalanches as early as the 19th century, when extreme events revealed the catastrophic effects of large-scale timber cutting, especially in the pre-alpine and alpine regions. The hitherto unhindered tree felling came to an abrupt end. Simultaneously, many major river-training works commenced, were renewed or completed as an emphasis was placed on protective measures of river engineering.

Natural hazards continued to play an important role in modifying Swiss policies into the 20th century. The risk situation was aggravated by development in hazardous areas. The social and economic consequences of avalanches, floods and windstorms exerted an impact on policy considerations and Switzerland has moved to a more integrated approach to the management of risk.

In 1997, the *National Platform for Natural Hazards (PLANAT)* was created by the Swiss Federal Council. This extra-parliamentary commission aims to make better use of existing syn-



ergies and therefore to avoid duplication of efforts in natural disaster reduction. PLANAT is made up of representatives of the Federal Government, the Cantons, research and professional associations, and the economic and insurance sectors. The terms of reference for the first period of its activities from 1997-2000 were to:

- Develop a national strategy for dealing successfully with natural hazards.
- Coordinate all parties involved in disaster reduction.
- Create more awareness about natural hazards and to replace the conventional protection approach with a global view of risk management.

Plans for the second period of activities from 2001- 2003 give priority attention to:

- Promotion of public relations.
- Initiating and supporting projects which

deal with integrated risk management.

- Supporting third-party projects with similar aims.
- Seeking better utilization of synergies among various sectors.

Information, education and creation of general awareness about risk reduction are not only high on the priority list of PLANAT but are increasingly recognized as being important by virtually all players in Swiss risk management. An interesting development in this field is the virtual campus initiated by several Swiss universities and research institutes which cooperate in a *Centre of Competence on Natural Disaster Reduction*. Students and researchers already have access to courses in the field of natural hazards and risk management at www.cenat.ch. This information is soon to be extended to benefit after people doing practical work with natural hazards. Moves are also

Swiss strategy for integrated risk management

Switzerland policy recognizes that absolute safety cannot be achieved by any means. However, great strides have been made in the past few years in progressively proceeding from the earlier conventional hazard protection to a more integrated management of risk. This latter approach is based on a balanced equilibrium of preventive, response and reconstruction measures. A residual risk, which is based on social, economic and ecological criteria of well-being, must therefore be accepted. This ultimately leads to a sustainable management of risk

In order to establish coherent procedures that can also take account of the country's cultural, geographical and linguistic diversity, Switzerland gives considerable importance to the "subsidiary principle". This principle is constituted as one on the inviolable rights of the lower hierarchies of official authority and public responsibility. It establishes that the upper hierarchical levels only exert a degree of political power and only take over those administrative duties that the lower hierarchic levels are not able to cope with, or accept, themselves. Hazard and risk management in Switzerland follows this subsidiary principle also in the political sphere, as there is a distribution of responsibility between federal, cantonal (state) and communal authorities. This extends to individual land- and property-owners as well as to various national, regional and local institutions, organisations and associations.

The Swiss approach to hazard and risk management is furthermore founded on the three cornerstones of disaster "preventive", "response" and "reconstruction" measures. While all three cornerstones are of comparable importance, they are in a somewhat reverse subsidiary relationship to each other. Great emphasis is placed on prevention. Response must be efficient and smooth in the face of catastrophic events. Reconstruction has to take place subsequently, to a degree, which is necessary, feasible and compatible with far-reaching considerations about the environment. The ultimate aim of the Swiss strategy is to achieve sustainable development in all sectors of natural disaster reduction.

Beyond its own borders too, Switzerland maintains and promotes the exchange of know-how and experience with other countries in regard to disaster reduction, as also reflected elsewhere in this report. It equally supports supranational efforts aimed at close collaboration with others involved in both sustainable development and the provision of humanitarian assistance when required.

underway to upgrade the *Swiss National Alarm Centre*, recognizing that communications are essential means by which information can be passed in times of relative calm as well as during times of crisis.

Research is another priority for PLANAT, concerning all natural hazard sectors. One important issue is related to a better understanding of the forces of natural hazard as well as the coping mechanisms of structural mitigation measures. Research will also continue with regard to monitoring climate change and the evaluation of its connection with natural hazards.

As financial resources are always limited, they must be allocated in the most productive manner. Several relevant moves are underway in Switzerland to ensure their most effective use. These include:

- Giving precedence to non-structural preventive measures including water course maintenance over river-engineering measures.
- Shifting resources from reconstruction to preventive measures.
- Redistributing the allocation of finances among the primary parties concerned in order to increase inter-cantonal collaboration and thus reduce the ill-effects of exaggerated diversity of activities as well as to avoid duplication.
- Improving the coordination and consistency in the use of government subsidies and similar incentives for local authorities and communities, for instance through the activities of the Federal Office for Water and Geology and the Federal Forest Directorate.

In any event, it is recognized that more finances need to be allocated to build greater awareness for disaster risk reduction among the public and policy makers, alike. This is reinforced by the evident experience that without periodic publicity, the necessary funds for a continuous reappraisal of natural hazard requirements simply are not provided. It is a bitter fact that both individuals and politicians have a short memory, which explains why

things normally only start to move in the wake of a disaster such as occurred during the unusually severe series of winter storms experienced across the country at the end of 1999.

Risk reduction plans, linked to specific responsibilities, policies, and practices

Case: Costa Rica

During 2000, the Ministry of Agriculture in Costa Rica took the unprecedented step of creating a *Risk Management Program in the Agricultural Planning Secretariat*. Concern for agricultural losses increased with the impacts of El Niño between 1997 and 1998 and with the recurrence of flooding and drought. The decision to create the programme was motivated further by decisions taken at the Central American Presidential Summit held in 1999 when disaster and vulnerability reduction issues dominated the agenda.

This development reflects the larger impetus given to disaster and risk reduction by the *Central American Integration System's (SICA)* specialised agricultural sector organizations, the Regional Advisory Board for Agricultural Cooperation and the Central American Agriculture and Livestock Advisory Board.

Case: Iran

Iran has a high exposure to seismic hazards. Considering this risk throughout the country, as indicated in the figure below, it became evident that a long-term vision was required to reduce significantly the high level of risk for the population. The development of a national policy of disaster risk reduction in Iran was largely motivated by the participation of scientific and technical interests within the country. This demonstrates that the evolution of risk reduction frameworks need not originate strictly from civil administration or political initiatives. Scientific interest has exerted a major role in driving policy relevance, in Iran and by so doing, was then able to implement a series of actions in different segments of the society.

There were a number of problems that had to be tackled if a comprehensive and sustainable national framework to reduce seismic risk was to be created. Following the 1990 Manjil earthquake, the *International Institute of Earthquake Engineering and Seismology (IIEES)*, located in Teheran, started working with other technical institutions to develop a multidisciplinary strategic national research and mitigation plan for seismic risk reduction. The resulting *Iran Earthquake Risk Mitigation Program (IERMP)* has been implemented by *IIEES*, the *Building and Housing Research Centre*, the *Geophysics Institute of Teheran University* and the *Geological Survey of Iran*. With the added support of the *Earthquake Committee of Iran Research Council* and *Iran's National IDNDR Committee*, the programme members adopted the following objectives:

- Increase the scientific knowledge required for earthquake risk mitigation.
 - Reduce the risk of all structures and promote the need to build safer structures.
 - Increase public awareness and promote a collective prevention culture.
 - Develop plans for post-earthquake activities.
- In the political context, the first needs were to

reduction strategy were integral to national development objectives. Resources had to be reoriented from responding to immediate needs towards investing them in longer-termed and sustainable objectives. Importantly, policy-makers had to be encouraged to adopt a patient acceptance of deferred benefits.

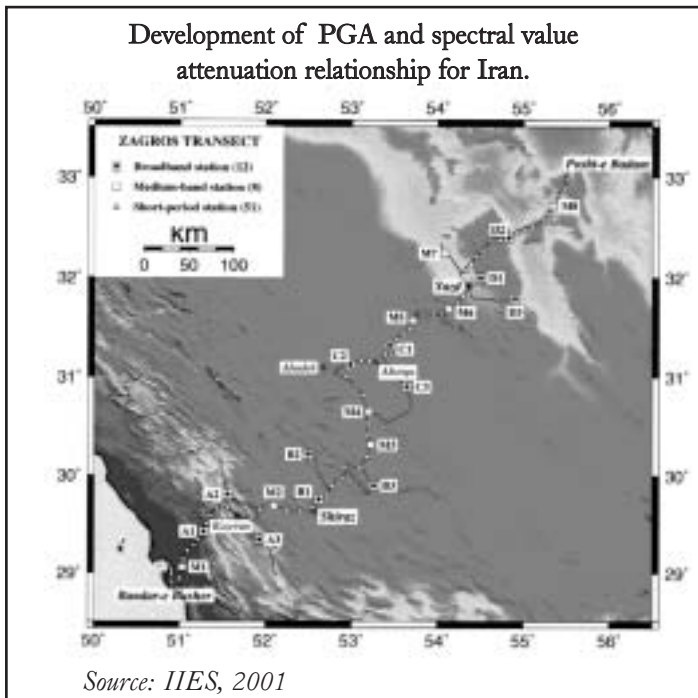
In an operational and technical context, emphasis was given to strengthening, and where necessary, retrofitting structures with particular attention given to lifeline facilities and the physical infrastructure. It was in this context that a challenging incompatibility existed between a developmental perspective that encouraged investment in seismic design, and thinking prevalent in the public and private sector of incurring less expenditure on construction.

With the calculated involvement of the engineering profession, backed up by its code of professional training, opportunities were identified that could translate a fuller use of technical knowledge into everyday life. This included a wider use of seismic design and construction techniques, and a more serious approach to the implementation and enforcement of building codes. Perhaps most importantly, the strategy provided an institutional “champion” for the concept of risk reduction, exercised through the practical conduct of the engineering profession.

IERMP developed a plan based on the common efforts among government officials, scientists, engineers, builders and the public, initially to define acceptable and achievable levels of risk. This led to two parallel requirements: making seismic safety a priority policy through revised legislation, and creating internal mechanisms to change existing engineering practices. A High Council on Risk Reduction was created in the Planning and Management Ministry of Iran to supervise the implementation of the new program. It concentrated on preparing the proper frameworks, budgeting, coordinating, and taking necessary decisions to ensure that the objectives were achieved.

The following are some of the actions pursued through the IERMP in policy areas:

- Shifting attention from previous considerations of only responding to earthquake



motivate a better understanding of the nature of seismic risks among the most senior policy-makers, and then to translate that awareness into political commitment throughout all the levels of government authority. This was pursued by emphasizing that elements of a risk

damage to introducing means that can reduce the risk of damage to vulnerable structures and lifelines before it occurs.

- Establishing a special government fund to strengthen important public buildings, including schools and hospitals, public infrastructure and lifeline facilities.
- Providing financial incentives for private and commercial sector interests that are interested in upgrading their existing vulnerable structures.
- Encouraging more industrialization in the construction field to ensure better quality control.

The following are some of the actions pursued through the IERMP in technical matters:

- Translating scientific knowledge into a usable and achievable format, using practical knowledge to promote risk reduction.
- Developing guidelines for conducting vulnerability assessments.
- Establishing detailed technical databases to document the necessary requirements to strengthen public buildings, and setting

priorities to do so, based on available resources.

- Determining the most appropriate and cost-effective means of strengthening different types of masonry, concrete and steel buildings.
- Promoting the use and enforcement of codes, quality control and inspection for all types of construction.

The following are some of the actions pursued through the IERMP in public understanding:

- Increasing public awareness and motivation using an active earthquake information system.
- Motivating the participation of the public in prevention and mitigation activities.
- Promoting the use of easy do-it-yourself construction techniques suited for simple dwellings in rural areas.

The following table summarizes the increase in resources allocated to seismic risk reduction during the course of the IERMP:

Resource allocation to seismic risk reduction, Iran

Type of resource	Before (1980-89)	After (1990-2000)
Seismic researchers	Less than 40	More than 265
Seismic graduate students	Less than 20	355
Seismic stations	15	45
Strong motion stations	270	Approx. 1000
Research laboratories	2	7
Books and technical reports	Less than 100	More than 460
Budget	Over 10 years, less than 700 million Rials. (US\$402,000)	Over 10 years, a total of more than 128,000 million Rials. (US\$73.5 millions)
	In 1989 alone, about 104 million Rials. (US\$59,727)	In 2000 alone, more than 37,000 million Rials (US\$23.3 millions)
Investment for laboratories	US\$ 3.1 millions	US\$ 11,5 millions

Source: International Institute of Earthquake Engineering and Seismology, IIEES, Teheran, Iran



Case: Algeria

In November 2001, unusually heavy rain fell in the Algerian capital, Algiers. Flash floods and mudslides swept through many parts of the city, killing more than 800 people. At the time it was suggested that disaster management structures and the population were woefully unprepared for such an event. However, it turned out that several cases of human activity and unsuited policies actually may have contributed to the severity of the disaster. Due to the scope of the disaster and its location in the centre of the capital, all levels of the government were seriously shaken. Senior officials experienced, first-hand, the lack of coordination of the various parties concerned with the emergency response, as well as having to accept their own failure of foresight.

Since this disaster, there is a new way of thinking about disaster management in Algeria, particularly in urban areas. This has been demonstrated through several initiatives that started only months after the disaster. For the first time ever, the Head of State ordered all the ministries to take serious account of the notion of disaster reduction and include it in their various programmes. The Prime Minister also discussed the matter during the Council of the Government, and called for a permanent coordinating structure of all the actors involved in disaster management. The Ministry of Interior is developing a permanent structure which will coordinate all phases of disaster management including risk reduction measures, response and rehabilitation. The General Directorate of Civil Protection is shifting its attention towards prevention activities. The current ruling political party in Algiers is preparing to include disaster management in its program for a forthcoming legislative election campaign. Senior party officials are soliciting expert advice from scientific and technical advisors in preparing their programme.

Since the floods, international organizations have joined forces to help in risk reduction projects. The Mayor of Paris paid a visit to the affected areas and signed a memorandum of cooperation between the *Wilaya (province) of Algiers and the Atelier Parisien d'Urbanisme* for a programme to promote better urban planning in Algiers. In early 2002, another French organization, *Architecture-Urgence*, signed a

convention for cooperation with the *Wilaya of Algiers* to work on urban planning to reduce disasters.

The UN office in Algiers also installed a commission to work on disaster reduction in Algeria and engaged an Italian specialist to discuss the matter with Algerian authorities.

UN- HABITAT proposed a cooperation project in disaster reduction with the Algerian government. A World Bank delegation has similarly visited Algeria to discuss a long-term project in disaster risk management. An expert in urban planning from USAID visited Algiers less than a month after the disaster to discuss eventual cooperation in disaster reduction in urban areas with many Algerian institutions. USAID has expressed an interest in preparing a project proposal for that purpose.

Within the first six months after the disaster, several seminars or conferences related to disaster reduction were either held or being planned. An Algerian-French colloquium on sustainable development and disaster reduction took place in Algiers only weeks after the disaster. Similar colloquia are planned for other regions of the country. All of these actions demonstrate that Algerian authorities at all levels are more aware today about the risks they face.

Case: Kazakhstan

The Republic of Kazakhstan often experiences earthquakes, floods, landslides, and coastal floods. Only recently has the importance of natural disaster reduction been recognized. In May 2000, Kazakhstan's *Emergency Situation Agency* published the Plan of Preparedness of Kazakhstan for Natural Disasters with the cooperation of the National Red Cross and Red Crescent Society and UNDP. The introduction of the plan cites the considerable financial losses incurred by the country because of disasters and urges all organizations to take proper action to reduce their negative impact on the country's development. The report provides guidance on preparedness activities for disaster reduction, response scenarios for disasters, legislation for efficient mobilization of organizations concerned, and implementation of different measures that can be deployed against various risks.

The last earthquake to devastate Kazakhstan took place in 1911, less than 30km south of the former capital, Almaty. The memory of this event has faded from the country's collective consciousness. Recognizing that the Armenian earthquake of 1988 occurred along seismic faults that had shown little movement for over 3,000 years, the Emergency Situation Agency has worked to increase public awareness about earthquake risks.

This activity is deemed to be crucial as most apartment blocks in Kazakhstan are similar to those that collapsed in the Armenian earthquake and in the Sakhalin earthquake of 1995. Even though the government's Institute of Seismology has been working since 1976 to monitor seismic movement, the institute also undertakes risk assessments, evacuation scenarios, and the analysis of ground conditions as part of its research activities.

The country also experiences other risks too. Due to the rising water levels of the Caspian Sea over the past 20 years, the Kazakh shoreline has grown by 20-40 km and water has encroached about 70 km inland. The national Water Resource Committee has reported that total costs for preventing losses from this increasing water level will exceed US\$ 3-5 billion, as researchers work intensively to reduce these future risks. The northern slope of the west Tengshan range, where Almaty is located, is exposed to floods, mud and debris flows, avalanches and landslides. In particular, landslides threaten areas where more than 150,000 people are living. In May 2002, southern parts of Kazakhstan were affected by storms and heavy rainfall that caused serious flooding in cities.

Although disaster awareness issues are being raised in scientific and official circles, there is still a lack of general public awareness, although that is slowly changing. The Emergency Situation Agency has prepared many brochures, pamphlets and videos to expand the general awareness of these hazards, and the public seems to be responsive. A recent newspaper advertisement for a new apartment building referred to the structure as being seismic-resistant, a comment that evoked noticeable interest. On the other hand, people have not yet understood that investment in disaster reduction is a sound long-term investment.

Some common limitations in most regions

The designation of administrative arrangements or even the passage of legislation provides only a basic framework for a disaster risk reduction strategy. Policies alone do not reduce the vulnerabilities of people exposed to the risk of natural hazards. Despite the implementation of policies, acts and regulations by official departments, challenges often remain to develop more broadly based practices throughout countries that involve different ministries and departments at national, provincial, district or even municipal and village levels.

In some countries, disaster management information has been classified or restricted, as a matter of public security. When combined with a lack of coordination between various government agencies, competing departmental issues or a persistent emphasis given to emergency response, the ability to cite a particular decree or policy initiative is not necessarily a guarantee of real commitment or demonstrated practical abilities on the ground.

Even among national focal points, there are few standard criteria that would emphasize the recruitment of trained disaster risk managers. Authoritative positions are most frequently occupied by career administrators who may or may not have any formal professional expertise or even familiarity with matters of risk management. Frequent inter-agency transfers of civil service officials further impede opportunities for national organizations to develop institutional memories with the result of consequent and irrevocable loss of valuable experiences and lessons learned.

In terms of policies, many countries assuredly advise that they have prepared state, provincial or district level emergency contingency plans, while some do not have any national disaster risk management system at all. In recent years, national building codes have been drafted in countries that did not before have them, although compliance and enforcement both remain very problematic in many of them. Thousands of buildings are constructed annually in known seismic areas, without incorporating any established seismic resistance techniques.

Population pressures or economic necessities, easily transformed into local political issues can frustrate the consistent application of flood or landslide protection zoning. Incidence of corruption or the lack of enforcement of existing policies and regulations are unfortunately much more evident than is generally acknowledged either officially or in diplomatic discourse, even though such administrative laxity has an important bearing on the effectiveness of any disaster risk reduction programme. It is only when legislation is able to place legal responsibility on specific officials whose decisions or lack of effective action perpetuate continuing conditions of vulnerability will risk reduction be able to be truly measured.

Future challenges and priorities

Coherent and comprehensive approaches to building institutional frameworks, at both national and local levels, are essential if one is to speak seriously of a sustained commitment to disaster risk reduction. This includes the need of policies and collaborative efforts among sectors, departments and institutions which deal with the different layers of development.

While governments need to encourage, direct and support these efforts, the vitality and effectiveness of the resulting organizational frameworks and operational capabilities remain based on the understanding and motivation of public interests. This includes, particularly, the engagement of people with a wide circle of skills and attributes ranging from educational practices to various forms of technical expertise. Acceptance of the necessity of risk management, coupled with direction and coordination, all backed by resources, are the hallmarks of institutionalized capabilities. The primary challenges and priorities to accomplish these goals include:

- Government authorities understanding the distinctiveness of disaster risk management and the value of investing in risk reduction to protect the well-being and the assets of society.
- The recognition and acceptance of allocating resources, over time, based on collective judgement about the needs of sustained disaster risk management is essential. Calculating and understanding the relative costs and benefits of anticipatory protection needs to be emphasized in contrast to sustaining much greater avoidable losses.
- All communities and countries need to assess variations in the intensity and the extent of hazards, evaluate local priorities and determine the relative degree of risk involved. This in turn will determine the requirements for sound institutional frameworks.
- The primary challenge is to begin with a self-assessment of national capacities – from government to local level – in risk awareness and management. While this can be done by using self-determined criteria, abundant expert guidance and specialist knowledge is available throughout the world.
- Examples cited display the importance of transcending the theoretical expression of policy frameworks and legal instruments and realizing their actual effects, in practice.
- National authorities and local leaders need to embrace policies that:
 - are realistic for the case at hand;
 - are linked to regulatory mechanisms that are enforced or effect change;
 - have an obvious benefit understood by local communities;
 - have obvious political advantages for political power holders;
 - have economic advantages to the private sector;
 - can be implemented with available resources.
- The extent to which disaster risk reduction is identified as integral to fundamental political responsibility can encourage greater sustained commitment in support of long-term national development objectives. It is essential that policy direction and operational capabilities be developed in multiple areas of governance and civil society if a culture of prevention is to be cultivated and extended to future generations.

3.2. Regional cooperation, interaction and experience

Hazards, like social affinities, often reflect regional characteristics grounded in the predominant geographic conditions. Historic and common political features also contribute to shared experiences within different regions or sub-regions around the world. Regional dialogue gives added depth and force to combined national interests, as much as regional institutions can tap and channel broader international expressions of intent into coordinated and better-suited, practical activities.

While the impetus may vary in different regions, natural hazards and the risks they pose to people who share geographic attributes present opportunities for neighbours to multiply their efforts in risk reduction.

They do this by sharing skills and experiences, and by combining resources to develop resilience to disasters. As disaster risk management encompasses a wider range of interests and abilities, there is a growing requirement for more political and professional interaction through multiple and innovative forms of regional cooperation. Regional cooperation embodies sensibility as much as solidarity.

A review of some examples of regional cooperation will show the scope of organizational frameworks employed to galvanize cooperation in disaster risk reduction. The fact that only few of these examples display organizational developments created expressly for the purpose of disaster risk management, highlight the extent to which risk issues pervade multiple dimensions of society and rely upon the work of many people.

The Americas



A major shift is now taking place in many of the countries in the Americas with more attention being given to risk reduction. Triggered by several major disasters during the last decades and further motivated by promotional and technical cooperation efforts and networking carried out during the nineties by regional and international organizations in support of the IDNDR objectives, the region has been fortunate to develop relatively advanced concepts and understanding of risk management. This is the result of combined efforts of social research, practical experience widely shared, and frequent opportunities to engage an expanding range of professional interests.

There have been additional and mutually reinforcing efforts and long-standing involvement of such agencies as the PAHO, IFRC, and OFDA/USAID. More recently, UNDP and

UNICEF have joined in providing technical cooperation, training and more public awareness for vulnerability and risk reduction. Other organizations have encouraged the development of new capabilities over many years, frequently built around specific strategic program areas, and in some cases within national disaster management organizations. These have included decades of efforts by OAS, ten years of existence of the Network for Social Study of Disaster Prevention in Latin America (LA RED), and a number of individual academic interests or initiatives.

The probability of loss and damages associated with the presence and complex interaction between hazards and vulnerability is now a growing preoccupation throughout the region. Although it is not always explicit in government and societal discourse, most people now recognise the relationship between failed or inadequate development practices and the construction of social vulnerability and increased risk to disasters.

High level commitment

At the Third Summit of the Americas held in Quebec City, Canada in 2001, the assembled heads of state declared:

“We commit to strengthening hemispheric cooperation and national capacities to develop a more integrated approach to the management of natural disasters. We will continue to implement policies that enhance our ability to prevent, mitigate and respond to the consequences of natural disasters. We agree to study measures to facilitate timely access to financial resources to address emergency needs.”

A regional – hemispheric- conference focussing on risk reduction practices was held in Costa Rica in December 2001, as a follow up to this Summit.

Moreover, the relationship between environmental degradation and hazard incidence has been increasingly brought to the forefront by institutions such as the *Central American Commission for Environment and Development (CCAD)*, IUCN, IADB, CAF, the Caribbean Development Bank (CDB) and the World Bank. Climatic variabilities as manifested by El Niño/La Niña phenomenon has prompted the *World Meteorological Organization (WMO)* together with regional organizations to go beyond the scientific and technical research concerns and seek application of available information for early warning and institutional strengthening for risk reduction.

This commitment to a shift towards integrated risk management to reduce the impact of disasters has several times been re-affirmed at the level of heads of state.

● Central America

The impacts of consecutive major catastrophes between 1997 and 2001 have profoundly changed the way disasters are conceptualized in Central America (Panama, Costa Rica, Nicaragua, Honduras, El Salvador, Guatemala). The effects of the El Niño/La Niña episodes of 1997/98 were the most severe this century. Hurricanes Georges and Mitch in 1998 devastated the economies of the entire region, in addition to causing much damage to personal property from floods throughout the countryside. The El Salvador earthquakes of

2001 raised serious questions about the risk consequences of land use and inadequate environmental management practices. The fact that hurricane Mitch damaged the interests of both the poor population as well as the private commercial sector served to create a collective view of the need for change.

In addressing these conditions, the governments of the region, working together through the *Coordinating Centre for the Prevention of Natural Disasters in Central America (CEPRE-DENAC)*, have confirmed a political commitment to risk reduction and reconstruction processes through social transformation. Their experience is a valuable example for the world.

However, challenges still remain in successfully moving from the expression of political intentions to fundamentally changed policies and practices. Advances will require enormous efforts at all levels of activity, including greater social consciousness, legislative and institutional changes, modified social practices, the reduction of corruption, and the mobilization of private-sector and commercial interest groups. The objective is to instil a society-wide acceptance of sacrificing short-term gains in exchange for long-term sustained protection for social and environmental resources.

This advance in political will has been achieved through expanding regional integration. Governments and heads of state have shown a readiness to proceed jointly, working to achieve common purpose and through shared resources. This is reflected by the endorsement of a *Strategic Framework for the Reduction of Vulnerability and Disasters in Central America*, and the adoption of a *Five Year Plan for the Reduction of Vulnerability and Disaster Impacts (1999-2004)*.

The strategic framework identified six major work areas:

- Strengthening national disaster organizations.
- Developing early warning systems and strategic plans.
- Increasing research on hazards and vulnerability, including the promotion of information exchange.

- Formulating distinctive risk reduction strategies for specific sectors.
- Providing mutual assistance in case of disaster.
- Enhancing local level risk management.

There has been more collaboration with community and municipal based organisations such as *the Community Network for Risk Management*, the *Federation of Community Organisations* and the *Central American Municipal Federation*. There is a promising expansion of programmes dedicated to reducing vulnerability to natural hazards at local levels, building national capacities, and exchanging experience and information regionally.

Beginning in July 2001, UNDP launched a two-year *Regional Programme on Risk Management and Disaster Reduction*. This concentrates

Community - based regional initiative

Initial consideration given to community-based disaster reduction outlooks were boosted by a GTZ-inspired project for *Strengthening of Local Structures for Disaster Mitigation (FEMID)*. To undertake a regional approach for introducing risk reduction considerations within local development frameworks, it used pilot activities in all six Central American countries. Experience gained in the use of early warning in local communities was applied to floods in the project pilot zones. In the Masica area of northern Honduras it became a regional and international example of good practice. After early warning schemes had been consolidated in different areas, local committees – formed to promote this single activity – began to develop a broader interest in other primary risk reduction issues. This then led to some of the groups establishing new relationships with development agencies, as occurred in the Chepo area of Panama.

on improving local risk management practices, within the framework of CEPREDENAC's *Local Level Risk Management Programme*, and strengthening the capacities of national risk reduction systems. A new phase of the UNDP-coordinated inter-agency *Disaster Management Training Programme (DMTP)* is being designed to concentrate particularly on structuring national risk scenarios, identifying key actors and determining the priority research and training requirements of the region.



Coordinating Centre for the Prevention of Natural Disasters in Central America

CEPREDENAC has been key in realising these changes. Starting as an informal group of scientific and official response organizations in 1987, it has become the official *Central American Integration System's (SICA)* specialized organization for risk and disaster reduction strategies.

Following the coordination and operational demands imposed by the devastating disasters in the final years of the 1990s, it has proven crucial in tying together many professional abilities and regional political interests. Importantly, the regional strategy called for the updating and completion of *CEPREDENAC's Regional Plan for Disaster Reduction*. Since 1999, this has been the vehicle by which CEPREDENAC has promoted action identified by the governments and many other projects throughout the region.

CEPREDENAC has gained status through its work plans with other specialized agencies. It has undertaken risk reduction activities with PAHO in the health sector, the Housing and Human Settlements Coordinating Committee in the housing and human settlements area, the *Central American and Panamanian Institute for Nutrition* and the World Food Programme in food security matters, and the *Central American Transport Committee* in communications and transport. It has pursued additional endeavours to further risk reduction with other regional agencies in the fields of agriculture, water management, telecommunications, and electricity generation and distribution.

CEPREDENAC has moved toward broader regional programme development, encouraging projects to be implemented by national authorities or local groups. Recently, CEPREDENAC and the *Regional Unit for Technical Assistance (RUTA)* published guidelines for the introduction of risk management practices in rural development projects throughout the region. In a similar vein, CEPREDENAC is now addressing risk issues associated with the important *Puebla to Panama Logistical Corridor*, undertaking more work with the private sector, the regional and international banking community, and promoting risk reduction issues in Central American development agencies.

With IADB, World Bank and Japanese funds CEPREDENAC is financing a *Regional Prevention and Mitigation Programme* to finance projects favouring risk reduction proposed by national CEPREDENAC commissions. At the beginning of 2001 it created a *Local Level Risk Management Programme* with the support of IADB and UNDP. Initial activities have involved the establishment of a conceptual framework for risk management that will encourage programme activities, and the start of a systematic process of recording experiences in local level management in the region. A third initiative is the institution's *Regional Action Plan for Central America*, financed by UNESCO with Dutch, German and French support. This regional programme provides training for specialists in the use of technologies for analysing hazards, particularly the use of GIS applications.

Another programme for regional collaboration and capacity building was launched by the *Swiss Agency for Development and Cooperation* following hurricane Mitch. A *Disaster Prevention Programme (PREVAC)* is conceived to run from 1999-2003 with a budget of US\$ 5 million. Support is being offered to Honduras, Nicaragua and El Salvador responding to the proposals coming from the Strategic Framework for Vulnerability and Disaster Reduction. The programme concentrates on raising awareness of natural hazards, capacity building and institutional strengthening, and works with an array of institutional actors including ministries, national disaster organizations, scientific and technical institutions and universities.

● The Caribbean

The past decade, has seen an increase of multi-disciplinary discussions regarding disaster and risk management in the Caribbean. Since its establishment in 1991 by the *Caribbean Community (CARICOM)*, the *Caribbean Disaster Emergency Response Agency (CDERA)* has worked to create an expanding infrastructure for a methodical approach for developing disaster management programmes among member states, including multi-island projects.

Initiated to enable countries to cope more effectively in the aftermath of a disaster, increasingly, more emphasis has been given to disaster risk reduction as part of development and environmental concerns. The idea of disaster reduction has been introduced in most regional initiatives at policy level, including through the *Programme of Action for Small Island Developing States*, among the CARICOM priority areas for action, and the programmes of the *Association of Caribbean States (ACS)*.

These interests are consistently re-enforced on a sub-regional basis by the biennial *Caribbean Natural Hazards Conferences* organized by the primary regional disaster management stakeholders. These typically have included the *University of the West Indies (UWI)*, CDERA, USAID and UNDP. Furthermore, the issue of vulnerability assessment has become one of the key foreign policy areas of CARICOM, and it has been raised in several forums including the World Bank, IDB, OAS and the Com-

monwealth Secretariat. At the *Conference of Heads of Government of the Caribbean Community (COHG)*, the highest collective decision-making body in the region, the portfolio of disaster management and the environment has been declared a matter of cabinet level responsibility.

Other agencies have also contributed to capacity development in the Caribbean through funding of disaster management programmes implemented by government agencies and NGOs. In 1991, CARICOM committed itself to establishing a permanent agency with a focus on preparedness and response planning, supported by its member states. Since then CDERA has worked to broaden the disaster management agenda in the region.

It contributed to the development of disaster management among member states, as well as training and development of a core of professionals who are a valuable source of expertise for all countries. In partnership with a variety of donors, the agency has executed a number of projects aimed at building the capacity of member countries in disaster management.

● Andean countries of South America

The five countries of the Andean sub-region of South America – Bolivia, Colombia, Ecuador, Peru and Venezuela – live with a high level of risk and must often cope with disasters. These include the Huaraz Earthquake in Peru in 1970; El Niño/La Niña episodes in 1982-1983 and 1997-1998, the volcanic eruption of Nevado del Ruiz in Colombia in 1985; and the mudslides in Venezuela in 1999.

The most common types of disasters in the region are associated with earthquakes, volcanic eruptions, floods and droughts. From a socio-economic point of view, the highest impact is from hydrometeorological disasters.

Aside from the common historic and cultural roots shared by the countries, along with some topographic similarities, their institutional cooperation is enhanced through the Andean Integration System. Growing interest in collaboration was displayed when the *Andean Development Corporation (CAF/ADC)* estab-

PREANDINO

A regional cooperation programme

The overall objective of PREANDINO is to encourage and support the formulation of national and sectoral policies for risk reduction and disaster prevention and the development of models and forms of institutional organization that introduce a preventive approach into development planning (*see specific country information in the previous section on national institutional development*).

Its objectives at the regional level are:

- To promote, support and offer guidance on the organization of schemes and programmes for horizontal cooperation between equivalent institutions in the Andean countries, so as to strengthen their technical capacity for studying and adopting preventive policies and programmes;
- To promote region-wide risk prevention programmes, primarily those related to awareness of the threats to which there is the greatest vulnerability;
- To ensure the feasibility of, and to support and coordinate, technical cooperation initiatives among the Andean countries;
- To encourage supra-regional bodies and international organizations to propose and implement cooperation projects at the national and regional levels;
- To promote the institutionalization of prevention in the Andean region.



Strategic areas

To reach its above objectives, PREANDINO has defined a strategy designed primarily to:

- Incorporate risk prevention in State policy and in the institutional and civic culture in the Andean region;
- Emphasize three areas for action: the dissemination of information on risk, improved institutional management of risk reduction, and the inclusion of prevention in national, sectoral and territorial planning in the public and private sectors in each country;
- Attempt to ensure, from the very beginning, the strongest possible commitment to the objectives of the programme at the highest levels of decision-making in the public and private sectors;
- Create the best possible conditions for the exchange of information between the Andean countries on institutional developments, planning experience, and methodological and technological progress in identifying and evaluating threats, vulnerability and risk;
- Make ongoing efforts in the region and in each country to ensure that more is done to reduce the risks that affect people's quality of life;
- Create a favourable climate for international technical and financial cooperation in the countries of the Andean region, so that optimal, effective and coordinated use is made of the resources for risk reduction.

At the operational level, the key players in this initiative are the respective countries' national committees for risk reduction. These include representatives from the ministries of planning, science and technology, and the environment, as well as from national civil defence or disaster management agencies. All of these institutions are linked through a network that allows participants to share information about their activities and by so doing, to shape indicators that can gauge the effectiveness of disaster management. This cooperation is augmented by conferences and workshops, which facilitate the exchange of information and provide a common basis by which to conduct negotiations with financial bodies.



lished the *Regional Programme for Risk Prevention and Reduction (PREANDINO)* in late 2000, in accordance with the mandate entrusted to them by the Presidents of the five Andean countries in 1999. Under this mandate, CAF/ADC is coordinating the cooperation activities necessary to strengthen and develop risk prevention standards and institutions in each country and the principal regional projects that share those aims.

This mandate is rooted in an earlier one, under which CAF/ADC, on request of the Presidents of the region, made a study of the economic and social impact of El Niño on the countries of the region in 1997-1998 and an analysis of existing institutions dealing with disaster prevention. A one-year participatory study exercise was carried out engaging several institutions in each country. A detailed technical and institutional review of each country outlined, in particular, institutional weaknesses and the need for regional coherence, thus PREANDINO.

In the Andean countries, the use of disaster risk management as a public policy tool within development organizations is still in the early stages of development. A previous lack of focussed institutional frameworks explains the relatively limited degree of civil awareness about risk in all of the Andean countries. However, an emerging trend now recognises the need for concrete and determined action for the incorporation of disaster risk reduction into the broader context of development initiatives.

Information systems to support disaster risk management are scarce in these countries. There is a lack of consolidated information or channels for easy access to information about the different hazards. The information which is available is often highly technical and is not easily understood by a general audience.

To counter these types of problems, PREANDINO is supporting the construction of a network that will foster the exchange of experiences and contacts. Committees of knowledge are being established in each country to promote the creation of permanent channels of information exchange among research centres, producers of hazard-related information, and potential users within individual professional sectors.

Additionally, the civil defence organizations of the region have met several times since 2000 to consolidate a regional basis to improve coordination of response and preparedness activities. The southern command force of the USA has supported these efforts, among others. These activities have led to the formal establishment of an *Andean Committee for Disaster Prevention and Response (CAPRADE)* within the Andean Integration Community in July 2002. This important initiative is a sub-regional mechanism for improved and integrated risk management action. It was developed in accordance with the objectives of ISDR and supported by several regional institutions and bilateral actors.



Africa

Southern Africa



Extending south from the Democratic Republic of the Congo and Tanzania, the *Southern African Development Community (SADC)* comprises fourteen member states. With a population of approximately 200 million, SADC includes the following countries;

Angola, Botswana, Democratic Republic of the Congo, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

In general, Southern Africa has not been viewed as particularly prone to natural hazards, nor has it historically recorded massive losses from sudden-onset disasters. Primarily, the major risks that have affected the region have been slow-onset disasters related to drought, epidemic and food insecurity.

Until the early 1990s, perceptions of risk were shaped predominantly by armed conflicts and their destabilising consequences. In such a context, it is unsurprising that issues of natural disaster risk received little attention. To a significant extent, prevailing disaster management capabilities have typically been grounded in more narrowly focused efforts to monitor agricultural conditions and food availability, or to plan emergency relief contingency measures focussed almost exclusively on droughts.

There are a number of regional initiatives that are now contributing to the growth of disaster reduction in Southern Africa, but it is important to understand their antecedents. These date from the formation of the *Southern African Development Coordination Conference (SADCC)* in 1980, which had, as one of its priorities, the diversification of transportation and communications throughout the region. To reduce the dependence of landlocked countries on South African infrastructure, major investments to improve regional road and rail links was undertaken. These were considered vital to the growth of struggling economies, but to an even more immediate extent, such infrastructure was crucial for the movement of food and relief supplies across the region in times of drought, conflict or other emergencies.



By recognizing the strategic importance of food security, SADCC also made the subject a priority sector for regional coordination. To this end, it established the *Regional Early Warning Unit* which was tasked with consolidating crop information provided by national early warning units of the individual countries, and monitoring trends in regional food security. From their inception, these SADCC mechanisms played key roles in assessing and managing risks by establishing systems for the early detection and response to conditions of potential food shortages. Unlike institutional developments in other regions of the world, these first political engagements with disaster reduction in Southern Africa countries were driven by the protracted ravages of drought or other slow-onset emergencies.

Meanwhile, other political, social, economic and environmental changes have continued to shape the risk landscape in Southern Africa. With rapidly growing populations, many of which are without acceptable levels of social services or sufficient economic opportunities, and increasingly concentrated in urban areas, the countries of the region already know that they can expect to be exposed to more hazardous threats in the future. Since the floods that affected much of the region in 2000-2001, there is a growing recognition in official quarters of a much wider range of sudden threats.



There also continues to be the possibility of more intense examples of slow emerging conditions of drought and disease, exacerbated by variations in climate, increasingly fragile natural environments, and persistent impediments to national development that affect human livelihoods.

These concerns have provoked recognition at the highest political levels of the pressing need to focus on regional cooperation and to allocate more resources to risk reduction. This context has driven SADCC's successor organization, the *Southern African Development Community (SADC)*, to devote considerable attention to issues of public vulnerability, irrespective of whether potential disaster threats result from climatic hazards or conditions of poverty, and even more recently, disease. While SADC's technical engagement in disaster reduction has continued to evolve, it is important to note that the overall purpose of the reconfigured regional political community is to foster the economic integration and the promotion of peace and security among its 14 member countries.

SADC has taken an initiative to develop disaster management as a regional priority, with the establishment of an *Ad Hoc Working Group on Disaster Management* in 1999. An *Extraordinary Summit for SADC Heads of State and Government* was convened in Maputo, Mozambique in March 2000 to review the impacts caused by the floods across the region. At this summit, representatives of the SADC countries expressed the need for improved institutional arrangements for disaster preparedness and management of similar risks in the future.

Efforts have now been initiated to develop greater cooperation within the region to reduce risk generally, and to focus more attention specifically on anticipating, mitigating and responding to sudden-onset natural hazards, such as cyclone-triggered trans-boundary floods. Moreover, some of the national governments in the region are in the process of amending their own disaster legislation to place greater emphasis on the anticipation and reduction of natural and other related risks.

In May 2000, the *SADC Sub-Sectoral Committee on Meteorology Meeting* was convened. There, the Directors of National Meteorological and Hydrological Services (NMHS) in the SADC countries recommended that a regional project

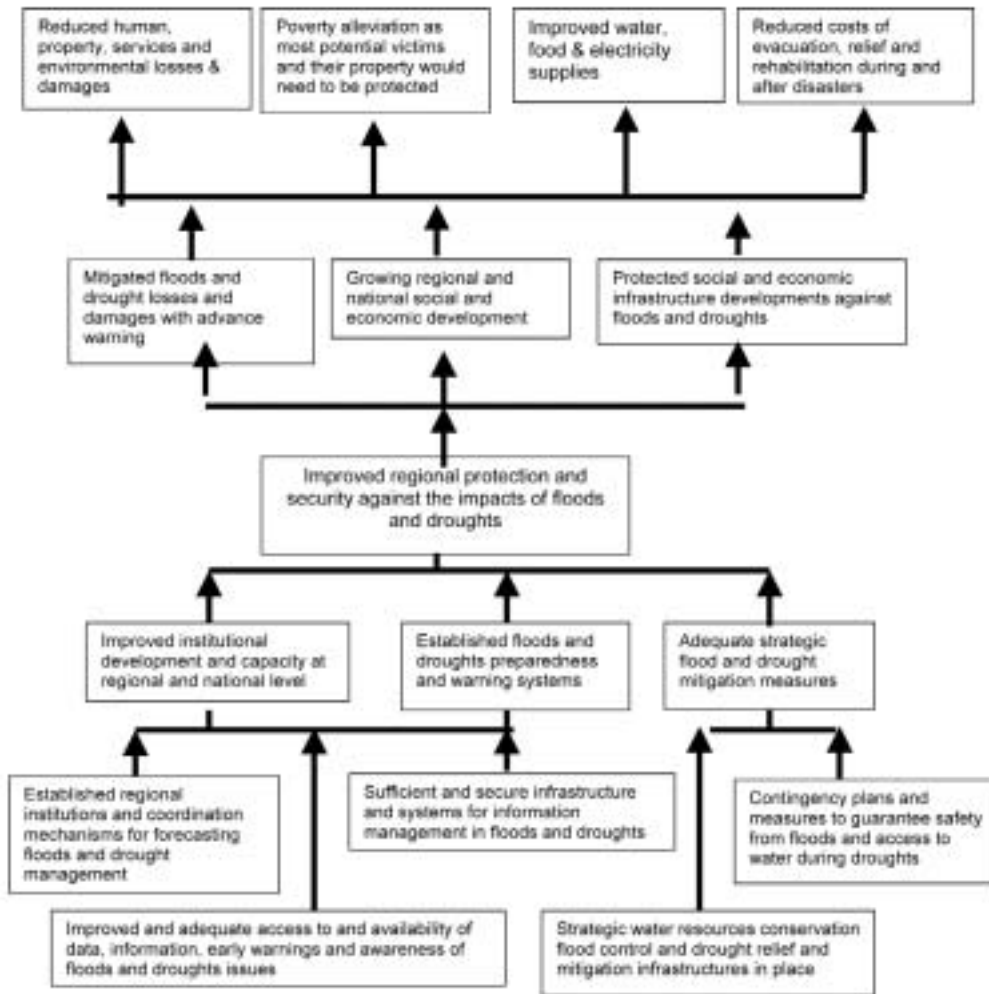
be formulated to address and strengthen the local capacities of national meteorological and hydrological services for early warning and disaster preparedness. A month later, the *SADC Committee of Ministers for Water* recommended that a strategic and coordinated approach be developed to manage floods and droughts within the region. These decisions underlined the particular importance attributed to coordination of the technical abilities required to contribute to the early warning of natural disasters and to ensure the effective implementation of related preparedness and mitigation activities. By August 2000, the SADC Council of Ministers approved an overarching *SADC Disaster Management Framework* for an integrated regional approach to disaster management and established a full *Technical Steering Committee on Disaster Management*. By the end of 2001, SADC had developed and approved a multi-sectoral disaster management strategy for the region, and the *SADC Water Sector Coordination Unit* had drafted a *Strategy for Floods and Drought Management in the SADC Region*.

The SADC's secretariat is in Gaborone, Botswana. It is responsible for developing an integrated disaster management strategy and for coordinating the efforts of other SADC technical sectors whose work directly relates to disaster reduction. Several of SADC's key technical units play critical roles in disaster reduction.

The *SADC Food, Agriculture and Natural Resources (FANR)* sector gives specific attention to the protection of regional food security. Its *Regional Early Warning Unit (REWU)* provides member states and the international community with advance information on food security prospects in the region. This includes providing information about food crop performance, alerts of possible crop failure and other factors affecting food supplies.

The unit also conducts assessments covering food supply and demand, and makes projections on related matters such as food imports and exports, the identification of areas or affected populations threatened by food insecurity, as well as threatening climate conditions that could trigger food insecurity. The FAO has long supported FANR with, among other information, data from its *Global Information Early Warning System (GIEWS)*.

Objectives of the SADC strategy for floods and drought management in the region



Source: SADC Water Sector Coordination Unit, 2001

The *Regional Remote Sensing Unit (RRSU)* of FANR collaborates closely with the Regional Early Warning Unit by working to strengthen national and regional capabilities in the area of remote sensing and GIS applications. It offers a range of specialized services for use in early warning for food security and natural resources management, including training agro-meteorologists in the use of satellite imagery products.

It processes and disseminates a variety of satellite information pertaining to meteorological conditions, vegetation distribution, crop outlooks and other development indicators. It is also used to monitor and map land use patterns, land degradation and desertification conditions. The resulting information is distributed to a wide-range of users throughout Southern Africa, including government ministries, private trading and industrial sectors, banking and finance groups, farming organi-

zations, NGOs, and international development assistance organizations.

While the RRSU has already provided important data related to seasonal flood and drought risk, it anticipates being able to strengthen its capacities in disaster reduction by generating an integrated flood and drought risk profile for Southern Africa in cooperation with the US Geological Survey. In a more general sense, RRSU can assume even wider importance to regional cooperation in disaster reduction as the combined effects of climate variation and the needs for monitoring environmental conditions become more integrated into future risk management practices.

Despite the specific nature of its name, the SADC *Drought Monitoring Centre (DMC)* located at the Zimbabwe Meteorological Service has a primary responsibility to monitor climate extremes, especially as they relate to



droughts and floods. By working closely with all of the national meteorological and hydrological services in the region, and with technical support provided by the WMO, the centre generates highly-regarded seasonal rainfall forecasts and provides additional climate analysis and information. It also produces regional climate data, synoptic reviews and weather outlooks, semi-processed global ocean-atmospheric data, monthly and seasonal forecast updates, and a ten-day drought watch for the SADC region. The centre provides opportunities to develop the technical and analytical abilities of staff, drawn from national meteorological and hydrological services in the region, through a secondment programme. It also manages meteorological and climate data-banks for the region.

Every year, the DMC coordinates the *Southern Africa Region Climate Outlook Forum (SARCOF)*. Beyond playing a crucial role in forecasting seasonal rainfall, SARCOF has proven to be a useful process that extends climate analysis and training practices to an expanding range of multi-sectoral users in Southern Africa. As the awareness of risk reduction becomes a matter of pressing national and regional concerns, and the consequences of changing climatic conditions are more apparent on both environmental and water-related issues, the compilation and dissemination of multi-sectoral information by regional mechanisms such as SARCOF will assume even greater future importance.

Both the *SADC Water Resources Sector* and the *SADC Environment and Land Management Sector (ELMS)* have crucial roles to play in developing policies and strategies for water resources and environment and land management issues in all SADC countries. The water sector has long given attention to the development of cooperative agreements on shared river basins, but the floods of 2000 and 2001 underlined the need for greater attention to regional flood risk, in addition to recurrent drought. The need for interstate cooperation associated with water-related hazards in Southern Africa is particularly acute as there are more than ten shared watercourses in the region, with the largest, the Zambesi River flowing through nine different countries.

The successful implementation of this disaster reduction strategy rests on interaction between

different technical and administrative networks across Southern Africa. In May 2001, an integrated *Strategy for Flood and Drought Management in the SADC Region* was approved for implementation over a four year period. The strategy focuses on preparedness and contingency planning, early warning and vulnerability information systems, mitigation measures, response activities and recovery strategies.

The process involves regular consultations through which the heads of disaster management, early warning, meteorology and water authorities from individual countries in Southern Africa will meet with SADC technical counterparts in order to monitor progress and address impediments to reduce drought and flood-related disasters. This process has been complemented by the US Geological Survey's support for the development of flood and drought maps for the region.

Fifty real-time and coordinated data collection stations are currently being installed in eleven Southern African countries under the *SADC Hydrological Cycle Observing System (SADCHYCOS)*. These stations and the information that they gather are expected to make major improvements in the timely availability of data and to provide more real-time data transmission and the dissemination of essential transboundary hydrological information for flood forecasting. This EU-funded project is being implemented by the SADC Water Sector Resources in association with the national hydrological services of the participating countries.

In addition, the Zambesi River Authority (ZRA) was established by Zambia and Zimbabwe in 1998 to coordinate their decisions on water use, power generation, and upstream and downstream risk consequences of their water management policies. Following the 2000 floods, the ZRA formed a Joint Operations Technical Committee with Hidroeléctrica de Cabora Bassa in Mozambique to share data and technical information about the operations of their respective Kariba and Cabora Bassa reservoirs. Their collaboration is an important example of shared institutional efforts by neighbouring countries to provide early warning for floods and to monitor water levels for power generation. This regional cooperation is furthered by the weekly exchange of data and

by the conduct of monthly meetings during the critical rainy season.

The *ELMS* has undertaken a number of projects related to land use practices as well as the conservation of environmental conditions which can reduce both flood and drought-prone conditions. *ELMS* has also been designated as the coordinating authority within *SADC* for all matters related to climate change, which places it in the forefront of inter-agency cooperation and collaboration to reduce the risk of future hydro-meteorological hazards.

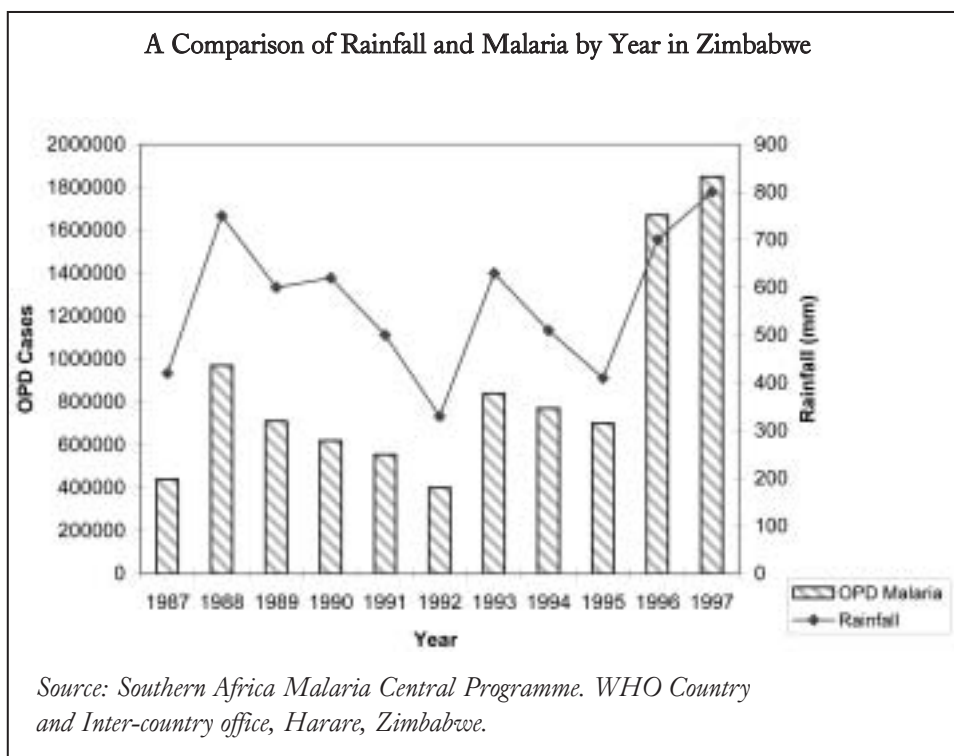
The *SADC's Health Sector* works closely with the *WHO's Inter-Country Office for Southern Africa*, having long recognized the public health aspects of disasters. Programmes such as the *WHO-Southern Africa Malarial Control Programme* address the causative factors of hazards in creating epidemics. The very close correlation that exists between temperature, precipitation and the incidence of malaria in specific locations underlines the essential cooperation between all of these various sectors relating to water, climate, land, environment, health and disaster risk management practices.

While not specifically a *SADC* institution, but sharing a common interest in furthering multi-

disciplinary collaboration, through expanded information exchange, the *Southern Africa Research and Documentation Centre* in Harare, Zimbabwe has published many professional papers and books that demonstrate both the breadth and depth of related interests in the region.

One of the most pressing challenges in implementing progressive disaster risk management laws and policies is the region's pervasive socio-economic and environmental vulnerabilities. When they are combined with the consequences of increased climate variability, such as more intense drought events, as well as cyclones and heavier rainfall, the urgency to position disaster risk reduction becomes an important development priority.

The disaster reduction challenge at the beginning of the 21st century is to link creative and coordinated strategies such as those outlined above that can reduce the impact of future uncertain risks, with ongoing development efforts that can minimize prevailing vulnerabilities and hardships. If risks remain unchecked, they will accelerate an already spiralling trend toward greater disaster-related losses, human inequities, and weakened societies.



Asia



There has been a discernible growth in the attention to policy frameworks and structures for regional collaboration in disaster risk reduction throughout Asia.

In contrast to some other geographic regions, such as Latin America and the Caribbean, the regional collaboration in Asia appears to stem less from the consequences of a single devastating disaster. Rather it appears to result more from shared outlooks emerging from different professional interests. In many of the examples reviewed here, a growing awareness and involvement with broader risk issues is becoming evident in regional forums that previously adopted more narrow concepts of crisis and emergency, or in some cases may not have previously anticipated risk in explicit terms.

It may be difficult at the present time to identify a clear and unambiguous approach to disaster risk reduction among the many cultural, social, and political distinctions in Asian societies, but there is nonetheless a clear movement to identify, and begin to address disaster risks. While disaster management agencies are grappling with the changing world before them, people devoted to other features of national socio-economic development are emerging as potential allies in reducing disaster risk. These include policy-makers and practitioners involved in such areas as environmental management, climate variation, natural resource utilization, regional planning, the construction or protection of infrastructure, education and public communications, and public administration.

Over the past two years, a *Regional Consultative Committee on Regional Cooperation in Disaster Management (RCC)* has been convened by the *Asian Disaster Preparedness Center (ADPC)* with AusAid's support, comprising heads of national disaster management authorities or offices from 24 countries in Asia. Members have endorsed the importance of the RCC as a forum to exchange information and experience regarding national disaster risk management systems. Annual meetings held in 2000 and 2001 have addressed capacity building and reviewed experiences of new legislation, policy and institutional reform, and related planning

processes. Both meetings recommended the wider sharing of experiences to enable countries developing new or modified legislation or institutional arrangements, to learn from the experiences of others in the region, as well as to develop disaster risk management plans at national, provincial and local levels. Through these actions, the RCC has served to consolidate and strengthen regional and sub-regional cooperative initiatives, even though the various priorities and interests of the countries may vary.

Specifically, the second of these meetings urged all RCC member countries to adopt a *Total Disaster Risk Management Strategy* that would represent "a comprehensive approach to multi-hazard disaster risk management and reduction, which includes prevention, mitigation and preparedness in addition to response and recovery." Several primary areas of action were identified to advance this approach in coming years:

- Developing community level programmes for preparedness and mitigation.
- Building capacity within national disaster management systems.
- Promoting cooperation and enhancing the mutual effectiveness of programmes of sub-regional mechanisms such as those of ASEAN, SAARC, SOPAC, ICIMOD and MRC.
- Creating awareness and promoting political commitment through regional initiatives.

The third RCC meeting, to be co-hosted by the Government of India in New Delhi in November 2002, will review the progress made throughout the region.

Information on these initiatives and the experiences of several countries in the Asian region were shared in a regional workshop on legal and institutional frameworks, and planning for disaster risk management held in April 2002 in Bangkok. The workshop, organized by ADPC with funding provided by the ECHO, OFDA/USAID and ADB, provided a venue to share experiences and discuss issues about what is working, and what needs to be improved in the institutionalisation of risk reduction efforts. This workshop provided another opportunity to establish links and to

develop closer working relationships among individuals and institutions involved in disaster management policy and planning in the region. At the next phase, projects will be identified which can assist countries in documenting the processes involved, as well as highlighting best practices to disseminate for the benefit of a wider audience.

In a similar fashion, the *Asian Disaster Reduction Center (ADRC)* has worked to foster cooperation among countries in Asia. A multi-lateral organization for disaster reduction based in Kobe, Japan, ADRC is composed of 23 Asian Member Countries plus four additional Advisory Countries.

By networking with focal points in each government and by facilitating the exchange of disaster risk management information among them, it strives to identify their acute needs and contributes towards the further development of human resources dedicated to the subject in Asia. Beyond its immediate Member Countries, ADRC also works to strengthen networking among other relevant organizations working with disaster risk management in Asia, such as UN-OCHA, UNCRD, ADPC, CRED and OFDA/USAID. It conducts studies and encourages research that will contribute to putting disaster management technologies to practical use. This includes coverage about the use of geographic information systems and satellite information systems, as well as the introduction on its website of new products and techniques that are useful for disaster reduction such as anti-earthquake reinforcement, and methods for preventing landslides.

ADRC has launched cooperative projects to develop the disaster management capacities of Member Countries, based on their respective requests. It provides financial and technical support for selected activities, and then disseminates the outcomes and lessons from the projects among its Member Countries and to other nations around the world. These programmes include the promotion of educational programmes to develop disaster reduction capacities, (community-based flood disaster mitigation project in Indonesia, school educational programme for disaster reduction in the Philippines); activities that increase professional skills for emergency search and rescue

(urban search and rescue training programme in Singapore); furthering the development and dissemination of technical knowledge by inviting visiting researchers from Member Countries to ADRC, and by conducting short-term visitor training programmes.

Regional cooperation is promoted by ADRC's management of an information database on natural disaster reduction in Asia. With a particular focus on matters of legislation, disaster management, training and country reports, their website shares lessons for disaster reduction among Asian countries. ADRC also organizes international conferences and workshops to discuss the status of disaster reduction activities in Asia. In 2002, it held the Fourth ADRC International Meeting in New Delhi, co-organized by the governments of India and Japan, followed immediately by a second meeting of the same regional participants to discuss ISDR involvement in Asia. Later in the year, ADRC and OCHA jointly conducted the Regional Workshop on Networking and Collaboration among NGOs of Asian Countries in Disaster Reduction and Response in Kobe, Japan.

With common objectives but different emphasis, both ADPC and ADRC have cooperated with OCHA to organize consultative meetings of regional institutions, UN agencies and multilateral development assistance organizations. The first meeting was held in Kathmandu in 2001 and more recently in June 2002 another was conducted in Bangkok. This second consultative meeting focussed on the concepts of Total Disaster Risk Management and discussed emerging international partnerships for reduction of risk and vulnerability to natural hazards with additional partners in the region. These included the longstanding interaction with UNDP programmes and IFRC activities in South East Asia, as well as further collaboration with the USAID Regional Office in Manila and the European Commission's regional DIPECHO programmes based in Bangkok. Additional interests in regional cooperation for total disaster risk management strategy were expressed by the Asian Development Bank, the International Institute of Disaster Risk Management (IDRM), Emergency Management Australia, ICIMOD, and ASEAN.



The 11th ASEAN meeting was held in Chiang Rai, Thailand, in August 2000 and endorsed the urgent development of an *ASEAN Regional Programme on Disaster Management (ARPD)*. With technical assistance extended by ADPC and financial support provided by the European Union, the ASEAN secretariat and member countries have reached an advanced stage of planning. This new regional programme will guide cooperative action in ASEAN member countries in the following core areas of activity:

- Planning and conducting joint projects.
- Collaborating on research and encouraging networks among member countries.
- Building capacities and developing human resources in areas of priority concern.
- Sharing information, best practices, and disaster management resources.
- Promoting partnerships among various stakeholders including government authorities, NGOs, community and international organizations.
- Promoting advocacy, public awareness and education programmes related to disaster management.

The ASEAN Regional Forum (ARF) is another regional platform composed of the ASEAN countries and 13 additional dialogue partners (Australia, Canada, China, Eu, India, Japan Korea, Mongolia, New Zealand, Papua New Guinea, Russian Federation and USA). It is convened to develop mutual confidence-building measures and to promote dialogue on regional security concerns. Under its umbrella, several groups have been established to promote cooperation in specific areas including disaster relief and marine search and rescue. Four inter-sessional meetings on disaster relief have taken place in Wellington (1997), Bangkok (1998), Moscow (1999), and Hanoi (2000). These meetings have included delegations from ministries of foreign affairs, defence, and disaster management from all ARF member countries and have thus provided a unique platform for discussions at high levels focussed on multiple aspects of disaster management. In addition to these meetings, some specific achievements of ARF include a series of training activities, developing a matrix of past cooperation in disaster relief among member countries, conducting an inventory of early warning

systems and drafting guidelines for post-disaster responsibilities.

Among the seven countries which belong to the *South Asia Association for Regional Cooperation SAARC* (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka) issues of disaster risk management have been periodically touched upon by the *SAARC Technical Committee on Environment, Meteorology and Forestry*. A regional study was conducted on the *Consequences of Natural Disaster, and Protection and Preservation of the Environment* in 1992. Most recently at a meeting of the Technical Committee in January 2002 reference was made to “the need for mechanisms to promote capacity building and technology transfer to support natural disaster management”. It was further stressed that together with concerns about the negative impacts which climate change exerts in the region, a common South Asian position should be developed on these issues in international forums.

There have also been regular and continued endorsements of inter-state cooperation in natural disaster management and resulting declarations at SAARC Summit Meetings, even if they have seldom occupied primary attention among the many regional issues, typically on the agendas. However, at the most recent 11th Summit Meeting of SAARC held in January 2002 in Kathmandu, the view was more explicitly expressed as, “the Heads of State or Government felt a strong need to devise a mechanism for cooperation in the field of early warning, as well as preparedness and management of natural disasters, along with programmes to promote the conservation of land and water resources”.

As all SAARC member countries are exposed to similar hazards, they have much operational experience in disaster risk management that could be exchanged to a considerably greater extent than is currently the case. Important areas that could benefit from cooperation include training, the exchange of both operational and technical professional information, the exchange of government officials, and coordination in policy formulation and implementation, especially in the case of disasters affecting neighbouring countries. The reduction of risks associated with transboundary hazards is a particularly urgent area in which to expand formal

mechanisms among SAARC countries for cooperation and improved coordination.

There are other technical frameworks in Asia that focus increasing attention on the consequences of natural hazards. The application of seasonal climate prediction and forecasting as an integral part of comprehensive risk management is one such example. The unprecedented breadth of impacts associated with the El Niño/La Niña events during 1997-99 across many sectors in South East Asian countries underlined the need for effective, and continuing, risk assessments. As climate became accepted as a major determinant in contributing to recurrent risks, the meteorological services of the region have worked in close partnership with an increasingly wide range of sectoral agencies.

Regional institutions such as ADPC have also become more involved in working with national agencies and technical institutions to study the impacts of past extreme climate events in order to anticipate and mitigate the impacts of future occurrences. Innovative capacity-building activities have brought together specialists from a variety of resource management responsibilities to assess and manage the common risks posed by climate variability. In May 2002, a two-week workshop on the applications of climate information was organized jointly by ADPC and the Thai Meteorological Department. It brought together, for the first time, meteorological forecasters, water resource managers, agriculture sector managers and food logisticians. By working together and blending their respective professional talents, the participants assessed the risks posed by climate variability in the region and worked to develop strategies to minimize or reduce those risks. Such activities illustrate a gradual movement towards the introduction of risk management concepts in other resource management sectors beyond traditional or singular disaster management organizations.

International relationships at the regional level are a key requirement in the development of effective flood early warning systems as rivers pass from one country to another. The development of expanded institutional capacities of the Mekong River Commission over the years is a fine example of good regional cooperation among countries in the Mekong River Basin in Southeast Asia.

The *Asian Urban Disaster Mitigation Programme (AUDMP)* is being implemented by ADPC with core funding provided by OFDA/USAID. It is founded on the overarching belief that loss of life and property from disasters hinder sustainable development, and that such losses can be reduced if appropriate methodologies are introduced through different aspects of city administration. With a concentration of both risks and resources, cities can represent a crucial focus to reduce vulnerability.

Early warning in Cambodia

Although there is a system for tracking river levels, there is still no proper early warning system that will provide information to disaster-prone populations, and there is no centralized information centre. To address this and other issues, the UN Disaster Management Team in Cambodia is currently supporting the development of a regional network for disaster management and mitigation in the Mekong countries. This is to reduce the vulnerability of the poorest residents to the negative impacts of disasters and to protect broad based development gains.

Response to ISDR questionnaire from Cambodia, 2001.

The programme's goal is to reduce disaster vulnerability of urban populations, infrastructure, lifeline facilities and shelter in Asia by establishing sustainable public and private sector mechanisms for disaster mitigation. As good governance and decentralization of governing responsibilities are high on most countries' political agenda, AUDMP promotes country initiatives that can demonstrate the worthwhile value of strategic approaches to urban risk reduction as part of urban development planning processes.

Working to common standards in association with partner organizations in 10 Asian countries, AUDMP works to build the capacities of local authorities, national governments, NGOs, businesses and others institutions that can contribute to urban disaster mitigation. Primary tools employed are facilitating organizational networks, sharing knowledge and successful experiences and promoting dialogue among key stakeholders. By these means, it is anticipated that successful mitigation approaches can be replicated in other cities and countries worldwide.



Risk reduction practices employed include physical measures such as flood protection embankments or safe building designs, but they also include the promotion of other practical measures ranging from legislation, training, public awareness and advocacy that further risk reduction. AUDMP support activities ranging from hazard mapping to creating improved policy environments in disaster-prone countries.

Information on these initiatives and the experiences of several countries in the Asian

region have been shared further in a Regional Workshop on Legal and Institutional Frameworks, and Planning for Disaster Management held in April 2002 in Bangkok, Thailand. The workshop provided a venue for sharing experiences and discussing crucial issues about the development of disaster risk management policies, legal and institutional frameworks, and the development of specific plans. The next phase of the projects initiated by ADPC will assist the countries to document the process as well as best practices, which can be disseminated for

Demonstration projects undertaken by AUDMP partner organizations in 10 Asian countries vary widely in accordance with local priorities.

In Bangladesh, Cambodia, and Thailand the focus is on floods, while India, Indonesia and Nepal concentrate on earthquakes. The Philippines and Sri Lanka address multiple hazards. Laos is concerned with urban fire, and Viet Nam pursues housing requirements in flood-prone areas. Some of the specific project activities and lessons include the following:

- Hazard mapping and risk assessment: Projects in Sri Lanka and Philippines have demonstrated methodology for development of urban land use plans through integration of risk reduction measures. Projects in Bangladesh and Cambodia demonstrate community-based approaches.
- Mitigation planning and implementation: Lessons learned from AUDMP initiatives demonstrate that the planning and implementation of disaster risk reduction practices should involve government officials, community organizations, and NGOs working in partnership.
- Public awareness and education: Different approaches, tools and products have been used in public awareness campaigns for different audiences in Bangladesh, Indonesia, Nepal and Sri Lanka.
- Capacity building: AUDMP's approach to training, resource materials and continuing education is to develop generic curricula on urban disaster mitigation, which are then adapted and institutionalized at the national and local levels through national partner training institutes.
- Safer building construction: Country projects have carried out detailed analysis of existing building construction practices and the condition of existing building codes, acts, bylaws and/or construction guidelines to find ways to increase the effectiveness. Different initiatives have promoted safer construction in India, Indonesia, Nepal and Sri Lanka.
- Community based approaches to disaster mitigation: As the community is where physical, social and economic risks can be most adequately assessed and managed, community-based disaster risk reduction involves public participation in assessment, planning and implementation activities which take full account of a community's vulnerabilities and capacities. The country projects in Bangladesh and Cambodia specifically focus on the importance of people's perception of flood risks, the purpose and tools of community flood risk assessment, and the strategies for community organizing, resource mobilization and capacity building.
- Policy, legal and institutional arrangements: Sound policies and legislation for disaster mitigation, as well as institutional arrangements that have clear lines of responsibilities need to be in place. AUDMP's project partners in Indonesia and Sri Lanka have taken the initiative to review country policies related to disaster management.

Table: Sample criteria for accomplished disaster reduction. AUDMP

Basic Principles	Factor Components	Level of Impact	Description
Enactment and Modification of Disaster Reduction Policies	National Level	High	<ul style="list-style-type: none"> The programmes has directly or indirectly influenced national level policies in more than ten countries of Asia. Policy modified or established to facilitate action: at least four
	City Municipal Level	Medium	<ul style="list-style-type: none"> At least eight municipal plans written or revised during the programme period Municipal bylaws modified Municipality level Disaster Management Units established
	Community Level	High	<ul style="list-style-type: none"> The Cambodian project under AUDMP (Flood hazard mitigation programme) is basically a community-based programme. It also influenced the community level. Several community-based initiatives were implemented (e.g., DMC ward No. 34 in Kathmandu Metropolitan City)
Assistance in Integrating Disaster Risk Reduction in Governance	Disaster Reduction incorporated in national plan and policies	Medium	<ul style="list-style-type: none"> Background work done for incorporation in several countries Municipalities in the process of incorporating disaster reduction in their agenda
	Poverty Alleviation and Disaster Reduction	Low	<ul style="list-style-type: none"> Background works done for incorporation in several countries
	State Commitments for Disaster Free Environment	Low	<ul style="list-style-type: none"> Active participation in AUDMP national project by national and municipal governments Indirect commitment expressed by government ministers, secretaries National Committee for Earthquake Safety Day established in Nepal Additional investment of 5% of AUDMP budget from non-AUDMP sources In-kind contribution additional
	Enactment of Regulations for Disaster Reduction	Medium	<ul style="list-style-type: none"> This is found to be a slow and complex process. AUDMP, together with other programmes, has influenced the process in some of the partnering countries
	Creation of Implementation Mechanisms	Medium	<ul style="list-style-type: none"> This is found to be a slow and complex process. AUDMP, together with other programmes, has influenced the process in some of the partnering countries
	Awareness-Raising	Awareness-raising programmes	High
	Awareness-raising materials	High	<ul style="list-style-type: none"> Posters, pamphlets, handbooks, fliers prepared and distributed in project cities Other materials in the process of being prepared
	Institutionalization of Awareness-raising programmes	High	<ul style="list-style-type: none"> Earthquake Safety Day observed in Nepal on an annual basis since 1999. Disaster reduction days observed annually in Sri Lanka and Bangladesh



Basic Principles	Factor Components	Level of Impact	Description
Training	Training curricula and materials	High	<ul style="list-style-type: none"> Improved access to hazard mitigation techniques and skills More than 5% of public and private sector professionals trained in disaster management Number of trained professionals: 150+ Twelve institutions in the region conduct training programmes regularly, based on the training curricula developed under AUDMP
	Training institutionalization	High	<ul style="list-style-type: none"> A network of Asian disaster management training institutions (ADMIT) established 30% annual increase in AUDMP network First year baseline: 25 institutions
Promotion of Public Commitments	Creation and updating of Disaster Mitigation Acts and Regulations	Medium	<ul style="list-style-type: none"> AUDMP process has greatly influenced the process of writing new or revising existing legal process SOP for municipalities written in Bandung
	Creation and Reforming of Disaster Management Councils and Committees	Low	<ul style="list-style-type: none"> Background work done by respective partnering institutions in AUDMP countries and cities leading to realization of needs Disaster management committee(s) created at central, municipal and community levels in Nepal and Sri Lanka.
	Preparation of Disaster Risk	Medium	<ul style="list-style-type: none"> Action Plans created and in the process of implementation in partnering cities Number of operational plans developed: ten
	Reduction Plans and Programmes	Medium	<ul style="list-style-type: none"> This is found to be a slow and complex process. AUDMP, together with other programmes, has influenced the process in some of the partnering countries
	Public Commitments in Action	Low	<ul style="list-style-type: none"> Community participation in the development process has been a recognized method by countries of the region. AUDMP process has developed it further by implementing community-based disaster risk reduction process in the partner cities
Community Participation	National Commitment	Medium	<ul style="list-style-type: none"> All the demonstration projects in AUDMP have developed mechanisms for community participation in disaster mitigation work as appropriate to the countries
	Setting up of mechanisms of community participation	Low	<ul style="list-style-type: none"> Need for improvements realized in countries where it was lacking, but there has not been significant progress in legal status of NGOs in those countries.
Enhancing Role of NGO	Improved legal status	High	<ul style="list-style-type: none"> Partnership mechanism established, but need to make sustainable
	Mechanism of Partnership	Low-Medium	<ul style="list-style-type: none"> Tremendous increase in the responsibilities. A successful NGO working in Disaster Risk Reduction is overwhelmed by the increase in its responsibilities as perceived by the government, the community and even by the private sector. This is expected to create the demand for improved legal status in countries where it is yet lacking.
Internalizing disaster reduction as a way of life and culture	Responsibility enhancement	Medium	<ul style="list-style-type: none"> Demands for improved safety started being expressed from the population Fatalism greatly reduced in project influence areas and zones, but need to sustain the efforts: Examples are: <ul style="list-style-type: none"> - People bought in, even in Bandung where there was no earthquake during the past several hundred years. - Success in Kathmandu Valley, Nepal; Bandung, Indonesia; Ratnapura and Nawalpitiya in Sri Lanka

Challenges for regional interaction in Asia

The following issues have been cited by Asian practitioners as contributing to either sporadic or inconsistent attention being accorded to disaster risk reduction in international exchanges or regionally-based endeavours:

- ✓ Tunnel vision that relegates risk awareness to marginal consideration in contrast to predominant political visibility in responding to disasters that have occurred.
- ✓ Different constituencies and mandates pertaining to various sectors of disaster risk management.
- ✓ Scarcity of resource allocations for risk reduction, in contrast to emergency response.
- ✓ Weak or inconsistent reliance on dynamic risk assessments in national development strategies.
- ✓ No single umbrella organization representative of regional interests and priorities related to disaster risks.
- ✓ Lack of awareness, policy or economic motivation to include disaster risk impact analysis in project design.
- ✓ Different, over-lapping or over-looked, geographical coverage of countries' or donor's interests and project distribution.
- ✓ Lack of programmatic mechanisms for matching regional providers with local needs – decisions often influenced more by political affinities than potential disaster risks.
- ✓ Nationalist motivations, or competing initiatives and duplication among donor interests.
- ✓ Bilateral versus multilateral initiatives, donor, or supply-side influenced projects.
- ✓ National policy objectives contrasting with broader regional collaboration.
- ✓ Insufficient working-level cooperation and knowledge transfer, duplication of information collection and dissemination.
- ✓ Limited opportunities for dialogue on a regional level. Lack of structured communication and knowledge of other agencies' programmes.

the benefit of a wider audience. The following table gives an indication of criteria being considered as suitable measures to gauge accomplishment in selected areas of responsibility across the region.

From the AUDMP experience, the following conditions highlight current constraints which remain to be addressed:

- Lack of interest and willingness of governments and organizations to take responsibility.
- Other political preoccupations or institutional impediments.
- Scarcity or non-allocation of funds and human resources.
- Lack of awareness of roles of other agencies.
- Lack of recognized mechanisms for information sharing and coordination.
- Lack of consistent donor policies or limited donor collaboration.
- Cooperation not sufficiently institutionalised within countries, so that if a key individual leaves, cooperation and collaboration may lapse.

- Different, overlapping concepts of sub-regions, or even definitions of the Asian region.

The extent of cultural variation and political diversity across Asia works against regional cooperation. However, at least some of these limitations could be overcome, or measures taken to resolve them if the international donor community and regional organizations alike could work towards a more consistent and focussed approach to accord disaster risk reduction a more distinctive and visible role in development strategies.

Pacific small island developing states

Pacific small island developing states and territories quite diverse in their physical and economic characteristics and exemplify many different cultures, languages and traditional practices. Most of these island countries comprise tiny areas of land widely dispersed throughout the Pacific Ocean, so that even within single countries, the distance between islands can be enormous.



The scattered distribution of these island states, together with their small size and relative isolation, makes development activity distinctive from other parts of the world and quite costly. Human settlements range from traditional rural villages where most people live, to rapidly growing modern, commercial cities. There are many forms of land tenure throughout the region, but most are based on communal land ownership through which a large amount of joint community control is retained over the use of land and the exploitation of natural resources.

Despite a popular portrayal of the South Pacific as a region of islands with serene beaches, blue lagoons, and an idyllic lifestyle, SIDS have very fragile ecosystems. At the beginning of the 21st century there is now a greater concern growing about the longer term consequences of climate change and rising sea levels.

For this reason, Pacific SIDS have been committed to the implementation of development projects to reduce risks to people and property, and have worked continually to strengthen their national and regional resilience to hazard impacts. The historical record of specific disaster reduction initiatives, albeit quite short, also

shows that Pacific SIDS have taken a very positive approach both in traditional and more contemporary ways to enable Pacific islanders to maintain their way of life.

The management of disasters is widely recognized in the Pacific as a national concern, although it is equally understood that strengthening regional linkages and fostering a sense of common purpose improves overall disaster and risk management capabilities. The similarity of hazards that Pacific SIDS face, the shared problems they experience, and a generally common approach adopted in their institutional arrangements all provide a fruitful basis for regional cooperation.

However, as some types of disaster occur only rarely, governments and communities find it difficult to maintain a high level of awareness and preparedness. The resources available for disaster mitigation also have changed over time. Governments became involved in disaster assistance early in the colonial era, taking over responsibilities at independence, often by providing considerable assistance for immediate relief or to assist in rehabilitation after a disaster. Later, such aid came to be understood by both donors and recip-

Progress in the Pacific

There has been admirable progress of well-structured programmes for disaster risk management in the Pacific, all guided by regional consensus, and with each one championed by respected regional organizations:

- From 1990-1999, the IDNDR provided a common purpose and an international structure to address a shared need of disaster reduction across Pacific SIDS.
- In 1993-94, Pacific SIDS developed a common programme on Natural Disaster Reduction in Pacific Islands Countries, presented at the World Conference on Disaster Reduction in Yokohama, Japan, 1994.
- From 1994-2000, the UNDP South Pacific Office supported the *South Pacific Disaster Reduction Programme (SPDRP)*, which proceeded in two phases: 1994-1997 and 1998-2000.
- A Tripartite Review conducted by UNDHA-SPPO-SPDRP in 1996, led to a *Regional Disaster Management Framework* being formulated in September, 1997.
- Widespread discussion ensued about the best way to institutionalise a collective regional strategy for disaster reduction, with direction being provided by the *Alafua Declaration* adopted by the Pacific Island Forum in September, 1999.
- UN-ISDR in 2000, coincided with plans to conclude the SPDRP and to constitute its successor, the *South Pacific Applied Geoscience Commission – Disaster Management Unit (SOPAC-DMU)*, from July 2000.
- With the design and official endorsement of a Regional Programme Plan, SOPAC-DMU embarked on an implementation process for the next three years from 2001-2004.
- Future directions will be guided by the innovative *Comprehensive Hazard and Risk Management Project (CHARM)*, an integrated risk management framework and practice to manage unacceptable risks in the Pacific SIDS, in the context of national development planning, encompassing both regional and individual country initiatives.

ients as unencumbered assistance. As the amount of disaster assistance has increased sharply over recent years, with the expanded involvement of bilateral and international assistance agencies as well as private voluntary groups, so too has been the consequence of community dependency.

During the 1980s, the UN Coordinator for Disaster Relief Operations supported disaster preparedness and response activities in the Pacific by providing technical and financial assistance for disaster management seminars, workshops, and planning exercises. In October 1990, a *South Pacific Programme Office (SPPO)* was established in Suva, Fiji, to act as the coordination centre for these activities. During the past decade in particular, this proactive approach to disaster management has become more prominent in the evolution of a regional strategy and in the development of individual national plans.

Later, during much of the nineties, the overall objectives of SPDRP proceeded in both its first and second phases to:

- Strengthen human resources and institutional capacity to manage the effects of natural disasters effectively and rapidly.
- Provide appropriate technical support materials for disaster management at national, local and community levels.
- Establish a disaster management information system.
- Achieve an acceptable and sustainable level of regional cooperation and collaboration.
- Empower communities to reduce their vulnerability to natural disasters.
- Establish training capacities at regional and national levels.
- Increase national capabilities to reduce natural disaster risk through development and implementation of mitigation measures.
- Strengthen sustainability through improved regional and national coordination, including mutual support.

To achieve these objectives, activities were clustered under six key programme components:

- In-country training and technical assistance.

- Regional training.
- Disaster mitigation activities.
- Regional support materials.
- Information management.
- Regional cooperation and coordination.

Although SPDRP was planned and coordinated on a regional basis, a high level of support and activity was demonstrated by individual Pacific SIDS. The collective programme also provided a mechanism for international donors to target their assistance for the region as a whole, in a coordinated and focussed way that successfully avoided both duplication of effort and inter-agency competition on all sides. Financial, material and technical support for disaster reduction activities was channelled through SPDRP by Australia, China, Germany, Japan, Netherlands, New Zealand, UK, and US.

In the South Pacific, a risk assessment project, known as the Pacific City Project is being implemented by the South Pacific Applied Geoscience Commission (SOPAC) in the capitals of Pacific SIDS. The project was originally based on earthquake related hazards, but it will now be extended to include other hazards. A micro-zoning map is now in place for the seismic hazard maps.

Response to ISDR questionnaire from Tonga, 2001.

An integral part of the SPDRP was the Pacific Regional IDNDR programme, greatly facilitated by the interest and support of the Australian National Coordination Committee for IDNDR, which encouraged this coordinated regional approach by funding 31 country projects. It also supported several other regional projects, conducted both regional and international meetings, and maintained an active programme disseminating information.

A study by a Fijian, A. Kaloumaira (SOPAC-DMU, 1999a) highlights the state of capacity-building for Pacific SIDS in 1999 in terms that reflect the incorporation of mitigation strategies into national government and non-governmental systems. As the following excerpt points out, the relevance, and therefore the efficacy of disaster reduction is heavily dependent upon the extent that it reflects prevailing social, cultural, and environmental interests of the people it is intended to serve.



The *South Pacific Applied Geoscience Commission Disaster Management Unit (SOPAC-DMU)* was established in July 2000. It was created to provide an expanded approach to disaster risk management throughout the region while maintaining a positive relationship to the previous decade's UNDP-SPO SPDRP programme and its resulting partnerships.

The present goal of the SOPAC-DMU project is to strengthen national disaster management programming capacities and to integrate risk management practices within the economic strategies of countries in order to achieve long-term community resilience. This will be implemented through the CHARM programme, a comprehensive strategy based on sustainable hazard and risk management, but one that also seeks to achieve greater effectiveness in disaster response and recovery practices following disasters.

In addition to the annual Pacific Regional Disaster Management Meetings, other SPDRP-initiated activities are continuing in the SOPAC-DMU programme. Information is disseminated regularly through the publication of SOPAC-DMU quarterly reports and a newsletter. Other major efforts continue to

engage the commitment of international agencies and to develop expanded partner relationships through formal memorandums of understanding with foreign government agencies and international institutions.

The current strategy for improving Pacific regional collaboration rests on two primary objectives: to establish a highly functional coordinating body (SOPAC-DMU), and to strengthen the capacity of national risk officials to accomplish effective disaster management programmes domestically. As no formal institutional mechanisms existed to promote this type of regional collaboration in support of country programmes, this has become a priority. It is also expected that various CHARM strategies will lead to a redefinition of NDMO roles and responsibilities in a number of countries, as disaster risk management is integrated within mainstream government planning. Therefore, advocacy at senior levels of responsibility and appropriate professional development strategies will also receive priority attention.

Comprehensive Hazard And Risk Management (CHARM) programmes are keys to optimising the efficacy of donor aid and achieving sustain-

Pacific Islanders have inherited a resilient social system. The strength of this system is in its extended family values and communal mechanisms that link to national systems. It requires only a little bit of restructuring and advocacy to integrate these into a practical organizational framework that will foster ownership, and promote joint participatory approaches to mitigation management between government and other stakeholders.

The challenges on island nations arise from the expanding progress of development on an essentially limited volume of natural resources. This has forced development to encroach into adverse environments, rapidly increasing community vulnerability to natural disasters. Increasing awareness of mitigation measures through science and technology alone cannot foster preparedness. Strengthening the complementarity between science and the technological tools with the social and humanitarian aspects has to happen.

Mitigation for Pacific disaster managers is in effect being good facilitating managers. It calls for skills to build operational networks so as to entuse effective use of local resources. It requires forging collaborative efforts and technical competence. It needs building partnerships to equip stakeholders for effective field operation.

In the past years, island nations have each established a strong national coordination unit. Importantly, each nation has developed a national disaster management plan that establishes the management structures and allocates responsibilities to key organizations. The support plans and operational procedures are the critical forum that organizes the complexity of community involvement into a system that works in partnership with government.

Mitigation pilot projects through this facilitative management approach are providing the building blocks that successfully incorporate mitigation planning into national systems."

Source: A. Kaloumaira, SOPAC-DMU, 1999a

able outcomes within individual Pacific SIDS. While previous work was undertaken to enhance the existing national disaster management capacities and to strengthen institutional mechanisms, it was related primarily to achieving more effective coordination of emergency response activities. More recently, changing outlooks renewed efforts directed toward more comprehensive programming that placed disaster management responsibilities within a broader risk management framework. A knowledge base and institutional arrangements now exist within the Pacific region to commence individual country programmes and regional collaboration.

There are many government line ministries and departments, together with regional organisations, that are currently undertaking risk management projects. Many of these are undertaken in isolation, with very little information sharing or collaborating partnerships being established, which in turn leads to duplication of effort. In order for national officials to identify programming gaps, they must first have a big picture of all the hazards and the risks that exist, together with an overview of what projects are being undertaken or proposed.

Usually it is only the national planning offices that would have this information. However, research has found that there is not usually a matrix that shows all projects and their linkages. The development of the tool as well as its application, need to be supported with skills, training and advocacy programmes. Because of this, the CHARM approach integrates all disciplines from all sectors and allows the product to be assimilated into the national planning processes.

In order to institutionalise the principles on which CHARM is based, strategic approaches have been identified to translate the concepts into practical forms of activity. They are:

- Creating a regional CHARM development strategy: As a new concept, CHARM requires investment in the professional development of senior offices from stakeholders' agencies. It also requires close collaboration with the region's traditional donors and other regional organizations, as it is a tool envisioned to enhance sustainable development and its many subsequent benefits.
- Fostering national development strategies: CHARM involves creating a participatory inter-agency approach among government and non-government agencies. Its execution requires the involvement of key representatives in both individual and group consultations. The key elements of the CHARM process are:
 - Identifying known hazards.
 - Analysing each hazard against national development priorities.
 - Identifying vulnerable sectors in relation to hazards.
 - Identifying risks and determining the most appropriate ways to manage those

Disaster Management Project in the Pacific

"Disaster management is everyone's business. It is a fundamental component of individual, community, business, NGO and government safety and well-being. It is an essential prerequisite for the achievement of community resilience and sustainable development. [To] ensure an integrated and sustainable approach to comprehensive hazard and risk management is achieved, a major function of the Disaster Management Unit (DMU) will be to act as a coordinator to bring together major stakeholder groups representing regional, governmental, community, corporate and NGO interests. In this broker/facilitator role, the DMU will play a pivotal part in identifying, encouraging and assisting in disaster reduction and risk management activities throughout the region and within Pacific island countries."

The **SOPAC-DMU Disaster Management Project** has four key components:

- Establishment and effective management of the new DMU within SOPAC.
- Guidance of professional skill development among key disaster management officials.
- Technical support for the formulation and management of country programmes.
- Promotion of the benefits of risk management among politicians and policy makers.

The **CHARM programming approach** has been developed to:

- Intrinsically link together development priorities and programmes of individual countries.
- Clearly identify gaps within existing or proposed country project activities.
- Enable SOPAC to work closer with its regional partners and to develop the SOPAC-DMU annual work plan and activities schedule around clearly identified country needs and priorities.



risks within realistic time and resource frameworks.

- Identifying what activities or projects are already being implemented or proposed, both at the country level and by regional organizations.
- Identifying programming gaps.
- Identifying possible options for altered development priorities in light of impact scenarios.
- Determining lead responsibilities and agencies for managing the implementation of the risk reduction strategy.
- Training: As a new concept, the development of CHARM will require time and

the collaborative effort of all major stakeholders for it to be fully implemented. In-country training capacities need to be developed and strengthened to drive this process.

- **Strengthening Information Technology Capabilities:** A critical success factor will be to ensure that national disaster management offices throughout the region are equipped with human and technical capacities to manage multi-disciplinary information resources. This will require appropriate technological tools and computer-based information and communication systems.

Comprehensive Hazard And Risk Management (CHARM)

Six underlying strategic principles to underpin the implementation of CHARM:

- Ensure ownership by the national countries.
- Ensure linkages with National Strategic Plans.
- Ensure linkages and harmonizing with existing systems.
- Ensure appropriate communication and consultation with communities, stakeholders, donors and development partners.
- Establish the principle that risk reduction is vital to national development and that CHARM is a powerful tool in the reduction of risk.
- Ensure CHARM is promoted as a public safety tool, a risk reduction change driver, as cost-effective and as part of an agreed regional programme with donor support.

Immediate challenges to CHARM include:

- Reaching agreement on the processes and means to guide a uniform approach among all participating countries.
- Establishing a regional implementation framework.
- Identifying training strategies and other essential implementation supports.
- Marketing CHARM effectively, with a view towards sustainability.
- Advocating for and gaining high level support for its adoption as a national initiative.



Europe



Western Europe

Research is one of the necessary and fundamental pillars of disaster reduction. *The European Commission (EC)* has promoted collaborative research between commercial interests, universities and research centres in the field of disaster reduction, with an increasing budget allocation for this purpose:

- *European Cooperation in the Field of Scientific and Technical Research (COST)*, which started in the 1960's and has the aim of supporting joint European research.
- *European Strategic Programme for Research and Information Technology (ESPRIT)*, which started in 1983.
- *Framework Programme*, started in 1984 as multi-annual research programmes, are summarized below:

Programme	Duration	EU contribution (Euros millions)
1st Framework Programme (FP1)	1984-8	73,750
2nd Framework Programme (FP2)	1987-91	5,396
3rd Framework Programme (FP3)	1990-94	6,600
4th Framework Programme (FP4)	1994-98	13,200
5th Framework Programme (FP5)	1998-02	14,960
6th Framework Programme (FP6)	2002-06	17,500

Source: *European Commission, Directorate General on Research*

In particular, the launch of the multi-annual research Framework Programme marked the move towards a more targeted collaboration between universities, research centres and private companies. Such strategic partnerships were created with the political intent to pro-

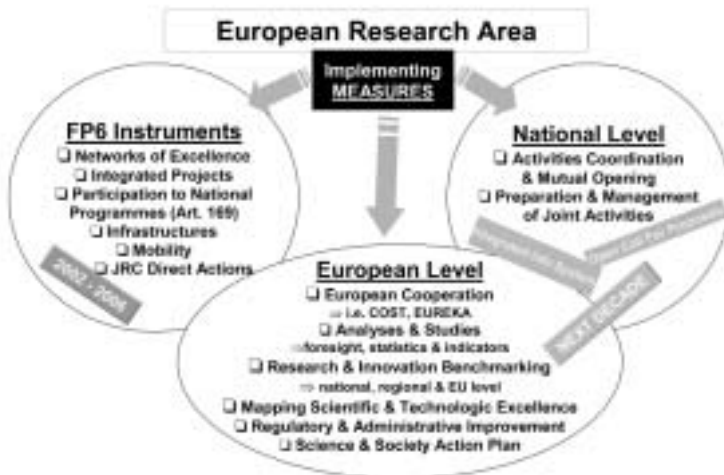
mote social unity in Europe's research community. European research in the field of disaster reduction can be traced back to the EPOCH Programme of 1987-89 and has continued through strengthened political support to the currently envisaged *European Research Area (ERA)* by bringing science closer to the needs of society. Almost 150 research projects have contributed to hazards studies and disaster risk reduction with the support of the EC over the past 18 years.

Another important initiative promoted by the EC is the Global Monitoring for the Environment and Security (GMES) that fills the need for independent information on key issues affecting the world's environment and the security of citizens. It focuses primarily on the use of earth observation techniques for maintaining an adequate long-term watch on key landscape parameters, such as vegetation cover, land use, resource degradation or depletion. It will also call for techniques to support the assessment of natural risks and the management of catastrophic events.

Under the framework of ERA, the EU aims to launch a concerted effort to face problems affecting the economy, society and citizens for which science

holds the key. Furthermore, as sustainable development is a major political objective in the EU's agenda, it demands specific research requiring interdisciplinary approaches. Disaster reduction is one of these areas. ERA can be schematically explained by the following figure:

ERA - background



ERA will work to foster closer collaboration and coordination of research and innovation activities at both the national and European levels by means of networking of key organizations, involvement of main actors, and project integration with EUREKA/“Innovation 2000 Initiative”. The initiative will strive to promote the coherent development of research and innovation policies in Europe by pursuing common targets, benchmarking RTD policies, mapping designated centres of excellence, employing scientific and technological foresight, statistics and indicators, and supporting the improvement of regulatory and administrative environments. Finally, it will strive to ensure the lasting effect of long-term programmes covering elements of variable scale.

Specific research priorities that are dedicated to disaster reduction include the following:

- Mechanisms of desertification and natural disasters where research will focus on large scale integrated assessment of land/soil degradation and desertification; long term forecasting of hydro-geological hazards monitoring; mapping and management strategies; improved disaster preparedness and mitigation.
- Impact of environmental issues on health, including methods for risk assessment and the mitigation of risks of natural disasters to people.

In addition, research will be geared to analysing links between climatic change and natural disasters by concentrating on the development of instruments that can identify and gauge hazards better, or by working to reduce the consequences

of natural hazards such as floods, storms, fires, avalanches and landslides.

Within the sixth framework programme, the *Directorate General Joint Research Centre (DG JRC)* has a key role of supporting policy development through applied research. The JRC will concentrate on issues of natural and technological hazards and will continue to support efforts which develop a European framework for forecasting, assessing, managing and reducing risks in the community. The JRC will carry on with institutional projects in the area of disaster risk reduction, including:

- *Natural and Environmental Disaster Information Exchange System (NEDIES)*
<http://nedies.jrc.it>
- *Natural Hazards*
<http://natural-hazards.aris.sai.jrc.it>
- *European Laboratory for Structural Assessment - Earthquake Engineering (ELSA)*
<http://structural-mechanics.jrc.it>

The JRC will further develop a system approach to the management of these hazards and efforts will be centred around its operation and improvement of harmonised European monitoring systems. A link to the GMES initiative will be developed. The JRC will focus particularly on the development of EU policy applications which contribute to the GMES concept in three areas of work: support to international environmental agreements, assessing risks and hazards, and evaluating environmental stress.

In parallel to the JRC projects, other EC Directorates General are supporting complementary initiatives in disaster risk management. In the DG Environment there are projects which supplement the research carried out in the EU. Some are linked to civil protection areas of cooperation such as:

- Major Project on Prevention
<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpmaj01.htm>
- Flood projects:
PREMO98'
<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpact05g.htm>
Reduce the Risk of Floods in the River Geul Catchment.

<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpact05c.htm>
Flood and Erosion Management in Alpine River Basins.

<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpact05e.htm>
Development of rescue actions based on dam-break flood analysis (RESCDAM).

<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpact05h.htm>
Analysis of the 1993/1995 Floods in Western Europe.

<http://europa.eu.int/comm/environment/civil/prote/cpactiv/cpact05a.htm>

The *European Environment Agency's (EEA)* core task is to provide decision-makers with the information needed for creating sound policies to protect the environment and support sustainable development. It carries out studies on issues such as the impact of extreme hydrological disasters in relation to Europe's water resources. It also supports the EC in diffusing information on the results of environmental-linked research. <http://org.eea.eu.int>

The *EUR-OPA Major Hazards Agreement* constitutes an open agreement on setting up cooperation in major natural and technological disasters. It has been signed by 23 Member States of the Council of Europe. Its aim is to carry out a multidisciplinary study of the cooperation methods through political, scientific and technical activities.
<http://www.europarisks.coe.int>

Central Europe

The *Central European Disaster Prevention Forum (CEUDIP)* was established in 1999 through the joint efforts of the National Committees for the IDNDR from the Czech

Republic, Germany, Hungary, Poland and Slovakia, to continue activities of the ISDR. The specific motivation was to formulate an institutional mechanism that could increase the collaboration in disaster reduction related to all types of hazards, and particularly floods, shared among these neighbouring countries.

Following the shared experience of the destructive Oder River floods early in 1999, the initial interest that stimulated the participating countries was a common desire to improve early warning capabilities both among and within the individual countries. Other issues have emerged subsequently, such as the role of the media in disaster reduction, national legislation about declared emergencies, the participation of civil society in disaster reduction activities, and the preparation of training materials.

The forum has conducted annual meetings since 1999 in Prague, Warsaw, Bratislava and Bonn. The members of CEUDIP agreed at their meeting in 2000 that closer cooperation would be required with EU policies related to civil protection and disaster reduction. As four of the CEUDIP countries are candidates for future membership in the EU, they have assigned particular relevance to assess their present capabilities.

In particular, they have recognized the growing importance of strong and active participation of the public, working through civic groups and other NGOs to supplement the efforts of government institutions and agencies. This approach to foster common and improved regional standards was augmented at CEUDIP's meeting in Bratislava in 2001 when it was agreed to develop a project of cooperation with the EU institutions involved with emergencies, risk and disaster reduction issues.

Future challenges and priorities

In reviewing the accomplishments of regional cooperation, interaction and experience for disaster risk reduction in different parts of the world, two success factors stand out: the sustained commitment of permanent facilities or institutions having the primary objective of promoting the multi-disciplinary aspects of disaster risk management, and an incontrovertible belief in the shared values of countries of the region concerned in their various forums and agendas.

It is clear that both policy interests and material resources must transcend strictly national outlooks. Mobilising regional or sub-regional efforts must support national institutional and capacity strengthening. The examples cited demonstrate that in some instances such awareness is thrust upon a region abruptly as through Hurricane Mitch in Central America, or it may evolve more methodically through shared orientations as is the case for Pacific SIDS.

In all cases there needs to be an established and consistently supported institutional hub that can both promote and respond to multi-disciplinary and inter-state issues related to disaster risk reduction.

The function which these institutions serve as a dissemination vehicle, acting as clearing houses for diverse material that merges political, professional and public interests, should not be overlooked as a critical contributor to building regional collaboration. There is little doubt that the momentum and resulting success that has been realized in terms of regional cooperation owe much to the efforts of both regional and international organizations such as PAHO, OCHA/UNDP, OAS, CEPRE-DENAC, PREANDINO in the Americas, ADPC and ADRC in Asia, and SOPAC in the Pacific.

While SADC and IGAD currently display some initial policy impetus for disaster risk awareness in Southern and Eastern Africa, the fuller realization of practical forms of institutional commitment remain a challenge in Africa. Throughout the Arabic-speaking world and among all European countries, there is an absence of consolidated recognition or material support for a sustained regional focus.

An international framework of regionally focussed institutions could be created that are dedicated to the various aspects of disaster risk management practice.

3.3. Community action

“Much has been learnt from the creative disaster prevention efforts of poor communities in developing countries. Prevention policy is too important to be left to governments and international agencies alone. To succeed, it must also engage civil society, the private sector and the media.”

Kofi Annan, IDNDR Programme Forum, Geneva, July 1999

Risk reduction measures are most successful when they involve the direct participation of the people most likely to be exposed to hazards, in the planning, decision-making, and operational activities at all levels of responsibility. Local leaders, drawn from political, social and economic sectors of society need to assume a primary responsibility for the protection of their own community.

Community processes and actions to accomplish disaster risk reduction is much talked about, in theory, but it is much more difficult to realize in practice. There is however experience to suggest that the involvement of local residents in protecting their own resources is possible and can work – if sufficient attention and investment is devoted to the subject. The salient issues and examples which illustrate successful practice are presented under the following headings:

- The essential role of community action
- Community leadership and relationships
- Increasing community capabilities
- NGO and volunteer activities
- Building local self-reliance: sharing resources, building partnerships
- Dynamics of local collaboration
- Traditional community coping mechanisms at stake

The essential role of community action

Disaster reduction is most effective at the community level where specific local needs can be met. When used alone, government and institutional interventions often prove to be insufficient and frequently are seen to be sporadic and only responding to crises. They are inclined to ignore local perceptions and needs and the potential value of local resources and capacities in the process. As a result, it is not surprising that emergency relief assistance far exceeds resources invested to develop local disaster risk reduction capabilities.

First, communities must be aware of the importance of disaster reduction for their own well-being. It then becomes necessary to identify and impart essential skills that can translate risk awareness into concrete practices of sustained risk management. Such an approach needs to develop activities that can strengthen communities' capacities to identify and cope with hazards, and more broadly to improve residents' livelihoods.

Community

The definition of community in this context refers to a social group, which has a number of things in common, such as shared experience, locality, culture, heritage or social interests.

The Asian Urban Disaster Mitigation Programme (AUDMP) has validated these principles through its activities with local institutions working in local Asian environments. Community-based disaster mitigation is a cross-cutting theme where assessment, planning and implementation are participatory in design and address the community's vulnerabilities and capacities.

Projects in Bangladesh and Cambodia have been built around the concept of specifically focusing people's perception of flood risk; the purpose and tools of community flood risk assessment; the strategies for community organizing, and resource mobilization and capacity building. All of these elements and



strategies contribute to mainstreaming community-based disaster management in poor and vulnerable communities as a cost effective option.

■ Community leadership and relationships

Any system of local planning and protection must be integrated into larger administrative and resource capabilities such as provincial, state and national disaster plans and risk reduction strategies. It is equally important to realize that communities cannot implement community-based disaster mitigation alone.

Viable forms of community-based disaster reduction depend on a favourable political environment that understands, promotes and supports this participation process.

A recent Australian study found that the extent of commitment by local governments to take action depends on emergency managers making the right choices about citizen involvement in planning risk reduction processes. This can build an informed constituency for disaster reduction and drive a real commitment among

elected officials to take action. Key decisions include:

- Objectives to be achieved by involving citizens.
- Areas in the planning process where, and when, citizens participate.
- Which citizens to include.
- Techniques to use in order to obtain citizen input.
- Information that is to be provided to citizens.

Disasters are opportunities for change and community development. Women are participating actively in rehabilitation and reconstruction around the world. Their organizations have a special role to play, and are doing so in several places. “Networks of networks” is an increasing phenomena among community-based organizations and NGOs to share their own experiences among community leaders and groups. One such network linking women’s organizations is the Grass Root Organization Operating in Sisterhood (GROOTS). The following are examples from Gujarat, India, and Turkey, of shared experiences within this network.

People - especially women - rebuilding their own communities in Gujarat

Immediately after the Gujarat, India, earthquake in January 2001, *Swayam Shiksam Prayong (SSP)*, (self-education for empowerment), an Indian NGO, joined many community-based organizations in the recovery effort. Drawing on their prior experience following the Latur earthquake in the Maharashtra State of India in 1993, they proposed a policy, which would not only rebuild the devastated Gujarat communities but reform and strengthen their social and political structures. The central concept was that people – especially women – need to rebuild their own communities. Key elements of the strategy included:

- Using reconstruction as an opportunity to build local capacities and skills.
- Forming village development committees made up of women’s groups and other community institutions to manage rehabilitation.
- Engaging village committees to monitor earthquake-safe construction.
- Redressing grievances at the village level.
- Striving to locate financial and technical assistance within easy reach of affected communities, and not be dependent on its being mediated by others.
- Arriving at a clear definition of the role of local governments in planning and monitoring, information flow, problem-solving, and infrastructure use and development.
- Distributing information about earthquake safety and entitlement to all homeowners.
- Encouraging the use of local skills and labour, and retraining local artisans in earthquake-resistant technology.
- Including women in all aspects of the reconstruction.
- Assigning titles of houses in names of men and women.
- Encouraging coordination among government officials, district authorities and NGOs.
- Seeking to facilitate public-private partnerships for economic and infrastructure development.

www.sspindia.org

Women community groups active in risk reduction and reconstruction

Turkish women displaced by the major earthquake that struck Turkey's Marmara region in August 1999, began organizing themselves immediately after the disaster. Assisted by *the Foundation for the Support of Women (FSWW)* and obtaining funds from NOVIB and the American Jewish World Services they worked together with government agencies, local municipalities, other NGOs and technical professionals.

FSWW built eight women and childcare centres to provide a safe environment for children and a public living room for local women, providing day care services as well as income earning opportunities for women. Additionally, these facilities have become centres for women to consider housing and resettlement problems and priorities, such as:

- The future utility and limitation of temporary prefabricated settlements.
- How to resolve problems of isolation, transportation, local governance, minimal infrastructure and wide-spread unemployment.
- Housing requirements of renters and others who are not legal owners.
- Earthquake safety standards for future housing.

Groups of women go door to door in their community to gather basic information about their settlements, to publicize meetings and to increase participation. The women discuss problems, consider solutions and their own role in motivating changes. They invite experts to their centres, visit construction sites, prioritise a list of officials to contact, and devise strategies to hold authorities accountable for the information they provide and the promises they make. They visit local authorities to get information about reconstruction activities and then post their findings at the centres, the settlement administration office, shops and schools.

In all eight centres a women's group meets regularly with local officials. They also exchange strategies across centres. In Izmit, they signed a protocol with the City Council and another with an organization responsible for the local implementation of Agenda 21 to develop policy proposals on the future of prefabricated settlements and housing safety in the region. Local authorities have started to understand that the women serve an effective communication function within the community.

The most important lesson women feel they have learned is that resettlement is a long process that requires ongoing monitoring. The following lists the women's response to work they are doing:

- Are more confident and feel stronger.
- Have begun to see that they can influence the decision-making process if they act together.
- Believe that only a common and widespread sense of responsibility in the community can promote public safety and mitigate the effects of a new earthquake.
- Are comfortable with the technical language related to construction and can question safety and quality standards.
- Can understand infrastructure issues.
- Can do repairs and become plumbers, electricians and carpenters for the benefit of the community.

Source: *Huairou Commission Newsletter, volume 3, No. 1, April 2001*

Increasing community capabilities

Inhabitants of local communities are potential victims of natural disaster. They also represent the greatest potential source of local knowledge regarding hazardous conditions, and are the repositories of any traditional coping mechanisms suited to their individual environment. Furthermore it is their personal assets, physical property, and way of life that are likely to be threatened by hazard.

It is little wonder that it is the local population which responds first at times of crisis. They are also the last remaining participants as stricken communities strive to rebuild after a disaster. Given these conditions, it is striking that the participation of local communities often proves to be problematic in so many disaster risk management strategies. There are several constraints or reasons why this may be so, and each points to a lesson for effective engagement of community participation.

A bottom-up approach is needed to promote change. Local communities are those most aware of historical risk scenarios and the ones closest to their own reality. It is not only a question of public awareness, it is a question of local community groups having the chance of influencing decisions and managing resources to help reduce vulnerability and to cope with risks.

Neither the widespread dissemination of prior experience nor the abundance of scientific and technical knowledge reaches local populations automatically. An informed and sustained programme of public awareness is essential to convey the benefits of experience to vulnerable communities in terms that relate to local perceptions of need.

The effective use of knowledge not only requires wide dissemination, it must also be presented in a way that relates to local conditions and customs own conditions and risks. While this has long been accepted as a cardinal principle for development accomplishments, it has remained a difficult principle in many disaster risk reduction strategies.

The realization of virtually all disaster risk reduction is essentially local in nature – and that requires community action.

In every community, knowledge, professional abilities, and experience fashioned from adversity can be found, but seldom are these resources called upon or fully utilised. A special effort is required to recall locally valued traditional coping mechanisms and strategies. Modern concepts can provide innovative approaches. The advantages of modern technology, such as those provided by GIS or access to satellite weather forecasts need not diminish the values of traditional wisdom. Vietnamese villagers maintained irrigation channels and protective dykes for a reason, just as Pacific islanders were guided in their choice of materials and construction techniques in building their earlier disaster-resistant houses.

NGO and volunteer activities

Experience demonstrates that NGOs involved in disaster risk reduction are focussed primarily on public awareness activities and advocacy programmes. They particularly seek to encourage the desired shift in emphasis from emergency assistance and disaster response to the more engaged roles of local community participation in planning, vulnerability assessment, and risk management practices.

Some Asian countries, such as the Philippines, Bangladesh and India have elaborate policies, strategies, legal and operational mechanisms to accommodate the participation of NGOs and community based organizations in all aspects of national development. But the extent to which they have embraced risk reduction activities is still modest. In the Americas, there has been a recent spurt of interest in the subject. The results of that remains to be seen. In Africa, a handful of small initiatives seem to be as much a consequence of recent or continuing threats than representing a fundamental shift in policy awareness or local community commitments.

● Case: Philippines

In the Philippines, the *Citizen's Disaster Response Network (CDRN)* is a national network of 14 NGOs that promotes community-based disaster preparedness work. Since its inception in the early 1980s, it has conducted campaigns and advocacy work to mitigate the impacts of disas-

ter. By working together with communities, CDRN has developed strategies to enhance people's capacities through community organizing, forming village-level disaster response committees, developing local early warning systems, organizing rescue teams and diversifying local sources of livelihoods. Receiving little external support from donor agencies, it has reached hundreds of villages and initiated community-based disaster mitigation initiatives.

● Case: Bangladesh

To reduce the vulnerability of flood-prone communities in the Tongi and Gaibandha municipalities of Bangladesh, *CARE Bangladesh* has adopted a community-based approach working in collaboration with partner NGOs in the municipalities and with the Disaster Management Bureau of the Government of Bangladesh.

This urban disaster mitigation project, funded by OFDA/USAID and managed by ADPC's Asian Urban Disaster Mitigation Programme, began by motivating community volunteers to conduct baseline surveys and vulnerability assessments. Through this initial activity, different community groups recognized the importance of their joint community participation and how each could contribute to practical risk reduction activities. This project emphasized the importance of promoting hazard and risk awareness among community groups and sought to involve collaborators in other subject areas by placing community-based disaster risk management issues on the political agenda.

Since 1998, in order to promote community awareness about the value of disaster risk reduction, the government of Bangladesh has designated the last working day of March as National Disaster Preparedness Day. In 2001, this national day was organized jointly by the Tongi and Gaibandha Municipality Disaster Management Committees, *CARE Bangladesh* and other partner NGOs.

● Case: Zimbabwe

The *Community Drought Mitigation Partners' Network* is an NGO network chaired by the local NGO *SAFIRE* and aims to promote and

strengthen drought mitigation in Zimbabwe. The current members, ENDA, ORAP, ZFFHC, World Vision and Zimbabwe Projects strive to implement joint community-based risk reduction projects, conduct public debates on drought mitigation, and produce and distribute the *Living with Drought* newsletter. These efforts seek to share lessons that have been learned and recent scientific research results related to disaster reduction. Meetings are also convened between rural farmers, scientists and innovative farmers.

A similar regional network is the anticipated *Southern African Drought Technology Network*. It will work to facilitate the sharing of information among small-scale farmers, NGOs and community-based organizations working with rural food security, agricultural research institutions, agricultural extension work, and agribusiness on drought-coping strategies that are responsive to the needs of the rural poor. Community-based disaster risk reduction initiatives are well developed in Zimbabwe, but documentation of successful practices must still be improved. It will be important to complement this with further research to feed into the national disaster management plans and strategies.

● Case: Germany

The *Community Action Group for Floodwater in the Old Community of Rodenkirchen (Bürgerinitiative Hochwasser, Altgemeinde Rodenkirchen)* is a non-profit association in a district of Cologne, founded after the severe flooding of the Rhine River in 1993 and 1995. This self-

“We are convinced that protection against flooding can only be successful in the long-term if all inhabitants along the river perceive themselves as a community working in solidarity with each other. As we ourselves have experienced with our own considerable efforts and the many setbacks we have suffered, acting together does not come naturally but, rather, it is a product of knowledge, experience and conviction, mediated through communication – and this is best achieved through personal contacts.”

Speaker for Community Action Group for Floodwater in the Old Community of Rodenkirchen, Cologne, Germany



help group advocates the interests of more than 4,000 residents in matters of local flood protection. It strives to achieve a balance between the legitimate protection of the population and the aims of a sustainable floodwater policy which also must include the rights of downstream inhabitants and the river as a whole. This means, for instance, that while the group supports the construction of polders on the upper reaches of the Rhine and its tributaries, it also expects the city of Cologne to undertake its own considerable efforts to ensure that any retention areas which are sacrificed as a result of structural mitigation practices are compensated by other natural means of water retention in the municipal area.

■ Building local self-reliance: sharing resources, building partnerships

Disaster reduction depends on the conscious commitment of individuals and communities – understanding and accepting the values of changed behaviour, having access to the technical and material resources necessary for doing so, and accepting the personal responsibility to carry through the efforts involved.

Communities are generally unaware of the hazards they face, underestimate those they know of, and overestimate their ability to cope with a crisis. They also tend not to put much trust in disaster reduction strategies, and rely heavily upon emergency assistance when the need arises.

Taking such a viewpoint into account highlights the need for tools that can create a culture of prevention against all forms of hazards within local communities. This requires the knowledge of practical and low-cost methods which address likely hazards that can be conveyed to a wide-variety of participants including, community groups, trades people, commercial and financial interests and local government employees.

● Case: Indonesia

In recent years, Bandung, Indonesia has suffered repeated floods. The communities most affected are low-income populations. They sel-

dom have ready access to warning information or emergency equipment that would enable them to evacuate or otherwise protect their possessions. Efforts to reduce the risk of annual floods through strategic plans on reducing damage created by disasters are necessary. These plans should include knowledge on protecting lives and assets, encouragement to the community for minimizing risk of disasters, and continuing to improve the quality of life.

In 2000-2001, the government of Indonesia asked the *Bandung Institute of Technology (BIT)* to implement a community empowerment project in cooperation with ADRC. ADRC, located in Japan, learned lessons from the Great Hanshin-Awaji Earthquake in 1995, about how community participation is indispensable to enhance disaster management capability at local level. Thus the project was aimed to enable local residents in the communities to cope properly with flood disasters. Two flood-prone districts were taken as model cases. This project included town-watching, in which local residents walked around their communities with experts such as researchers from BIT and related institutions, to discuss the risk of disaster occurrence and points to be improved for disaster reduction. As a result, local residents themselves proposed specific measures, such as making roadway improvements, constructing protective banks and better defining the watercourse in order to reduce future flood risks.

● Case: selected Asian countries (India, Indonesia, Nepal, and Uzbekistan)

The United Nations Centre for Regional Development/Disaster Management Planning Hyogo Office (UNCRD Hyogo Office) was established in Kobe, Japan in April 1999 to promote disaster mitigation activities by examining the reconstruction process in Hyogo and disseminating the experiences there to disaster-damaged areas in developing countries. It provides advisory services to vulnerable communities, especially in ways that can improve the safety of primary community facilities such as schools and hospitals vulnerable to disasters, and by identifying and then disseminating best practices in disaster management at the community level. UNCRD Hyogo Office helps to develop disaster resistant communities by link-

ing socio-economic considerations with physical hazards in urban development work at the local levels.

Under the framework of human security, the goal of the initiatives is to attain safer and more sustainable livelihoods. To achieve this goal, the initiatives focus on community development and empowerment activities. In specific programmes such as the School Earthquake Safety Initiative, new approaches are formulated to integrate disaster mitigation components into urban development work at different levels of urban growth processes through various activities for schools. The programme is being conducted in India, Indonesia, Nepal, and Uzbekistan with the overall goals to:

- Empower the community with know-how and technology for safer earthquake construction.
- Build a disaster-resilient and self-reliant community.

To achieve this, a specific focus has been given to the school systems, where the vulnerability of the school buildings are evaluated and technically tested, and affordable retrofitting techniques are then provided. There are five direct objectives of the project:

- Evaluate the vulnerability of school buildings in each of the selected cities.
- Recommend designs and affordable means of strengthening vulnerable schools.
- Retrofit one or two demonstration schools using appropriate or improved traditional technology.
- Provide training to workers from the local construction industry who build schools and residential dwellings.
- Prepare disaster education materials for school children, teachers and communities and use them for training and education purposes.

• Case: India

More than one year after the earthquake in Gujarat, most of the affected families were still struggling to put their lives together. While in some places aid agencies had built and handed over houses to villagers, the experience of a

local community in Patanka shows how community-led rehabilitation can yield results. Patanka, a village of about 250 families, suffered extensive damage during the earthquake, with about 170 houses collapsing and the rest being badly damaged. Since it lies in an area beyond the focus of most relief teams, it

In Japan, local community organizations with responsibility for disaster preparedness cover half the population of the country.

Japan response to ISDR questionnaire, 2001

received less attention from aid agencies. Even distribution of government compensation, as everywhere, was taking time.

Kheemabhai, a village leader from Patanka, found out about a Delhi-based disaster management NGO called SEEDS. He expressed to SEEDS his community's desire to reconstruct the village, themselves. Although SEEDS had been working in the area, this was the first time it confronted a community keen to reconstruct for itself. The village only requested logistical support from the NGO.

First, a meeting was organized with the district government to ensure speedy distribution of compensation so that the villagers could start rebuilding their homes. After a visit to the village, the enthusiasm he witnessed convinced the official to extend full support to the villagers. Patanka became a scene of hectic activity. Everyone was busy building their houses, getting material from a special material depot and collaborating with engineers about technical details of earthquake-resistant construction. Entire families became involved, with women and children seen curing the masonry work with water, or ferrying material to their sites.

In the partnership approach everyone contributes. The initiative was truly led by the community. The SEEDS team helped the villagers obtain building materials, including limited amounts of cement and steel. The villages supplied their own stone, bricks, wood, roof-tiles and labour. Architects and engineers from SEEDS trained the masons, labourers and the villagers themselves on earthquake-resistant technology through on-the-job training, and through periodic training workshops.



Patanka is on its way to becoming an international example of good practice in community-led rehabilitation. Two expert masons from Nepal's National Society of Earthquake Technology came to teach their Gujarati partners how to build safe houses. They developed a very good rapport with all the villagers, and expressed considerable respect for the abilities of the local masons. Language barriers notwithstanding, they could all be seen working, guiding and advising at the construction sites well into the evening.

While there were many supporters, the decision-making was done by the community itself. Each family determined its own house design, the material to be used, and initiated the construction. Upon completion of construction in the village, there was a pool of trained masons able to continue playing an important role in the rebuilding of the rest of Gujarat. Recognizing the strength of this community-led rehabilitation model, organizations including the UN Centre for Regional Development, Gap Inc., the Earthquake Disaster Mitigation Research Centre in Japan and a consortium of NGOs from Japan, all pitched in to support and promote it.

A wider dissemination campaign is being planned to promote such work and create more awareness about the success of do-it-yourself, low-cost earthquake-resistant construction. In Patanka, there was not only excitement about building a new village, but a great sense of ownership and pride among the villagers on having done it themselves, paid for it themselves, and also having done it in a technical way that will protect their homes in the future.

**Case: South Asian countries
(Bangladesh, India, Nepal, Pakistan,
Sri Lanka)**

Duryog Nivaran – the South Asian Network for Disaster Mitigation, sponsors a project called *Livelihood Options for Disaster Risk Reduction* that proceeds from the recognition that for many thousands of people in South Asia, if not millions, living with disaster risk is a fact of everyday life. It is therefore only by strengthening livelihoods and by building more effective

coping capacities within individual communities that a viable foundation for disaster risk reduction can be created. The project is fundamentally community-based, with the intention of identifying crucial linkages between livelihoods and the related options which have the potential to reduce disaster risks. Supported by the Conflict and Humanitarian Affairs Department of DFID, the project has the following components:

- Research that can identify the implications of disaster risk on livelihoods.
- Formulation of strategies that strengthen livelihoods and can reduce disaster risks.
- Developing the capacities of stakeholders through community-based approaches to disaster management.
- Undertaking pilot demonstrations of risk reduction strategies.
- Advocating and promoting policies to influence a paradigm shift that recognizes that disasters are part of the development process, and empowering people and their local communities to take an active role in building resilience to hazards and to minimize future exposure to disasters.

The project has attracted cooperation from government institutions, NGOs, research and development planning organizations and media, in a process of localizing adaptations to suit the specific nature of hazards, vulnerabilities and the needs of individual South Asian communities.

Case: Maldives

In the Maldives, community efforts to reduce vulnerability is common, where the entire land-mass comprising low-lying coral atolls is particularly threatened by rising sea levels. From 1998-2000 there were five damaging storms that affected 43 islands and 5 atolls. In June 2000, severe waves lashed the resort island of Bolifushi causing US\$ 1.3 million in damage. To prevent these types of hazards from becoming future disasters, local communities and NGOs have worked together in planting trees on the beaches and in constructing sea walls to prevent beach erosion, thereby minimizing the impact of tidal waves on the islands.

Case: Central American countries, community based organization

The *Central American Community Risk Management Network* was inspired by the impact of Hurricane Mitch. The perceived exclusion of community-based organizations from the reconstruction process became a stimulus to increase the participation of community organizations and to foster the development of grass-roots approaches to risk management and disaster reduction.

The Network was formed in Nicaragua in May 1999 with the support of CEPRE-DENAC, GTZ, HABITAT and the IDNDR. The network works through existing community organizations in many areas of Central America by providing training and technical advice. It has focused its attention particularly on the popular understanding of the relationships between disasters and development, and the need to strengthen existing community-based development organizations rather than creating new, local disaster organizations. Member communities of the network have participated in early warning projects and training activities supported by organizations such as GTZ.

Dynamics of local collaboration

With the proper motivation, local communities are receptive to new ideas. However, the full participation of community members is only possible to the extent that efforts are based on mutual trust, a clear definition of the decision-making process, and transparency of management practice and economic expenditure. Politics and financial disparities exist in villages and neighbourhoods, so it becomes important to identify shared values and concerns.

Scientists and engineers are challenged to translate their research findings into concepts and language understandable by communities, as much as administrators must strive to motivate risk management practices that protect residents' own interests and assets. More often than not, successful community action in disaster reduction hinges on appropriate and low-technological approaches that are



easily and economically adopted by inhabitants. These conditions underline the importance of recognizing that community action must be associated with a larger national strategy in which local efforts play a crucial part.

There must be a sense of local ownership and a cooperative working relationship among different organizations if local capacity is to flourish. Successful outcomes depend on community involvement from planning to the implementation and monitoring of activities so that local people feel that the work of reducing risks has relevance to their lives. Risk and resource analysis should include rapid appraisal tools and techniques. This means that local people have to be involved in both risk mapping and resource assessment, as too often the needs and resources that already exist within a community are overlooked or discounted. If these assets are harnessed and developed from the beginning, they form a valuable part of the process.

The IFRC Disaster Preparedness Appeals Analysis Mapping for 2002-03 indicates that a significant percentage of the sample group of 32 National Societies reviewed were including community-based disaster management activities in their 2002-03 programmes.

The IFRC learned that successful integrated and participatory planning needs to lay out a distinctive methodology with clear aims and objectives, and one that includes the involvement of different actors drawn from govern-

ment, technical agencies, NGOs, communities, UN and other international agencies. The strategy requires a serious commitment to identify genuine strengths and weaknesses, opportunities and threats of National Societies as integrated approaches of participation should mirror the basic processes associated with vulnerability and capacity assessments.

It has proven important to identify what elements and criteria are relevant for community-based disaster preparedness and to consider the development of a unified conceptual framework which defines its role within the larger context of other national programmes. Equally, there is a need for better indicators of performance to indicate impact even when disaster does not strike. Careful thinking is necessary to consider a reliable funding strategy to ensure sustainable commitments. The

The Benefits of Experience / National Red Cross and Red Crescent Societies

What worked well in community participation?

- Participatory rapid appraisals provide relevance, increase ownership, and motivate self-initiated projects (Nepal: increased indigenous knowledge and confidence, unity of communities' beliefs).
- Bridges the gap between relief and rehabilitation (Mozambique).
- Increases the number of volunteers – the formation of Red Cross community groups increase capacity at the local level.
- As mitigation components increase, so does resilience at community level, encouraging partnership processes.
- Action planning and identification of vulnerability become more problem oriented (India).
- The development of community disaster plans creates a more organized response, and become a unifying force (Peru).
- Integrating community-based disaster preparedness with health programmes promotes development and income generation, increasing resilience to disasters.
- Establishing networks with local government mobilizes leaders. (Community Based Self Reliance Programme in Papua New Guinea, which is completely owned by the National Society.)
- Community originated empowerment supported by National Societies through moral support rather than hardware, for example by encouraging the identification of risks by communities.
- Integrating disaster preparedness into health workshops merges similar programme interests and aids cooperation within volunteer training of civil protection, ministry of health, and National Society (Syria).
- Creating regional awareness for community action and promoting HIV/AIDS as global disaster and health issue (North African Integrated Disaster Preparedness and Health Initiative).

What did not work well?

- Sometimes there was misunderstanding with local authorities, who saw the programme as a threat to maintaining a culture of dependence by the local population.
- Inadequate capacities in the National Societies to support activities at the community level. However, community-based disaster preparedness approaches progressively are resulting in increasing National Society capacities at national, branch and community levels of activity.
- Poor planning processes in some areas.
- Insufficient efforts to ensure sustainability after initial funding period.
- Roles can sometimes clash with those of local authorities, especially in the absence of an inclusive planning process.
- Lack of community-based disaster preparedness and management was a serious detriment in gaining public response at local level (Turkey earthquake).

experience of National Societies of Red Cross and Red Crescent in Bangladesh and Philippines demonstrate a positive correlation between integrated participatory planning and enhanced levels of local self-reliance.

■ Traditional community coping mechanisms at stake

Collective and environmentally sound land use and tenure at community level is in many places still based on traditional and commonly accepted practices, which help to cope with phenomena such as drought and floods. This conventional practice is respected more than modern laws in many communities in Africa and elsewhere. However, traditional ways are more and more being replaced by western or "modern" economic and social interests and values, increasing vulnerability and exposure to hazards and weakening coping capacities. Examples can be found in the Brazilian rain-forest, where indigenous groups interests are being replaced by economic ones that turn forests into pastoral land, thereby imposing land degradation, increasing drought or flood patterns and forcing social exclusion.

Long before there were national governments or development planners, Pacific islanders had to live with natural hazards and extensive losses. While a considerable sense of traditional values and social conditions remain, the internal migration from villages to urban areas are thrusting significant numbers of people into changing lifestyles in the Pacific island states and elsewhere. Urban immigrants frequently lack knowledge about local hazards and urban risks, and are seldom familiar with appropriate behaviour to minimise potential losses. They are often marginalized politically, and frequently lack the social network of kin, which provides vital support and can be relied upon for information and communal responsibilities in most villages. As far as hazards are concerned, the process of urban adaptation involves a shift away from community self-reliance and shared knowledge towards an expectation that formal government organizations will provide protection, warnings, support and relief.

These are considerations yet to be seriously accommodated in national strategies of disaster reduction and risk management.

Future challenges and priorities

Community participation is something that is understood differently in each cultural or political context. Some universal and specific challenges and priorities are outlined below.

A satisfactory link needs to be enhanced between the development of national policy guidance and direction and the widespread use of viable mechanisms that can actually translate those principles into sustained, but flexible, locally-based activities. People also have to understand and accept that they, too, have a responsibility towards their own survival – it is not simply a matter for governments to find and provide solutions.

The following priorities can be identified:

- Enhancing local technical skills:
 - Transfer of expertise at a local level should be enhanced and developed, e.g. early warning systems and procedures suited to small-scale requirements.
 - Transfer of local experiences, and their thematic application within various communities have to be developed.
 - Better communication is required among authorities and managers, and among community leaders for this purpose.
- Increasing social cohesion and community empowerment at all levels:
 - Local communities, civic groups, traditional structures, public services, collective achievements and values

should be encouraged and financed, as they considerably reduce vulnerability and strengthen local capacities.

- Existing grass-roots and community-based organizations at community level, including women organizations, should be reinforced, for them to take action and participate on disaster risk reduction activities.
- Mechanisms for community participation in information, decision-making and resource management to reduce risk should be strengthened.
- The involvement and participation of "ordinary" people in all technical, developmental and policy-related projects, needs to be encouraged, by creating inclusive discussion forums. There, people would be able to evaluate, explain and discuss their own needs, as well as debate with scientists, politicians and other skilled persons about what could be done to reduce risks.
- A re-evaluation of externally determined policies by local people should be done to make them compatible with their needs and more people-oriented.

Ultimately, effective risk reduction has to take place within the much broader context of initiatives that build an informed, capable and resilient community by drawing on its traditional strengths and the benefits of collective experience and skills. This must be pursued conscientiously over a period of time, and supported with necessary resources – long before there is any immediate threat of crisis.



Chapter 4

Building understanding: development of knowledge and information sharing

- 4.1 Information management and communication of experience
- 4.2 Education and training
- 4.3 Public awareness



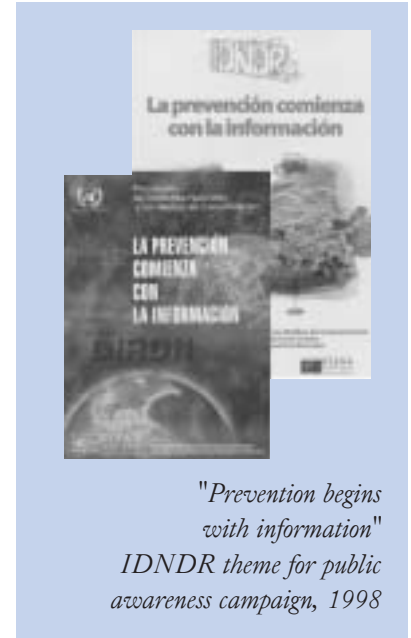
Photo:
University of Costa Rica

4.1. Information management and communication of experience

Effective disaster risk management depends upon a series of related actions and the means to engage the informed participation of all stakeholders. Exchange of information and communication practices play key roles in the realization of these activities. Data availability is crucial for ongoing research, to monitor hazards and for assessing risks. Information describes working conditions, provides reference material and allows access to resources. It shapes many productive relationships. Rapid and widespread developments in modern communications record and disseminate the value of experience, convey professional knowledge, and contribute to decision-making processes. Integrating new developments in information management with established and more traditional methods can help to create a much better understanding about hazards and risk at all levels of responsibility through public awareness programmes. They inform are instrumental in achieving more comprehensive early warning systems and effective mitigation efforts.

Effective information management and communication about disaster risk reduction is conveyed through:

- An awareness of current issues of information management
- An appreciation of initiatives around the world
- Selected national information programmes
- Technical information, experience about different hazards
- Using cyberspace to discuss disaster risk reduction



Current issues of information management

• Advantages

As disaster risk reduction issues pervade both popular interest and official policy outlooks, related information to the subject is expanding rapidly. The sources, previously associated mainly with the catastrophic events, or considered as the exclusive domain of specialists, can now reach a wider range of users. The number of interested people, educational institutions, organizations and local community users is growing, as are relevant websites, networks, and multidisciplinary and professional exchanges.

In addition to these many sources for exchanging technical or specialized data, other means of communication have emerged to disseminate research about disaster risks, to convey information about new activities and programmes, and to seek new ways through which people can work together in reducing risks. Within the ISDR framework, the use of Internet-based and electronic conferences

and discussion forums have been successful on several occasions.

Innovations in GIS technology are increasingly becoming an accepted tool for the presentation of hazard vulnerabilities and risks. Other forms of information dissemination provide new insights about knowledge engineering, management techniques and cognitive sciences. Some of the most significant and useful developments in the evolution of information systems relate to innovative machine-user interfaces that rely on natural language processing for searching and analysing data. Others rely on the expanded use of “fuzzy logic” and expert learning systems such as those based on neural networks.

Many of these advanced techniques hold particular promise in communicating data, information or experience in quicker or automated early warning systems, distinctive public awareness programmes, and for a wide variety of educational or community-based applications. They can assist in the development of learning materials, but rather guided by the specific needs and interests of communities or individual users.



● Limitations

The exponential growth in the volume of sources and data also poses continuing challenges for the processing and dissemination of meaningful information. Users find it ever harder to assess the accuracy, veracity, and in some cases, the validity of the content. While systematic gathering and timely provision of information are keys to ensuring the effective use of information, processes of sorting, analysing and targeting information for primary interest groups are at least as important to avoid information overload and confusion among users.

Moreover, there is a growing tendency for many information providers to rely on increasingly sophisticated means of electronic communication, thereby excluding many potential

users that live in impoverished areas. While some institutions have been hesitant to adapt to new forms of communication and technologies, many others now rely on electronic communications or web site access for information that is often beyond the reach of the people most vulnerable to disasters.

Several factors have hindered the development of efficient information systems for general use, while other constraints might be more institutional in nature. Several commentators in Africa have conveyed to the ISDR secretariat their view that the provision of timely, definitive information remains problematic throughout all aspects of disaster management responsibilities. A response from Bangladesh to an ISDR survey on the status of disaster reduction shared a common concern voiced by other countries as well. Their concern results from the fact that various government agencies, international organizations, technical organizations or academic institutions, as well as NGOs, all produce data and information relevant to disaster risk management processes. The need of individual organizations or external donor agencies to have adequate information for their own programme interests has motivated most agencies to develop information systems that cannot easily be applied to other settings.

While many of them are involved in various projects concerned with hazard and risk issues or land-use planning, no commonly acknowledged focal point exists to provide easy or consistent access to such information. As a consequence, important data or information related to risk maps, or associated public awareness and education programmes about hazards, might either be scattered or confined among libraries, individual government offices, academia or individual technical programmes with no common point of access.

Lack of information—or lack of access?

As conveyed in the regional ISDR report which took account of conditions in Southern Africa, but which no doubt apply elsewhere, there are many countries in which a wealth of disaster risk information exists in archived form: hydrometeorological data, early land-use records, historical natural resource conditions, water records and related issues. Such information might be recorded in an unsuitable form, or more seriously, might not be readily accessible because of restricted institutional or technical reasons. These might include conditions in which,

- Data is retained or restricted under presumed security considerations, or as an institutional power base;
- Inadequate cross-sectoral reference or communication about the existence of data so that other potential users are not aware of the information;
- Compilation and dissemination of information are not considered a priority by organizations;
- Information is maintained in specialist, non-standard, incompatible or even archaic formats;
- Information that exists in spatial or other formats can be costly to convert into more readily accessible formats;
- Data compilers might not have consulted potential users about their respective data requirements so available data are not structured to easily address the needs of either current or subsequent users.

An appreciation of initiatives around the world

There are numerous examples that illustrate how information management, innovative communication practices about hazards and various professional initiatives associated with disaster issues, have helped to advance public understanding and professional involvement in disaster risk reduction in recent years.

● International scope of information

There are two primary global information sources that are widely used for access to accumulated hazard and disaster reduction information, both located in Europe. One, the *Centre for Research on the Epidemiology of Disasters (CRED)* is a *World Health Organization (WHO)* collaborating centre at the School of Public Health of the Catholic University of Louvain in Brussels, Belgium. It maintains an *Emergency Events Database (EM-DAT)*. This comprehensive record of natural disasters that has documented more than 12,500 events by types and country of occurrence during the twentieth century, was created with the initial support of WHO and the Belgian Government. The CRED database is widely recognized professionally for its efforts to provide a consistent rendering of the often casual, vague

or conflicting information about disasters that is frequently conveyed in different formats. It can be accessed on the following web site: www.cred.be.

A second highly regarded source of cumulative information about natural disasters that have occurred around the world since 1965 is the *NatCat Service* database maintained by the *Research and Development Department of Munich Reinsurance (Munich Re)*, in Munich, Germany. Information derived from this hazard documentation service is published in five major languages by MunichRe and circulated widely in *Topics*, an annual review of natural catastrophes. Munich Re also provides more specific information to commercial clients and other interested parties about the extent and intensity of specific disaster events or amalgamated information regarding regional or global exposure

GLobal IDentifier Number (GLIDE)

Accessing disaster information can be a time consuming and laborious task. Not only is data scattered but frequently identification of the disaster can be confusing in countries with many disaster events. To address both of these issues cred is working with a technical advisory group of partners on a globally common Unique Identification code for disasters, proposed by the *Asian Disaster Reduction Centre (ADRC)*.

The partners include ReliefWeb-OCHA, OFDA-USAID, FAO, US/NOAA Office for Global Programs (OGP) and the World Bank. A *GLobal IDentifier number (GLIDE)* is issued every week by EM-DAT at CRED for all new disaster events that meet the EM-DAT criteria (www.cred.be). The components of a GLIDE number consist of two letters to identify the disaster type (e.g. ST - storms); the year of the disaster; a four-digit, sequential disaster number; and the three-letter ISO code for country of occurrence. So, for example, the GLIDE number for hurricane Mitch in Honduras is: ST-1998-0345-HND.

This number is posted by CRED, ReliefWeb, NOAA-GOP and ADRC on all their documents relating to that particular disaster and gradually other partners will include it in whatever information they generate. As information suppliers join in this initiative, documents and data pertaining to specific events may be easily retrieved from various sources, or linked together using the unique GLIDE numbers. The success of GLIDE depends on its widespread use and its level of utility for practitioners.

ADRC has prepared a specific website <http://glidenumber.net/> to promote GLIDE. Being in its experimental phase, the group encourages visiting this website and welcomes comments or suggestions.

For more information contact CRED or ADRC (arakida@adrc.or.jp)

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analyses and trend studies. The Munich Re World Map of Natural Hazards has been valued by disaster and risk management professionals since its first publication in 1978. Its subsequent Globe of Natural Hazards most recently updated in 1998, has also proved to be an effective information tool. Munich Re regularly produces additional publications and has recently issued a CD-ROM, *World of Natural Disasters*, to advance the public knowledge of hazards and exposure to risk. By employing digital technology and the benefits of GIS representation of information, this CD-ROM is easily able to provide the risk identification and evaluation expertise of the reinsurance industry to engineers, government officials and other interested people. It is able to make a quick assessment of the basic natural hazard potential at any terrestrial position in the world at the click of a button. Additional information can be found at www.municre.com

Another widely used source of public information and database is the *ReliefWeb*, operated by OCHA. Located at www.reliefweb.int, it focuses primarily on current international emergencies and disasters with humanitarian implications, although it also provides current response-oriented information about natural disasters. ReliefWeb provides an excellent and wide-ranging selection of information, press accounts, related contacts and operational information, as well as archived information drawn from public, governmental, NGO and authoritative sources about various types of emergencies and their consequences. However, as its name indicates, it largely relates to emergency preparedness and response interests.

In November 2001, IFRC launched its *Disaster Management Information Systems (DMIS)*. This provides a single entry point for relevant disaster-related information and multiple disaster management information sources that is browser-accessible for members of the Red Cross and Red Crescent Movement. Supported by four National Societies, the United Kingdom bilateral development agency, *Department for International Development (DFID)* and the commercially sponsored Ericsson Response Program, the project aims to provide information about disasters in a systematic way and to monitor a number of factors that might signal an impending disaster. It provides a toolbox of working documents, tem-

Global reports about disaster, risk and vulnerability

World Disasters Report

One of the most respected sources of information about disasters is the World Disasters Report, an annual publication of the International Federation of *Red Cross and Red Crescent Societies (IFRC)*. Published since 1993, the World Disasters Report provides the latest trends, facts and analysis of the world's humanitarian crises. Described by the World Bank as "a very valuable resource for the international community", the report is an indispensable reference work for those searching current information about strategies and tactics in the face of disaster. The report is backed by the resources and expertise of IFRC.

The 2002 edition of the World Disasters Report is focusing on risk reduction issues. The report analyses the challenges and opportunities facing risk reduction, and examines preparedness and mitigation initiatives from disaster-prone countries around the globe. In addition, the report studies the issue of humanitarian accountability, presents a methodology to assess vulnerabilities and capacities, and concludes with disaster data tables that are updated annually. It addresses such current issues as whether disaster preparedness and mitigation can convincingly be shown to pay off in terms of lives, livelihoods and assets saved. (www.ifrc.org)

Global Environment Outlook

In line with its role in environmental monitoring and assessment and early warning, UNEP has launched the *Global Environment Outlook (GEO)* series, which contains baseline information on emerging environmental issues and threats, as well policies being implemented at the global and regional levels. The findings and recommendations of the GEO report series constitute the basis of UNEP activities in early warning and vulnerability and risk assessments.

The GEO-3 report of May 2002 specifically addresses the issue of human vulnerability to

environmental changes, including elaboration on the specific relationship between the impact of natural hazards and emerging disasters. It also includes a section on disasters, in which the ISDR secretariat collaborated with information. UNEP also produces other associated reports of regional and/or thematic scope, such as on small island developing states. More information about GEO-3 can be found on the UNEP web site (www.unep.org).

World Vulnerability Report

Since 1989, the annual UNDP *Human Development Report* has increased a wider public understanding of the social or human dimensions of development. The human development index and the subsidiary human poverty index are both based on a small number of carefully selected parameters for which data are available and provide alternative indicators to conventional *gross domestic product (GDP)* measurements. Awareness of the linkages between natural disasters and development has also increased considerably in recent years. Vulnerability to calamities is now recognized by many institutions as an important issue for sustainable development. However, while Human Development Report has been far more successful than was originally envisaged, the linkages between increasing disaster risk and "human" development have yet to be fully explored and addressed.

In this regard, UNDP is in the process of producing a first issue of the *World Vulnerability Report (WVR)*. The goal of WVR is to increase the attention of governments and the international community to viable approaches to managing and reducing disaster risks.

As part of this report, UNDP will present a Global Vulnerability Index, which will compare countries according to their relative risk levels over time. The index will highlight the level of national efforts and progress made on mitigating disaster risk annually, and will promote the further production of related national reports. The first issue will be made available in the second half of 2002.

plates, operational guidelines and links to online data sources and more than 400 web sites all sorted by categories. It is expected to speed up emergency awareness and action by providing decision makers with timely information, as well as with feedback from the Red Cross and Red Crescent network throughout the world. Specific operational links to data sources during a disaster are grouped, highlighted and then archived for future reference. The Preparedness Section of the site allows delegates and National Societies to directly input information on disaster trends from anywhere in the world and potential response to unfolding disaster situations. During large-scale emergencies, ongoing operational information can be exchanged, as logistics mobilization actions and contact details are also posted to improve communication and cooperation between the different actors involved. This dynamic and interactive working tool continues to evolve and adds new features on a regular basis in response to the needs of its users. After a first year of activity, the password-protected site has over 600 users from 178 National Societies, delegations, IFRC and International Committee of Red Cross staff.

Other institutionalized efforts also are under way to facilitate the global use of shared disaster management information. Working through both negotiated international agreements as well as efforts to standardize communication protocols and technical compatibility, some governments and disaster management professionals are working to realize a comprehensive initiative to increase the availability and improved utility of advanced communication and information technologies for more effective disaster management. While the objectives of the *Global Disaster Information System (GDIN)* are yet to be fully realized, this international collaborative association of specialists from governments, international and donor organizations, NGOs, commercial and academic institutions is working to enhance its capacities to receive and use disaster information. In a general sense, GDIN seeks to offer a variety of services that can link users with appropriate information providers and to encourage the use of greater technical compatibility or integration of information systems across geographical regions so that information can be shared more effectively. While much of



its interest revolves around remotely sensed data, GIS applications, mapping and display information, GDIN also tries to assist disaster specialists in obtaining information that may otherwise be difficult for them to locate or to access through individual efforts. It particularly strives to benefit disaster managers in areas where there are limited resources or limited access to technology. Further elaboration about GDIN activities and intentions can be obtained at www.gdin.org.

Using cyberspace to discuss disaster risk reduction

At a more individual level of information exchange, there is an increasing number of publicly accessible and free multidisciplinary e-mail discussion groups, listserves and related electronic networks that can be accessed.

An NGO network, The Stakeholder Forum for Our Common Future, and the ISDR Secretariat organized an online discussion during May 2002, on the subject, "Links between natural hazards, environment and sustainable development: Taking action to reduce the risk of disasters". An effort was made to broaden the discussion of these related topics to a much larger group of interested people than those who may otherwise be involved with matters of sustainable development. More than 350 participants from 80 countries registered and many engaged in an active exchange of views, experience and concerns. These were all posted on a dedicated website which can be viewed at www.earthsummit2002.org/debate. Numerous topics emerged, including: the impact of natural hazards on development and how to reverse vulnerability; risk assessment and early warning systems; fostering community involvement and developing coping capabilities within communities; and the promotion of education and capacity building. A wealth of experience unfolded during the month, as case examples illustrated a variety of specialist knowledge. There were also carefully considered comments about current limitations, and the imagined roles and responsibilities that may lead to potential solutions. Some of these outlooks are included in this global review. Regardless of the individual views expressed, a readily per-

ceived value of such exchanges is the ease of being in touch with other people around the world who share a professional interest and personal commitment to these issues. It is an excellent form of networking, that is stimulating too. It is easy, and does not require a large investment - beyond ones' own time and wish to contribute.

A similar discussion was and cyber conference was organized in November 2001 with the Division for the Advancement of Women (UN/DESA), on disaster reduction and natural resource management with a gender perspective, see: www.un.org/womenwatch/daw

One such initiative is the *natural-hazards-disasters network* that is a managed information service and discussion group that covers socio-economic, psychological, organizational, scientific and technical aspects of disaster triggered by all kinds of natural and technological hazards. Its members are drawn from operational agencies and academic institutions throughout the world and anyone with an interest in the subject can join through the list's web site at www.jiscmail.ac.uk/lists/natural-hazards-disasters.

Another similar and lively source of information, discussion and professional debate regarding the social dimensions of hazards, vulnerability and risk particularly following a major disaster, is the *Radical Interpretation of Disaster Experience (RADIX)* web site, located at www.apu.ac.uk/geography/radix, which was initiated by the scholar Ben Wisner. IRADIX seeks to provide a venue for discussion, working papers, opinion pieces, resources, or links that can help in understanding the root causes of disasters. This includes issues such as human rights, respect for diversity, translation of available knowledge into action, links between disasters, economic development and politics, with particular relevance to local community interests and people-centred activities for risk reduction. RADIX seeks to bring together groups related to disaster risk reduction that have not always shared information easily with one another, including scientists, human rights activists, development workers, government officials, business executives, environmentalists, media representatives, etc.

● Regional initiatives

Regional information or documentation centres relating to hazard awareness or risk reduction activities have been established in several locations. A review of some of these centres will illustrate the different approaches and the diversity of interests that are served in different parts of the world, while the value of their various products and services all contribute to the body of international experience in disaster risk management.

Africa



There is no region-wide disaster information centre covering the wide variety of hazard or risk conditions on the African continent, but there are several specialized documentation centres that are expanding their activities into related fields of risk. The Southern African Research and Documentation Centre (SARDC) is one such highly regarded centre. Based in Harare, Zimbabwe, SARDC is an

independent regional information and documentation centre that seeks to enhance the effectiveness of key development processes in the region. It pursues this aim through the collection, analysis, production and dissemination of information and by working to enable local capacities to generate and use information.

It has operated as a non-profit foundation since 1987 and its objective is to improve the base of knowledge about economic, political, cultural and social developments and their implications, by making information accessible to governments and policy makers, NGOs, the private sector, the media and regional and international organizations. The documentation centre contains more than 9,000 subject files on regional issues, a library of books and periodicals, computerized databases of selected materials that are retrievable through the use of keywords and maintains specific bibliographic and contact databases on primary areas of interest.

Particular areas of interest related to risk reduction include the state of the environment in Southern Africa, disaster management infor-

Drought Information in Africa

Mention should also be made of several other specialized or technical organizations in different regions of Africa that produce and disseminate numerous information products related to the specific hazards or risk reduction activities with which they are involved. As these have not been constituted for fulfilling comprehensive functions related to disaster risk management and as they do not exist primarily as information or documentation centres, they are discussed in further detail elsewhere in other sections of this review. Nonetheless, the IGAD Drought Monitoring Centre, located in Nairobi, Kenya, and the SADC Drought Monitoring Centre in Harare, Zimbabwe, have expanded their professional interests in recent years to become important regional centres for information about a wide range of climate conditions and hazards. Periodic and semi-annual climate forecasts are produced by each of these centres and circulated widely among both technical and policy officials in most countries of Southern, Eastern and Central Africa.

Similarly, the Regional Early Warning Unit (REWU) and the Regional Remote Sensing Unit (RRSU) of the SADC Food and Natural Resources Development Unit (FANR) produce both routine and specialized information on drought and related potential risks affecting food security in the 14 SADC countries. The SADC Environment and Land Management Sector (ELMS) Coordination Unit and the SADC Water Sector Coordination Unit are also both involved significantly in project activities, policy development and information dissemination pertinent to the natural hazards and risks associated with their respective areas of interest. In the Sahel region of West Africa, AGRHYMET (www.agrhymet.ne) is a specialized hydrometeorological institution of the Permanent Inter-State Committee for Drought Control in the Sahel (CILSS) with the primary function of producing and disseminating information and related products. These institutions work together to improve the extent and quality of technical information about environmental hazards, drought and other related disaster risks that is available for policy makers in the region. However, in the broader context of information management and communication of experience on disaster risk reduction, the example of such specialized centres of knowledge, working within specific professional environments, highlights the problem of incorporating their information capabilities more systematically into conventional practices of risk reduction communication.



mation devoted especially to drought and other regional socio-economic and political issues relevant to the development process and governance that have a direct bearing on matters of risk awareness and management practices. In this latter respect, SARDC maintains the Musokotwane Environment Resource Centre for Southern Africa (IMERCSA) which provides users with current information on environment and disaster management in Southern Africa. It is also the leading regional centre for global reporting on the state of the environment, producing fact sheets on environmental issues and a newsletter about the Zambezi River basin. It published the comprehensive book, *State of the Environment in Southern Africa*, with the thematic updates, *Water in Southern Africa* and the forthcoming "Biodiversity of indigenous forests and woodlands".

With offices in Dar es Salaam, Harare and Maputo, and by working with partner organizations in all SADC countries, SARDC is well placed to facilitate seminars, to conduct briefings and undertake consultancies for information exchange on environmental issues, human development, gender, electoral processes and related aspects of information networking. Additionally, SARDC staff and correspondents produce a variety of articles and reports on these same subjects for the Southern African News Features media service. As part of its commitment to develop professional information and reporting capabilities in the region, SARDC also conducts regional training programmes involving attachments and exchanges for Southern African journalists, editors and documentalists.

Latin America and the Caribbean



As elsewhere, the worldwide revolution in digital communications has swept through Latin America and the Caribbean. As an example in a crucial area of disaster management responsibility, by 2000 practically all Ministry of Health disaster programmes in the region had been connected to the Internet. This global "network of networks" served as one of the key tools for response to the many emergencies spawned by the El Niño phenomenon of 1997-1998. The response and reconstruction activi-

ties that followed Hurricane Mitch are considered the first in which computer-mediated communications played a major role in decision-making. Risk management institutions and professionals are now routinely accustomed to seeking information from a large number of World Wide Web sites, such as www.disaster.info.desastres.net, sponsored by PAHO.



Regional Disaster Information Centre (CRID)

One of the most comprehensive sources of information on disaster and risk management in Latin America and the Caribbean is the Regional Disaster Information Centre (CRID), located in San José, Costa Rica. This Centre was established from a pilot scheme originally developed by the Pan American Health Organization (PAHO)/WHO in 1990, with a mission to reduce disaster vulnerability by promoting a culture of risk reduction and cooperative efforts in risk management activities.

In 1997 it was conceived as a multi-organizational project supported by PAHO, IDNDR, CEPREDENAC, IFRC, CNE, MSF.

CRID has proceeded to offer information and documentation online and for direct consultation at its offices on a wide range of subjects, in both Spanish and English. CRID provides governments, professionals and civil society organizations with abundant, unrestricted and freely available disaster information. A web site at www.crid.or.cr or www.crid.desastres.net provides online access to CRID resources as well as convenient links to other disaster information resources. It now responds to some 120,000 information requests yearly as measured by use of the information products available on the web site, requests for technical advice and information searches by electronic forms and mail.

Additional products available from CRID include a Virtual Disaster Library CD-ROM in English and Spanish, produced by the United Nations system, and the LILACS Bibliographic Database on CD-ROM, updated peri-

The Centre has become a regarded regional institution through its gathering, processing and dissemination of high-quality information, as well as a focal point for training and knowledge engineering related to bibliographic information technologies. A primary aspect of all its activities is the building of additional institutional capacities for the better management and wider dissemination of disaster information, or the management of national or local disaster information centres. While its efforts contribute to the institutionalization of a regional disaster information system, CRID also promotes the concept of decentralization and disaster information exchange so that institutions and users can access materials more easily. In order to fulfil these functions CRID provides the following information services:



- Assists a wide variety of institutional and individual users to search and find disaster and health-related information available through physical or electronic media;
- Electronic access to an extensive collection of documents and other source materials;
- Publication and distribution of information products such as bulletins, bibliographies, and other materials for both public and technical use;
- Development and delivery of training for disaster management information centres, in such areas as the use of databases, controlled vocabulary for disaster-related information, use of the Internet, etc.;
- Design, production and distribution of training materials;
- Collaboration with other institutions interested in disaster information management;
- Management of information management projects;
- Organization of information stands, participation in specific events, etc.

odically. Furthermore, CRID produces specialized bibliographies on specific disaster related issues. So far 30 issues of this *Bibliodes* series have been published and distributed to several thousand users in both print and electronic versions. Other information products developed by CRID include a variety of training modules on information management and the digitization of documents, made available online or on CD-ROM. The Centre also provides information management project administration services and provides technical advice to sister organizations on the development of web sites and other information products. Currently with funding from ISDR, PAHO/WHO and the United States National Library of Medicine, CRID is implementing a project aimed at creating better information management capacities in El Salvador, Honduras and Nicaragua.



CEPREDENAC

More specific to the disaster reduction activities of individual countries in Central America, the

CEPREDENAC web site (www.cepredenac.org) contains continuously updated information on plans, programmes and projects in the region. The web site contains disaster statistics and analysis for the region, as well as links to the web sites of each of the national disaster organizations in Central America and many other risk and disaster management organizations active in the region. As the regional coordination centre for disaster prevention, CEPREDENAC has an important responsibility in encouraging economic and social planners working at national, regional and international levels to incorporate all information available in project design. This necessarily includes information about hazards and risks and how they may affect cost-benefit analyses of development and infrastructure projects, leading to possible design modifications that can bolster durable investments.

In 1999, CEPREDENAC produced a detailed inventory of available hazard, risk and vulnerability maps and related information as a first step in making them available to decision makers regionally and

A simplified version is available on the CEPRE-DENAC web site and an interactive format is being prepared to allow users to conduct searches and queries while online. Every source is described by the

- Type of map support, digital format, original software, etc.;
- Thematic nature of map (hazard, vulnerability, risk/type of hazard);
- Scale on which map is displayed, geographical coverage, year of last update;
- Institution in charge of compiling map information;
- Means of accessibility, reciprocity conditions.

investors worldwide. This inventory of 314 different cartographic references presents sources of information related to hazard, vulnerability or risk issues in Central America in a conventional database format. The inventory includes institutions located outside the region that have produced additional cartographic materials about Central America. The relational format of the database allows searches by country, institution and type of hazard.

LA RED

Disaster Inventory - LA RED

Wider public dissemination of disaster information is similarly served by the DESINVENTAR disaster inventory programme that was created and is maintained by the Latin American Network for the Social Study of Disaster Prevention (LA RED). This innovative software permits the storage and recovery of statistical analysis and graphic presentation of information about all types of damaging events registered in a database at the smallest territorial scale. Its utility has been demonstrated through its having become the official software used by all of the national disaster organizations in the region through an agreement fostered by CEPREDENAC. It will soon be introduced into the Caribbean under the joint auspices of the Association of Caribbean States and CEPREDENAC. In addition to this specific disaster inventory, the LA RED web site (www.desenredando.org) contains publications, reports about ongoing projects and additional information about social science initiatives in

vulnerability and risk reduction throughout the Latin American and Caribbean region.

The Caribbean Disaster Information Network

The Caribbean Disaster Information Network (CARDIN) (www.cardin@uwimona.edu.jm) was established in 1999 at the library of the University of the West Indies at Mona, Jamaica. By drawing on the previous experience of, and working closely with, CEPRE-DENAC and CRID, CARDIN has pursued similar information objectives: to serve as a subregional Disaster Information Centre and to become the central focal point for the exchange of disaster information in the Caribbean. CARDIN provides important information and communication linkages between the various national disaster management organizations in Caribbean countries.

The CARDIN focus is to provide wider access and coverage of disaster information in the region and to facilitate the dissemination of disaster-related information to the general Caribbean public. It will strive to do that by working through electronic means on the World Wide Web, by publishing a newsletter and by document delivery services. It also intends to create a database of disaster related information that is available on the Internet, CDs and in print formats that will provide essential resources for policy makers, practitioners, researchers and the general public. CARDIN offers the following services:

- Document delivery services ;
- Documentation centre ;
- Online search for disaster information;
- Reference services;
- Electronic journals;
- Links to selected full-text databases;
- Dissemination of disaster information to the public through a web site, newsletters and document delivery services;
- Creation of full-text documents and scanned images pertaining to disaster-related issues in the Caribbean for wider electronic circulation;
- Expanded working relationships with other agencies for more effective coordination of disaster information activities within the region.

North America

The Natural Hazards Research and Applications Information Center at the University of Colorado in the United States was founded 30 years ago to "strengthen communication among researchers and the individuals and organizations concerned with mitigating natural disasters". Its *Natural Hazards Observer* is a free publication published ten times a year that provides current hazards and risk reduction information, resource and institutional contacts, new publications, announcements, research initiatives and findings across the entire range of professional disciplines and jurisdictional responsibilities

involved with risk issues, predominantly in North America.

Copies of the Center's Disaster Research, an e-mail newsletter, the *Natural Hazards Informer*, a peer-reviewed series that summarizes current knowledge in specific areas of natural hazard interests, and many selected disaster-related Internet sites are all available on the Center's web site at www.colorado.edu/hazards. The Center also has an extensive specialized library which is catalogued on the web site as well as a wealth of material related to hazards research and the mitigation of natural disasters. All titles and the procedures to obtain the Center's many publications are also available on the Center's web site.

There are many other noteworthy disaster risk management or hazard research centres in the United States covering different subject areas or specializations. As the subject reflects rapidly growing public interest and professional relevance throughout United States society, several new centres dedicated to various aspects of risk management are being established. While many exist as part of a university or academic institution, others have been established as "charitable institutions", foundations, professional or scientific organizations, NGOs or commercial enterprises. Practically all of them are engaged in the exchange and dissemination of information related to risk reduction and virtually all such centres have web sites and additional information materials. An extensive list of these many sources of hazard and disaster information, institutes for study in related fields and all of their contact information are available on the Natural Hazards Center web site.

An example of regional collaboration to publicize hazard and risk assessments to a wider public audience can be cited from North America. In 1999, the National Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP) in Canada coordinated research with the National Centre for Disaster Prevention (CENAPRED) in Mexico and the United States Geological Survey (USGS) to produce the North American Map of Natural Hazards and Disasters. This comprehensive and informative series of maps drew on information from a number of existing sources and was published with very wide circulation by the American National Geographic Society*. The distribution of different natural hazards was combined with population characteristics to provide a simplified picture of risk and vulnerability throughout North America. Beyond the public education values served by the map, the joint exercise in producing it was instrumental in initiating cross-border dialogue and the sharing of knowledge between hazard experts and national, state/provincial and local organizations with interests in supporting hazard awareness and risk reduction in the three countries.

* The National Geographic Society, *Natural Hazards of North America Map* (Washington, D.C., July 1998).



Asia



In Asia, barely a start has been made to adequately compile the vast range of institutional abilities and breadth of information available on disaster risk reduction. There are important institutional focal points for the subject such as the ones that follow, but there are many more academic and technical facilities that address risk matters in their own areas of professional expertise or within the context of individual country needs.

Asian Disaster Preparedness Center www.adpc.ait.ac.th.

The Asian Disaster Preparedness Center (ADPC) is a regional resource centre dedicated to disaster reduction for safer communities and sustainable development in Asia and the Pacific. Located in Bangkok, Thailand, ADPC is recognized as an important focal point for promoting disaster awareness and developing capabilities that foster institutionalized disaster management and mitigation policies. ADPC maintains a specialized library of disaster-related material and publishes the quarterly Asian Disaster Management News newsletter for the disaster management community in Asia and the Pacific. It also supports regional information exchange, networking and capacity-building through a European Community Humanitarian Office Disaster Preparedness (DIPECHO) programme in South-East Asia and by working through its partner organization in its Asian Urban Disaster Management Programme supported by the US/AID. Additional information about its wide-ranging information services and projects is available on the web site.

Asian Disaster Reduction Center www.adrc.or.jp

Similarly, by collaborating with partners in Asian countries the Asian Disaster Reduction Center (ADRC) located in Kobe, Japan, accumulates and provides disaster reduction information throughout the region. The body of information available at ADRC provides a basis to carry out research into multinational disaster reduction particularly as it relates to multidisciplinary and multinational cooperation. The Center works through several mechanisms to convey information and to link different institutional activities related to disaster risk reduction in Asia. ADRC has developed a unique geographical information system for disaster management called VENTEN with the objectives of providing both a common structure for referring to disasters and also the data that it contains. It has also developed a comprehensive database on disaster management in collaboration with existing institutions such as CRED and OCHA/ReliefWeb and by drawing on the information resources of ADRC member and advisory countries. A network of NGOs in Asia called the Asian Disaster Reduction and Response Network (ADRRN) is also being formed to recognize the importance of NGOs in disaster reduction by exchanging information and promoting more collaborative relationships. These and other activities are accessible through the informative ADRC web site, and are addressed through a bi-weekly ADRC newsletter. Additionally, by including an extensive list of related institutional linkages in its web site, ADRC seeks to expand access to current information and to motivate broader opportunities of cooperation among already existing institutions.

Europe

A different type of information is provided by the Benfield Greig Hazard Research Centre (BGHRC) located at University College, London, in the United Kingdom. This centre has been recognized as a model of productive public-private collaboration in extending the availability and wider exposure of information about disaster risk reduction. It has the primary objective of providing a means to transfer advanced natural hazard and risk research, practice and innovation from the academic environment to the business world, government and international agencies. The intellectual products of BGHRC and Cranfield University of the UK fall into the two categories of strategic research about natural hazards and the processes that drive them, and more specific applied studies targeted at reducing the impact of natural hazards on society. There are also plans to publish a series of topical papers, "Issues in risk science", summarizing and promoting new research about natural hazards and associated risks, disaster management and related issues. Current information supplied by the Centre for disaster management professionals and the public includes the quarterly newsletter *Alert* and a series of working papers on disaster management that was launched in 2001. Individual projects have

yielded their own materials for wider circulation, such as the operational manuals *Communication During Volcanic Emergencies* and *Corporate Social Responsibility and Disaster Reduction*.

Additionally, by being able to draw on an enviable range of hazards expertise from University College, London and through its own extensive research network, BGHRC provides public information resources and media access to academics, research organizations and government institutions in the United Kingdom, throughout Europe and internationally. This includes the dissemination of professional analysis and observations through an information service and the publication of event and post-loss reports that are all used widely by the media, including all the major United Kingdom radio and television news services and others in Europe, the United States and elsewhere.

In France, PRIM.NET (www.prim.net) is a French educational multidisciplinary internet portal from the Ministry of land-use planning and environment (MATE) which promotes the culture of natural and technological disaster prevention. It underlines the close relationship between the human being and its natural environment in the framework of sustainable development. It is a forum for teachers, students and citizens where they can find useful information in French.

Selected national information programmes

To varying degrees and with different intentions, individual countries have established their own distinctive approaches to institutionalizing information functions for disaster reduction. While recognizing that the information needs of countries vary and there are reasons for different emphases, there is nonetheless a growing recognition of the need to combine different types of information that could be collected or maintained historically within various departments or agencies. The examples that follow demonstrate some of the challenges that countries have faced in gaining a clear understanding of their respective risk issues and how four different countries are proceeding to update and consolidate the body of their information for improved disaster risk reduction. In all of the cases cited, improved hazard and disaster risk information was an essential precursor to the further development of strategic national disaster risk management programmes.

Recognizing the similarities between these factors and those revealed by the LA RED DESINVENTAR database in Latin America, the MANDISA disaster event database was conceived with the following considerations in mind:

- Disaster incidents can occur at different scales, ranging from household to provincial and national levels;
- Disaster risk is driven by the interaction between triggering hazard factors and underlying conditions of social, economic, environmental and infrastructural vulnerability;
- Disaster impacts can occur in different socio-economic sectors or subject contexts, and therefore may be recorded in a wide range of formats or institutional locations;
- Disaster risk can be reduced by minimizing vulnerability—ideally through ongoing, practical initiatives that achieve multiple development objectives; and most fundamentally,
- Public access to information about local patterns of disaster risk is empowering and facilitates community participation in decision-making, thus strengthening opportunities for responsive governance.

● South Africa

In South Africa, the University of Cape Town's Disaster Mitigation for Sustainable Livelihoods Programme (DiMP) has developed a

disaster information management system for the Monitoring, Mapping and Analysis of Disaster Incidents in South Africa (MANDISA). The objective of the project, co-financed by OFDA/USAID and DFID/UK, is to create a system that can document hazards, vulnerabilities and trends related to localized small to medium-scale disaster incidents and to organize that information for better decision-making. Despite an earlier fragmented to non-existent information base causing localized events to be frequently overlooked, these smaller events are now considered to have disproportionate impacts on already marginalized communities. Moreover, as information about these disaster events is stored in different government services, it has been nearly impossible to create a consolidated profile on municipal disaster occurrence and losses—either by type, location, consequences or over time.

During 1999/2000 a team of researchers identified more than a dozen sources concerning disaster losses in Cape Town alone, containing more than 10,000 records of disasters. This was in glaring contrast to only 20-30 disasters that had been officially declared during the same period. One of the telling observations of the research was that, with the exception of two electronic sources, all other information was confined to paperbound materials. Such widely distributed and often-incompatible sources of information highlight the challenges of creating effective, synthesized disaster information systems. This has made integrated disaster reduction planning virtually impossible.

The information organized by the project is now maintained in a database and linked to a GIS system, visible on a publicly accessible web site. Since the end of 2001 www.MANDISA.org.za has been consolidating data on disaster events that occurred in Cape Town between 1990 and 1999 and has been displaying them with related information in tables, maps, graphs and photos. Users can interrogate the database online and generate additional information about trends and patterns of disaster risk. It is anticipated that this will enable municipal planners and residents alike to consider disaster risks more strategically, just as crime, public health, traffic incidents and other forms of risk are considered to be important developmental priorities underlying broader aspects of basic human security. Improved access to additional information has

created a more readily understood concept of hazards and risks now that they are not marginalized as rare or unique occurrences "caused" simply by either natural or divine intervention.

● China

In another context related to national policies for improved disaster risk reduction, the National Disaster Reduction Plan of the People's Republic of China (*NDRP*) adopted an objective to establish a comprehensive information system for the entire country. It seeks to strengthen the institutional abilities of sharing information, communication technology and operational experience among the many government departments and agencies already doing so, but only within their own respective fields. The central Government authorities approved a project in 1997 to create the *China National Center for Natural Disaster Reduction (CNCNDR)* and for it to act as the comprehensive national disaster information system serving the State Council, all ministries and government commissions, and linking central Government authorities with provinces and municipalities. It is expected that the system will be able to incorporate inputs from satellite remote sensing systems, provide comprehensive management system displays of disaster information, and form the basis of assessment and decision support systems by drawing on the widest possible range of professional and technical expertise throughout the country.

This wealth of material will then be provided for analysis and synthesis by the many technical and multidisciplinary abilities located in the *National Academy of Sciences*. By this unified process, the National Center will be able to make full use of the disaster reduction information and operational experience of all the relevant ministries, commissions, research institutions and social groups. It can then provide senior level officials with comprehensive information, professional services and technical guidance for more effective decision-making in matters of disaster risk management. Moreover, the Center is also expected to play an important role in professional training and public education in those specific fields concerned with national risk reduction. A new purpose-designed facility for the National Center for Natural Disaster Management is

being established. The Center is expected to open officially in 2002.

● India

India has also embarked on a strategic plan to improve the extent and availability of improved information for risk management activities. The Government of India's *High Powered Committee on Disaster Management Plans (HPC-DMP)* has decided to establish a *National Natural Disaster Knowledge Network*. The programme aims to facilitate an interactive, simultaneous dialogue between all official authorities, many professional disciplines and interested communities throughout the country involved with hazards and natural disasters. The *Nanadisk-Net* is planned as a powerful "network of networks" to store, manage and disseminate information and to connect government departments, research institutions, universities, community-based organizations and individuals working with the various aspects of hazard and disaster management. The system is intended to serve as a common repository for accumulated disaster management experience, with the advantage that the Network may then serve as a basis for expanded opportunities of distanced, electronic training. By including access to libraries and other resource institutions, these digital services will be able to provide much wider access to global databases, training materials and early warning systems. It is also anticipated that more technical, academic and professional institutions will become motivated to link into an integrated professional network that spans multiple professional sectors of interest.

● Australia

The Australian Geological Survey Organization has been working with Emergency Management Australia (EMA) to establish the *Australian Disaster Information Network (AusDIN)*. AusDIN is a consortium of national agencies, state emergency authorities, universities and private enterprise representatives working to develop an information network that provides information for all types of crisis management including risk assessment, mitigation, planning, response and recovery activities. It is



designed to be an Internet-based service that provides accessibility to data and information services for a wide variety of people involved in disaster and risk management. AusDIN is being developed within the international framework provided by GDIN and is planned to be linked with GDIN information systems. It is, however, just one part of a more comprehensive Australian undertaking to improve the management of information for disaster and risk management purposes. Additional non-technical approaches are being developed to foster networks and forums for people involved in the provision of information relevant to anticipating and managing crisis.

One such related initiative has been undertaken by the Urban Geoscience Division of Geo-

science Australia, the national agency for geoscience research and information. The *Australian Disaster Management Information Network (ADMIN)* undertakes holistic and comprehensive assessments and numerical modelling of risk from natural and man-made hazards in priority urban areas and addresses issues of concern to urban communities that require geoscientific information. The geophysical network carries out synoptic observations of earthquakes, tsunamis, geomagnetic fields as well as nuclear explosions. It seeks to increase national capacities for the distribution of comprehensive technical data and information for better disaster risk reduction and response.



Technical information service conveying experience about different hazards

Aside from the specific requirements of early warning which are reviewed in section 5.6, there are other examples of information centres devoted to specific hazards. Typically they convey frequently updated technical data as well as more general information about the changing events and circumstances pertaining to their individual hazard interests. They all fulfil a public information function and many are engaged in providing specialist reference material or advice to policy makers. A selection of these hazard information centres is provided. While most of them focus on a single type of hazard, the range of their professional contacts is typically quite extensive, reaching from scientific disciplines through environmental conditions to the social and economic dimensions of local communities where disaster reduction must eventually take place. Each of the examples below relates to the broad contexts in which disaster risk management information functions need to occur.

● Integrated Hazard Information

The *United States Geological Survey's Center for Integration of Natural Disaster Information (CINDI)* is a good example in which information about multiple hazards is collected, integrated and communicated to a wider public. Its website at cindi.usgs.gov provides information about drought, earthquakes, floods, hurricanes, landslides, volcanoes, wildfire, geomagnetism and other special topical areas of risk viewed in the context of the earth sciences or natural resources involved. With Outreach, Research and Response dimensions this information center is able to provide near-real time monitoring of hazards by integrating a variety of technical information drawn from many sources, and then to communicate to either technical teams or decision-makers. After a disaster, the Center can combine remotely sensed data with archived information to assess the nature and extent of impact from a particular event. The compiled information which has international application is also available for use in inter-disciplinary research that contributes to the improved use of data for hazard and risk assessment, or in the development of risk management strategies by local or national officials.

● Hydrometeorological Hazards

Information about hydrometeorological hazards is widely available through many institutional sources around the world, with specific current information as well as archived data related to individual countries accessible through every national meteorological and hydrological service. A wide variety of global products including forecasts valid for a period of 10 to 30 days are available at the three World Meteorological Centers located in:

- Melbourne (www.bom.gov.au),
- Moscow (www.mecom.ru/roshydro), and
- Washington, D.C. (www.nws.noaa.gov).

Specialized geographical products, and information related to specific types of hazards are compiled and widely disseminated by more than 20 *World Meteorological Organization Specialized Regional Meteorological Centers (RSMCs)*. There are 24 RSMCs with related geographical specialization located in Algiers, Beijing, Bracknell, Brasilia, Buenos Aires, Cairo, Dakar, Darwin, Jeddah, Khabarovsk, Melbourne, Miami, Montreal, Moscow, Nairobi, New Delhi, Novosibirsk, Offenbach, Pretoria, Rome, Tashkent, Tokyo, Tunis/Casablanca, and Wellington.

There are also eight designated RSMCs for the provision of computer-generated models for analyzing environmental crises and for providing hydrological or meteorological guidance in emergency actions. These centers can provide specialized transport, dispersion, and deposition models in accordance with internationally recognized arrangements and standards. These centers are located in Bracknell UK. for Europe; Toulouse, France for Africa; Montreal and Washington D.C., for the Americas; Beijing, Obninsk (Russia) and Tokyo for Asia; and Melbourne for the Pacific Region.

Hydrological information is also available from many regional centers throughout the world. Hydrology and water-related issues are the focus of many international agencies. One such center with a global focus is the *Centre for Ecology and Hydrology (CEH)* www.nerc-wallingford.ac.uk. By contrast, extensive information and widespread institutional linkages related to drought and associated environmental conditions can be found at the *International Drought*



Information Center at the University of Nebraska in Lincoln, U.S.A. (www.ngdc.noaa.gov and enso.unl.edu/agmet/centers.htm), which also offers a series of regional training seminars on drought management and planning techniques aimed at training scientists and policymakers worldwide in the science of drought management and preparedness. Another source is the *Oxford Drought Research Institute in the U.K.*

● Climate Change

An important international initiative has been proceeding since mid-2001 by an Inter-Commission Task Team convened under the auspices of the *World Meteorological Organization (WMO)*, its technical commissions and Member States to create a series of associated Regional Climate Centers (RCCs). Although individual centers are not yet established, they are being planned in order to increase the collaboration among climatological, meteorological and hydrological /water resources manage-

ment technical communities and to facilitate the widespread availability of climatic information pertaining to longer term forecasting. With the recognized need for more consistent technical criteria for data generation and exchange, and broader forms of inter-sectoral information analysis and dissemination particularly regarding the availability of seasonal to inter-annual forecasts, work is continuing to define both the potential organizational and functional responsibilities of Regional Climate Centers.

While this endeavor will necessarily draw heavily on the already established National Meteorological and Hydrological Services of individual countries, as well as the RSMCs engaged in providing a variety of hazard information and forecast products, the initiative is a timely indication of institutional moves to address emerging global needs for both technical and public information about changing perceptions of risk. In recent years the Regional Climate Outlook Forums have played a key

Other RSMCs specialize in tropical cyclone forecasting and the dissemination of related information services. These include:

- Nadi, Fiji Tropical Cyclone Centre covering the South-west Pacific Region, (www.met.gov.fj/advisories);
- Honolulu Hurricane Center for the Central North Pacific Ocean, (www.nws.noaa.gov/pr/hnl/cphc/pages/cphc.shtml);
- New Delhi Tropical Cyclone Centre, for the eastern Indian Ocean, (www.imd.ernet.in/services/cyclone/cyclone-warning-services);
- Miami Hurricane Center for the Atlantic Ocean and Caribbean Sea, (www.nhc.noaa.gov/products);
- Tokyo Typhoon Centre for the western Pacific and Asian Region (ddb.kishou.go.jp/typhoon/cyclone/cyclone);
- La Réunion Tropical Cyclone Centre for the western part of the Indian Ocean, (www.meteo.fr/temps/domtom/La_Reunion/trajGP/data/home_trajGP).

In addition there are Tropical Cyclone Warning Centers that have more specific localized regional responsibilities, such as those exemplified by the following:

- the Perth Bureau of Meteorology coverage for Western Australia, (www.bom.gov.au/weather/wa),
- the Darwin Bureau of Meteorology for the waters north of Australia, (www.bom.gov.au/weather/nt/inside/cyclone/cyclone.shtml),
- the Brisbane Bureau of Meteorology for coverage of the Coral Sea, (www.bom.gov.au/weather/qld/cyclone),
- the Port Moresby, Papua New Guinea National Weather Service for the Solomon Sea and Gulf of Papua, (website under preparation) and
- the Wellington Meteorological Service of New Zealand, Ltd. for the Southern Seas etc. (www.metservice.co.nz/forecasts/high_seas.asp)

role in defining these future requirements for RCC functions in the Regions through their cross-program analysis and wide circulation of multi-disciplinary information. At the same time the predominant, and distinctive, roles and requirements of different geographical regions around the world are recognized as being crucial to the most effective accomplishment of the intended objectives. As a broad conceptual framework of RCCs continues to emerge, attention will proceed with individual Regions considering their specific requirements and assessing current operational and technical abilities to meet them.

● Wildfire and related hazards

The current state of fire science that includes fundamental fire research and fire ecology and the results of bio-geochemical and atmospheric sciences research of the last decade provide sufficient knowledge to support decision-making in fire policy at most management levels of responsibility. However, in many countries this wealth of knowledge and expertise is either not known or is not readily accessible and available for developing adequate fire policies and related measures of operational management. The prolonged and severe fire and smoke episode that occurred in Southeast Asia in 1997-98 demonstrated that the available knowledge about fire and the related management expertise was utilized only to a limited extent. These circumstances led to confusion and uncertainty at national, regional and international levels of responsibility, resulting in delayed decisions and the late application of appropriately targeted international response to the fire and smoke emergencies. Retrospectively this could be explained by the lack of a regional Southeast Asian fire information system.

Considering the wider extent of fire issues around the world, as well as the extent of global experience in the field. The establishment of an institution preliminarily designated as a "Global Fire Management Facility" was proposed by a number of international conferences since 1996. On the basis of these recommendations the Government of Germany responded through the Office for the Coordination of Humanitarian Assistance in the Ministry of Foreign Affairs to establish a *Global Fire Monitoring Center (GFMC)* at the Max Planck

Institute for Chemistry in Freiburg, Germany from October 1998.

The GFMC serves an active role in the documentation, information and monitoring service functions among the fire science community, the technical community of engineering, technology development, the primary user community of fire managers, as well as policy makers. It aims to provide widespread and timely information in the field of long-term strategic planning for the prevention of disastrous wildland fires as well as enabling preparedness measures and appropriate responses for fire emergencies. A worldwide network of many institutions and individuals generates GFMC products of both national and global scale. All of that information and data are systematically collected, interpreted and displayed on the Internet by the GFMC at www.uni-freiburg.de/fireglobe. The information remains current, being updated frequently, and as may be required, daily. It is then archived for future reference or research purposes.

● Seismic Hazards

While there are many seismological and seismic engineering institutes around the world, widely known among the practitioners most immediately involved for their technical or informational services. Two representative examples of information centers are cited here that are particularly engaged in the dissemination of information about the seismic hazards.

The Earthquake Hazards Program of the United States Geological Survey (EHP/USGS) is part of the National Earthquake Hazards Reduction Program lead by the Federal Emergency Management Agency. This program has the primary objective to provide relevant earthquake science information and knowledge for reducing deaths, injuries, and property damage from earthquakes through understanding of their characteristics and effects and by providing the information and knowledge needed to mitigate those losses. The EHP/USGS' role is to provide earth sciences information and related products for earthquake loss reduction. Information is available on its website at (www.earthquake.usgs.gov/) to serve its specific goals.



The Earthquake Engineering Research Institute (EERI), in the United States is a national nonprofit, technical society of engineers, geoscientists, architects, planners, public officials, and social scientists, with the objective to reduce earthquake risk by advancing the science and practice of earthquake engineering. The organization seeks to accomplish this objective by improving the understanding of the impact of earthquakes on the physical, social, economic, political and cultural environments, and by advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes. EERI is recognized as the authoritative source for earthquake risk reduction information in the USA, and in partnership with other nations, and is involved in developing earthquake risk reduction information worldwide.

The Institute is best known for its field investigations and reconnaissance reports detailing the effects of destructive earthquakes. Often EERI serves as coordinator for the investigative efforts of several organizations. EERI membership includes leading earthquake investigators in all relevant fields from many countries, and has been engaged for many years in a project, with National Science Foundation support, to maximize the learning from destructive earthquakes. Preliminary information on the effects of destructive events is pub-

lished in the monthly Newsletter. Larger reports on major earthquakes are published as supplements to Earthquake Spectra, EERI's quarterly professional journal. EERI also sponsors post-earthquake technical briefings, an effort to reach professional communities throughout the United States.

In addition to its publications, EERI has produced more than 50 slide sets covering specific earthquakes and their impacts, earthquake resistant design, seismicity, unreinforced masonry buildings, loss reduction measures, mitigation of earthquake hazards, and a new series on earthquake basics. Videotapes produced by EERI include technical briefings on the Armenia, Loma Prieta, and Hokkaido-nansei-oki earthquakes. Further information about EERI and the availability of its information materials can be found on the organization's website at www.EERI.org.

● Volcanic Hazards

Within the volcanological community, the *World Organization of Volcano Observatories (WOVO)*, a commission of *IAVCEI*, is starting to build a major database involving information about the former "Decade" volcanoes. (www.volcano.undp.nodak.edu/vwdocs/wovo)

By providing both researchers and citizens alike more access to the details that scientists are monitoring, it will help everyone proceed from overly simplistic considerations of "whether a volcano will erupt tomorrow or not", to a more realistic availability of data with interpretations provided along with their accompanying uncertainties. The system will also convey information about what is being monitored to reduce those uncertainties, and clarify what else can and cannot be forecast. Initially, the database, *WOVOdat* will be an historical database so that observatories can conduct their own research for two years before providing data to *WOVOdat*, but eventually, it is anticipated that observatories may realize the broader benefits to be gained by sharing data in real-time.

Primary GFMC products include

- early warning of fire danger
- near-real time monitoring of fire events
- interpretation and synthesis of fire information
- archive of global fire information
- facilitation of links between national and international institutions involved in fire research, development and policy development
- support of local, national and international bodies to develop long-term strategies or policies for wildland fire management
- emergency hotline and (restricted) liaison capabilities for providing assistance in rapid assessment and decision-support for responding to wildland fire emergencies.

A second initiative to disseminate more volcanological information more widely also involves public electronic access. It is widely known that volcanic eruptions affect people and things in often predictable ways, but information about these effects has been spotty and not relayed systematically from the site of one eruption to the next. Many lessons are unnecessarily relearned, and further research elsewhere is impeded by others rediscovering basic knowledge derived from previous global experience. Efforts are currently underway to update a global compendium that will compile

current information about the effects of volcanic eruptions - including practical tips for their mitigation. This will be placed on the Internet for easy access from nearly any country and allow, for example, a water supply engineer and rice agronomist in one country to learn from the prior experience of a water supply engineer and rice agronomist in another country, within minutes. Pictures will illustrate the problems, while text will provide details and suggest possible mitigation measures.

Future challenges and priorities

The wide range of selected information services and program initiatives described above provide a basis to identify primary areas for future improvements in information management and the communication of experience in disaster risk reduction. Five key areas are identified:

- Availability of information
- Necessary capacities to utilize data
- Clearing house responsibilities
- Expanded access to information
- Future technology

● Availability of information

There is currently abundant information, available globally, on disaster risk reduction but that does not necessarily translate into its widespread availability, nor is it particularly well targeted for all potential users. In many places and cultures there is little relevant information conveyed that is suited to local languages or the actual living conditions of people exposed to natural hazards.

The very abundance of information also creates a problem for non-specialized or public users to ascertain the relative value or quality of specific information, if they are unaware of the originating source or broader professional context of the various sources.

Useful information demands that databases be kept current, bibliographic resources be continually expanded, and that access and search criteria should remain consistent and be widely understood by an expanding user group.

● Necessary capacities to utilize data

Frequent observations are made by individual country authorities about the inadequacy of many institutions that frustrate their desire to know exactly what relevant information exists, where to find it, and how to access it in the most efficient manner.

A priority initiative of considerable benefit would be the joint conduct of a national audit about risk-related information needs, availability and limitations. International organizations could help by providing guidance about existing sources or means for obtaining well-suited information.

The engagement of existing regionally-focussed information centres such as CRED, CARDIN, ADPC, ADRC, and the University of Colorado's Natural Hazard Center, and the use of their experience in linking suppliers of information with practitioners would be particularly valuable.

● Clearing house responsibilities

There is a glaring need for an international capacity to fulfil clearing house functions specifically related to the identification, ordering and dissemination of hazards and disaster risk-management information. The intended role is one that could foster the exchange of relevant information through the use of *lists of lists*, directories, and catalogue/search/retrieve/deliver procedures that would serve to direct and connect a very wide range of users and practitioners for all policy-making levels. Such facilities exist but concentrate on international disaster response or disaster preparedness, such as ReliefWeb and GDIN.

The ISDR secretariat is working in association with partners, and is in the process of strengthening its web site and resource centre to build a comprehensive and easily accessible series of directories and linkages that can form the basis of an approach to such a global clearing house function for disaster reduction.

By pursuing the issue globally, the existence of primary information gaps, the inadequacy of relevant data, or geographical shortfalls in information availability or dissemination may be more easily identified and addressed. Such a coordinated approach can also, with adequate

support, contribute to the establishment of commonly accepted protocols or procedures for recording or exchanging disaster risk reduction information, similar in function to the new XML protocol being used in the global software industry.

Other commonly acknowledged practices could greatly expand the availability of risk-related information by establishing nomenclature and facilitating search procedures related to key words, such as *yellow pages* type directories, contact details of widely recognized specialist institutions and international experts in key areas of risk reduction.

Experience gained over the years from the evolution of ReliefWeb as an acknowledged information-rich resource could be beneficial to the development of a similar comprehensive information platform dedicated to risk issues and disaster reduction information. Such a comprehensive PreventionWeb does not yet exist but could be a powerful instrument within ISDR to motivate and serve the different constituencies associated with disaster risk assessment and reduction activities worldwide.

● Expanded access to information

Beyond the technical limitations of information systems, more attention needs to be devoted to the human dimension of communication, with both policies and facilities that encourage a much wider opportunity for popular and community-based involvement in information processing and dissemination. This can be achieved through local risk maps based on community needs and values, public access information portals, or facilities that enable the shared exchange of locally-derived risk information among communities or countries.

In all such efforts to bring information practice closer to people most at risk, much more attention must be given to ensure that the costs associated with the availability or exchange of disaster information are affordable at local scales, particularly when applied to low and

medium income countries, or among more isolated and distant communities. There is a need to support and expand local, national and regional documentation centres and library services related to the topics.

The rapid and widespread use of mobile telephones and the often innovative economies associated with their use, offers a promising opportunity to marry technology with local capacities. The more effective use of radio media, in association with the availability of wind-up radios, represents another example of expanding traditional means of communication for a more informed and engaged population in matters of risk management. (See section on public awareness.)

● Future technology

The wider public use of learning systems and artificial intelligence can lead to an increased access to risk management information, which would be better adapted to the needs of specific users. The applications offered by the latest information technology provide a powerful interactive working tool for the extended disaster risk community. Through applications such as electronic conferencing and distance learning via Internet, immediate sharing of documents and drafts, efficiency and timeliness will increase.

Other applications could be developed further to enhance information on disasters and risk reduction. GIS, remote sensing imagery and satellite observations can help considerably to show vulnerable areas, enhance mapping, and ameliorate the understanding of hazards. Agencies like the United Nations Office for Outer Space Affairs (UN/OOSA), the Committee on the Peaceful Uses of Outer Space (COPUOS), the Committee on Earth Observation Satellites (CEOS), the Council of Europe Major Hazards Agreement (EUROPA), and the European Commission Joint Research Centre (EC/JRC) already contribute to these tasks.



4.2 Education and Training

The highest priority has to be given to present the various dimensions of disaster risk within a community through structured educational programs and professional training. As people's understanding and the exercise of their professional skills are essential components of any risk reduction strategy, an investment in human resources and capacity building across generations will have more lasting value than any specific investment made in technological systems to reduce risks.

Education and training for disaster risk reduction takes many different forms:

- Basic role of education and training
- Disaster risk management training centers
- Academic and educational programs
- Primary and secondary schooling
- Professional trades and skills training
- Capacity building
- Future challenges and priorities

Basic role of education and training

As disaster risk reduction has evolved over the past two decades years from interests focussed on the study of specific hazards, the responsibilities of civil defence authorities and the largely structural nature of physical protection, both the needs and the institutional resources related to education and training have also changed.

Academic research has become much more

focused on the transfer of knowledge and experience, which in turn has established the need for much closer association between the sources of specialist knowledge and the population it is intended to serve. With more attention being given to the social and economic conditions of vulnerability, conventional thinking about disaster management has become much more closely linked to basic developmental issues. By looking beyond the physical attributes of hazards, a greater emphasis has been placed on matters associated with disaster risk issues and preparedness.

Education and training about disaster management can no longer be considered as an area of specialist scientific study. The very concept of a disaster manager, fostered in the 1980s and early 1990s, no longer sufficiently conveys the expanded roles and responsibilities involved in contemporary strategies of disaster risk reduction.

This historical context is important to demonstrate the evolution of education and training as the concept of disaster management has grown and diversified. As increasing attention must now be given to the changing nature of hazards and the more complex conditions of risk, institutional facilities and relationships required for educating future populations will likewise have to become more diverse. A need remains to accommodate the combined influences of environmental and land management

"One of the most significant trends affecting disaster preparedness and response is the transformation that has occurred in disaster management. Once focused equally on war readiness and planning for disasters and viewed as the exclusive purview of individuals with military backgrounds, 'civil defense' has evolved into the profession of emergency management - a profession that requires diverse skills, ranging from the ability to develop formal disaster plans, to skills in community outreach and organizational development, the ability to mobilize political constituencies, and knowledge of new and emerging technologies. The professionalization of the field has been accompanied by the development of new organizations, specialty fields, and credentialing processes, as well as the growth of college and university curricula focusing on principles of emergency management. With this ongoing evolution in disaster management, disaster research must continue to document how and why disasters occur as well as their immediate and long-term impacts.

Source: K. Tierney, 2001.

issues, climatic uncertainty, changing demographics, and the pressing demands for sustainable livelihoods.

Education and training for disaster risk reduction must proceed along several fronts. Where disaster management training programs are already established, there is evidence that the frames of reference and the intended audience is expanding. More attention is being given to integrating disaster risk reduction into national development planning processes and in creating more resilient local communities.

There is now a recognition that disaster risks can only be successfully managed on a broad and multidisciplinary basis that narrows the existing gaps between researchers, teachers, and practitioners. While there is a much greater need for wider dissemination of professional and technical knowledge, there is at least as much need for study and understanding about the underlying social and economic dimensions of risk too.

Professional training for risk reduction will play a growing role as both the public and political authorities recognise that effective risk management strategies require many different skills. But such an investment in the development of human resources can only be sustained to the extent that the value of risk management is institutionalised. The examples that follow give some indication of the extent and variety of activities furthering the education and training of disaster risk management.

Disaster risk management training centers

There are a number of highly regarded disaster management training institutions that have evolved from an earlier emphasis on operation. Earlier attention devoted to such subjects as contingency planning and community preparedness activities has been reoriented towards motivating more local participation and multidisciplinary outlooks that can create disaster-resistant communities. As these centers have been organizing a variety of training programs over the past 15-20 years, alumni from one or the other of these centers frequently constitute the core of disaster professionals in many developing countries, particularly in Africa and Asian Regions.

Established training centers include:

- Disaster Management Center (DMC) at the University of Wisconsin in Madison, United States
- Asian Disaster Preparedness Center (ADPC) in Bangkok, Thailand,
- Cranfield Disaster Preparedness Center (CDPC) at Cranfield University in Cranfield, United Kingdom
- Emergency Management Australia Institute (EMAI) in Mt. Macedon, Australia.
- Asian Disaster Reduction Center (ADRC) in Kobe, Japan.

National Training Centers

Asia

- International Institute for Disaster Risk Management in Manila, Philippines
- National Center for Disaster Management at the Indian Institute of Public Administration in New Delhi, India
- Uttar Aranchal Disaster Mitigation and Management Center in Dehra Doon, India
- National Institute of Rural Development in Hyderabad, India
- Center on Integrated Rural Development for Asia and the Pacific in Dhaka, Bangladesh
- International Center of Integrated Mountain Development (ICIMOD) in Kathmandu, Nepal

Africa

- Disaster Mitigation for Sustainable Livelihoods Programme of the University of the Western Cape in Cape Town, South Africa. This programme conducts a course that aims to achieve an integrated understanding of disaster risk and its implications for sustainable development in southern Africa, with a specific focus on South Africa. It assumes an interdisciplinary perspective in disasters and conceptualizes disaster risk as an outcome of the interplay between human and natural factors. The programme also work with community outreach.
- Africa University in Mutare, Zimbabwe
- Disaster Management and Mitigation Unit of the National College for Management and Development Studies in Kabwe, Zambia
- Disaster Management Institute of Southern Africa (DMISA) in South Africa



Earlier training has in turn given impetus to the creation of national training programs or centers within individual disaster-prone developing countries which impart instruction for further extension of risk reduction practices through community-level practices. These initiatives also foster the growth of smaller informal training adapted to local situations and needs.

Academic and educational programs

Natural hazards have always been studied within the physical sciences, or expressed in terms of physical forces considered by other technical disciplines such as engineering. There was little academic interest in relating the study of hazards or their social and economic effects to societies.

Noteworthy exceptions in the United States included the early exploration of sociological aspects of disasters in the mid 1960s at the *Ohio State University Disaster Research Center* which led to the creation of the *Natural Hazards Research and Applications Information Center at the University of Colorado* in 1974.

Parallel developments occurred in Europe during the 1970s as a variety of technical specialists contributed to ideas that coalesced in the creation of the *Center for the Research and Epidemiology of Disasters (CRED)* at the School of Public Health, Catholic University of Louvain in Brussels in 1972. The ideas of a multi-disciplinary group of technical researchers called the London Technical Group led to the creation of the International Disaster Institute, a specialist research centre, in London in 1978.

Academic programs related to hazard studies and the different but related fields of emergency management have expanded widely over the past 10 years but only in some parts of the world. More than 60 centres that study hazards and disasters are listed by the University of Colorado Natural Hazards Center web site (www.Colorado.edu/hazards/). In addition, an

equal number of academic institutions are listed that offer either graduate or undergraduate programs in emergency management courses at colleges, universities, and other educational institutions located principally in the United States.

A similar record, but with a wider international scope, is maintained by the *Asian Disaster Reduction Center* in Kobe, Japan. Its web site (www.adrc.or.jp) lists more than 70 training institutions and program contacts for an extensive range of technical specialist, national and professional organizations including some academic institutions that offer short-term professional courses in various aspects of disaster management.

One academic program that reflects the development of programs in disaster risk management is the Masters of Science Course in Disaster Management offered by Cranfield University in the UK. Now in its third year, it aims to attract experienced mid-career personnel drawn from all organizational sectors among governments, UN agencies, uniformed services and NGOs, while at the same time catering for newly graduating students from a variety of academic backgrounds such as geography, development and environmental studies, political science and various technical courses of study. The focus is on the development of tools, techniques and approaches for effective disaster management rather than giving priority strictly to academic study and reflection. The aim of the course is to build effective disaster management capacity as well as reducing risks from natural disasters, complex emergencies and human induced disasters. Further information can be obtained from www.rmcs.cranfield.ac.uk/dmc

Regional variations also exist, although comprehensive listings of formal programs are not so readily available. However, in Latin American and the Caribbean there are several universities that offer postgraduate programs in disaster risk management.

In Latin America and the Caribbean

- The University of Antioquia in Colombia hosts the PAHO/WHO collaborating Centre for Education in areas of public health. In addition, the same University offers a Masters Degree in Contemporary Social Sciences and Risk Management within the faculty of social sciences.
- The University of the Andes in Bogota, Colombia offers a Risk Assessment and Disaster Prevention Postgraduate Program of Disasters.
- The University del Valle in Bogota, Colombia offers a post graduate program in Integrated Risk Management.
- The Cuyo National University in Mendoza, Argentina offers a postgraduate degree in Prevention, Planning and Integrated Management of Risk-Prone Areas.
- The Venezuela's Institution of Technology of Ejido (Instituto de Tecnología de Ejido) offers a technical degree in Emergency Management and Disaster Response.
- The Faculty of Medicine at the Central University of Venezuela has included subjects related to emergency and disaster preparedness in the undergraduate curriculum for many years.
- In Chile, the first postgraduate course on journalism and disaster management has begun.
- In Costa Rica: UNICEF, the Latin American Social Science Faculty (FLACSO) and LA RED promoted in 1998 a project to introduce reforms in the curriculum of risk and disaster education. The project undertook theoretical development, which are published in Education and Disasters (Educación y Desastres), and are also contained in a website www.desenredando.org.
- In the Caribbean region, the University of West Indies (UWI), has several disaster management related programmes out of the Jamaica and Trinidad & Tobago campuses. These include earthquake and volcano monitoring systems, disaster research units, crop production and management of tropical hazards, natural resource management programmes, as well as coverage of disaster management as part of Bachelors degree programmes. In addition at the Masters level, at the Mona and Cave Hill Campus, disaster management components are included in the Environmental programmes.

Four universities in Central America are presently conducting or developing Masters degrees in disaster-related fields.

- The National University (UNA) of Costa Rica offers a Masters degree in Natural Disaster Mitigation for Central America, established through cooperation with the Swedish Agency for Research Cooperation with Developing Countries. It involves many other Central American state universities.
- The University of Costa Rica (UCR) offers a series of courses related to hazards.
- The National Autonomous University of Nicaragua is currently designing a Masters degree in Prevention and Mitigation of Natural Disasters in conjunction with possible supporting interest from the Swiss Government.
- The Del Valle University in Guatemala is designing a Masters degree related to disasters oriented towards emergency preparedness and response.

Other courses:

- In Bolivia, an administrative resolution has encouraged the designation of risk management as an elective course or a technical discipline at college level.
- In Colombia, a higher education policy on risk prevention is being designed through a "National Commission on Disaster Prevention Education"
- In Venezuela, an existing program is being restructured to include disaster reduction subjects while a parallel initiative seeks to improve the disaster resilience in the design and construction of school facilities.



Professional trades and skill training

One notes a different orientation for education and training in disaster or risk management practices in Asian countries. The past thirty years have seen a remarkable growth in the number of professionals trained in different science and engineering branches related to geological, hydrometeorological and climatic hazards so that there are now many more people to assess and interpret the physical phenomena of natural hazards, even within smaller developing countries.

A variation of this approach is the Kathmandu Valley Earthquake Risk Management Project implemented by the National Society for Earthquake Technology (NSET) in Nepal. Engineering students participated in a building inventory and vulnerability analysis program during their summer vacation. More than 100 students were involved in the program and learned different aspects of safer construction in earthquake-prone areas, which had not otherwise figured in their engineering curriculum.

Even such an informal exposure of students to risk issues and their own recognition of the relevance to their studies, demonstrates a potential for future courses for the younger generation.

However, the teaching of science and engineering only infrequently proceeds into matters of hazard and risk assessment. When the subject is addressed, typical courses of study will rely on teaching structural mitigation and tend to feature physical means of seeking to control the effects of natural hazards, such as by the construction of check dams, flood embankments, or retaining walls.

While modern social science and public administration widely acknowledge the prevalence of increasingly complex societies, there is correspondingly little attention paid in formal educational programs to the human social factors, economic rationale, or political responsibilities associated with risk management. Accordingly, there is a visible lack of social scientists, community-based leaders or broadly informed public administrators practising in the field of risk reduction.

One exception is the Asian Urban Disaster Mitigation Program (AUDMP), implement-

ed under the auspices of ADPC in 10 Asian countries. This program's approach to training, learning materials and continuing education is to develop generic curricula on urban disaster mitigation, which can be adapted and institutionalised at national and local levels through training institutes.

An array of training programs, methods and tools have been produced over the past seven years including courses on floods, earthquakes and technological hazards. Other courses have emphasised community-based approaches to disaster reduction, while courses for safer construction techniques for masons have also been developed. In Asian countries, there is much more likely to be specialised institutions related to disaster management created by state authorities.

The on-line discussion in the lead up to the 2002 World Summit on Sustainable Development considered how best to promote education and capacity-building for the management of risk reduction. It considered means to incorporate disaster risk reduction issues in sustainable development practices and reflected a common understanding that education is linked to safety in many immediate and longer term ways. It noted that education involves a number of relevant aspects including public awareness of hazards, advocacy for public adherence to creating a culture of prevention, development of school curricula and professional training. However, it was also observed that the issue is not simply one of recommending more education. There is equally a need to address the ways in which these various forms of education and training can link and complement one another (see more: www.earthsummit2002.org/debate).

Such a gap becomes apparent when one considers that a disproportionate exposure to risk is concentrated in countries of the developing world where a dramatic potential for loss can be attributed to unsafe buildings. Most of these buildings are constructed informally. The involvement of certified technicians, or the application of formal engineering practices in these constructions is limited, due to economic realities.

The problem of safer construction becomes one of conveying sound, risk reduction building practices to the building owner. One mech-

anism that has been exploited to only a limited extent is by working with a more concentrated effort to involve the artisanal carpenters, masons and other locally skilled tradesmen who provide the great majority of technical expertise in construction. As they are local residents themselves, they can work as motivators for both current and future improvements. To accomplish this form of risk reduction training, it is necessary to recognise the role of these artisans more fully and to engage them in better understanding about the issues involved and by encouraging them to use technical knowledge in their work. Where the time has been taken to do this, such as in the *Core Shelter Construction Programme* in the Philippines and the NSET activities in Nepal, considerable interest was shown by the participating communities with rapid replication of the principles in neighbouring locations.

A significant advance in disaster education has been observed in Latin America and the Caribbean in recent years. There has been a growth in educating and employing professionals with skills necessary for risk reduction from within the region in contrast to an earlier reliance on external technical advice and abilities. This practice of developing local capabilities has been encouraged by international agencies. A few years ago, most courses and instructors had to be imported but that is no longer the case.

Capacity building

The concept of capacity building is to provide a target group with skills, resources and technical abilities to enable it to better help itself. In recent years, increased emphasis has also been placed on developing overall policy frameworks in which individuals and organizations interact with the external environment in their respective areas of endeavour.

Capacity building can be achieved through means such as training and education, public information, the transfer, provision or access to technology or other forms of technical assistance intended to improve institutional efficiency. In the field of disaster risk reduction, the concept can also relate to the formulation of an appropriate policy framework such as in the

training of disaster managers, the transfer of technical abilities or expertise, the dissemination of traditional knowledge and know-how, strengthening infrastructure or organizational abilities at local community, national and regional levels.

Most of the Programmes and agencies of the UN system are geared to provide and support capacity building in their respective areas of competence. For example, in 2001, UNDP through its country offices, Regional Bureaux and specialised programmes, strengthened disaster reduction capacities in over sixty countries. These programmes included building local capacities for disaster reduction in Central America and Jamaica, developing a new national risk and disaster management system in Haiti, strengthening national disaster offices in the English Caribbean countries, developing regional strategies for disaster management in the SADC countries and in the Stability Pact area (South-Eastern Europe countries), addressing flood risk reduction in the Tisza River Basin (Hungary, Romania and Ukraine), and addressing drought risks in Iran, Tajikistan and Uzbekistan. UNDP also supported several capacity-building programmes including in Albania, East Timor, Romania, Madagascar, and Malawi (see more information on UN agencies in chapter 6.2).

● Latin America and the Caribbean

Institutional initiatives to develop capabilities in hazard and risk reduction have been particularly evident in Latin America and the Caribbean for many years. The Organization of American States and the Pan American Health Organization (PAHO) have sought to relate their particular technical abilities and practical experience through expanded opportunities for education. PAHO's publication, *Catalogue of Disaster Publications and Information Resources*, contains a detailed description of all PAHO disaster training materials (books, CD-ROMs, slides and videos) and other sources of information, including the Virtual Health Library for Disasters and principal web sites that contain PAHO content. The catalogue is available on the Internet at www.paho.org/disasters/publications, and print copies are available on request to disaster-publications@paho.org/crid@crid.org



A comprehensive Inter-American Strategy was launched in 1999 to reduce the education sector's vulnerability to hazards by initiative of the Unit for Sustainable Development and Environment of the Organization of American States (USDE/OAS), working with PAHO and ISDR. Known as EDUPLANhemisferico, the program seeks to engage public and private institutions, national and international agencies, NGOs and private individuals to encourage member states to adopt the Action Plan for Reducing the Vulnerability of the Education Sector to Disasters through a variety of international forums. With a Technical Secretariat for General Coordination located at Peru's National University at Trujillo, EDUPLAN works through eight technical focal points located in Argentina, Costa Rica, Trinidad and Tobago, the United States, and Venezuela to conduct activities at a number of local, national and regional locations. Work is divided into three areas: academic improvement, citizen participation, and physical infrastructure protection. There is a commitment to improve the curriculum with the addition of more elements pertaining to risk reduction in primary, secondary and higher education so that individuals and groups of various professional interests are prepared to work together for disaster reduction.

In another sector in Latin America, progress in risk management in the public health services would not have been possible without building additional professional capacities. Independent consultants and local professionals have agreed that a low-cost, culturally sensitive strategy is the most effective way to contribute to the

reduction of risk. All ministries of health in Latin America and the Caribbean now employ at least one official who is in charge of disasters. In many countries there is an entire department or agency devoted to the subject. In Argentina, Bolivia, and Chile, new water and sewage concessions demand that participating private sector companies meet disaster reduction criteria in the construction, operation, and maintenance of water and sanitation systems. Vulnerability studies have been carried out in Brazil, Chile, Costa Rica, Ecuador, Peru, and Venezuela to examine water supply and sewage systems. This has led to an increased availability of current technical information and a growing demand for training in disaster reduction in this field.

LA RED has developed a methodology for training of local authorities in risk management. It has elaborated training modules and support material, with important conceptual contributions in the area of vulnerability reduction and risk management. This methodology is currently being applied in many countries in the region and adapted to local conditions.

● Africa

As current risk reduction efforts in South Africa require a considerable amount of intersectoral collaboration, a Training and Capacity Building Working Group has been established within the national Inter-departmental Disaster Management Committee to form one body that can monitor disaster management training and research throughout the country. The working group is compiling a comprehensive framework for all types of formal and non-formal disaster management training and other capacity building programs. It is also in the process of establishing a body to set standards for disaster management training consistent with the accreditation requirements of the National Qualifications Framework and the South African Qualifications Authority.

Schools for community outreach play a vital role in the community. A proper education through the schools not only teaches the children but also reaches deep into the community through the parents and teachers. It is observed from past experience that the basic problems related to disaster mitigation and

LÍDERES is a vulnerability reduction course in Spanish organized by PAHO/WHO taught almost exclusively by national specialists with international reputations with the aim of strengthening the managerial skills required by disaster risk reduction practitioners. The content of the LÍDERES course is constantly evolving and is revised in response to the needs of its target audience, the Latin American disaster reduction community.

A multi-sectoral course programme sponsored by OFDA/USAID in partnership with national governments and NGOs has a key advantage that Latin American and Caribbean agencies can hire professionals from neighbouring countries and benefit from their knowledge about local contexts and cultures, in addition to their local language abilities.

preparedness are frequently attributed to lack of training, awareness, education, and self-reliance within the communities. An appropriately educated and trained community is much more capable to cope successfully with natural hazards and to reduce their impacts.

● Asia and the Pacific

The School Earthquake Safety Initiative is being implemented by the UN Center for Regional Development/Disaster Management Planning Hyogo Office (UNCRD, Hyogo Office) in Kobe, Japan, in association with the Earthquake Disaster Mitigation Research Center (EDM) in Miki, Japan. It focuses on five cities in four countries in Asia: Bandung and Bengkulu, Indonesia; Chamoli, India; Kathmandu, Nepal; and Tashkent, Uzbekistan.

The objective of the initiative is to develop disaster-resilient communities through self-help, cooperation and education. The initiative also aims to promote disaster education among children, teachers and parents. This approach to public education also encourages widespread involvement in the realization of safer construction practices through retrofitting of school buildings with the involvement of the local communities, local governments and NGOs. As a visible and highly considered community asset, a safer school can serve as a valuable example of practices that can save the lives of children and serve for relief activities as well. It can be used as a temporary shelter after an earthquake, and can also promote the culture of prevention and mitigation through ongoing community activities.

Thus, the importance of schools in every aspect of the disaster cycle from pre-disaster mitigation to post-disaster rehabilitation can be recognised. Significant success has been achieved and many important lessons have been learned, which can and should be applied to different hazard-prone cities and countries.

In December 2001, the Philippine Institute for Volcanology and Seismology (PHIVOLCS) and the Asia/Pacific Cultural Center for UNESCO jointly held a training course in collaboration with the Philippine Commission on Higher Education (CHED), United Nations University (UNU) and the Asian Disaster Reduction Center (ADRC). ADRC encouraged participation from its member country network and personnel responsible for education about disaster management from 11 Asian countries. The program for these school commissioners, government education officials, and NGO officials included training aimed

particularly at furthering disaster management in schools, such as by demonstrating a model earthquake evacuation drill. Following this training, it is expected that disaster preparedness will be reflected in more school curricula across Asia.

The United Nations Disaster Management Training Program (DMTP) has been a major international initiative to develop training in disaster management. Originally launched by UNDP and UNDRP (now OCHA) in cooperation with a core group of UN agencies in 1990. DMTP, currently administrated by UNDP, supports ongoing capacity-building efforts of the UN system, international organizations and individual disaster-prone countries. Workshops have promoted the establishment of national or regional centres and strengthened their capacities to study technological and environmental hazards, seismic protection, crisis prevention and preparedness.

DMPT has conducted more than 70 workshops involving 6,000 participants in Africa, Latin America and the Caribbean, Asia and the Pacific, the Middle East and the Commonwealth of Independent States. Training materials include 22 training modules, 27 country case studies, simulation exercises, trainers' guidelines, and videos that have been created to implement DMTP's goals. They encompass a wide range of topics including learning about emergencies and disasters, techniques of disaster assessment or risk reduction, links between crisis and development. The training modules have been written in English, French and Spanish, with selected modules translated also into Arabic, Bahasa Indonesian, Chinese, Portuguese, Russian, and Vietnamese. To improve information exchange and access to all learning resources DMTP established a web site at www.undmtp.org.

In recognition of the importance of education in disaster reduction, the International Federation of Red Cross and Red Crescent Societies has devoted significant energy to this area, with activities including: training geography and social studies teachers as was done in the Caribbean through the Community Based Disaster Preparedness Programme, so that they may include the topics in their own classroom plans;

- working with tertiary institutions in Pacific island states to incorporate disaster management topics in their curricula;
- developing games and drama exercises as a means of imparting disaster preparedness information to children in the Pacific;
- preparing disaster preparedness manuals for school children, as was done in Vietnam; and
- using television cartoons to convey messages to adults and children in Central Asian countries.



Future challenges and priorities

In formal education programs and professional training activities, the shift from hazard-focussed to a broader integration of risk awareness, analysis and management has only just begun. Major disaster events in recent years such as hurricane Mitch in Central America, the Gujarat earthquake in India, or the widespread floods of Southern Africa have each dramatically increased both the public and official recognition that risk education is lacking. More sustained focus on informal training and community based capacity building is encouraged. The following priorities must be integrated if disaster risk reduction is to become more fully incorporated in routine education and training programs:

- Proceeding beyond emergency response
- Incorporation of risk in sustainable national development
- Educating about the social dimensions of risk
- Institutional basis to transmit experience
- A sustained commitment to risk reduction in the future

• Proceeding beyond emergency response

There has been a progressive acceptance of the distinction between emergency services required to respond to disaster and the longer-term and much more diverse responsibilities related to risk reduction. Both national and international commitments are necessary to invest in human resource development dedicated to risk reduction, first and foremost to support initiatives in the most disaster-prone countries.

A continued expectation, or reliance of external emergency assistance in response to singular disastrous events will impede any efforts to educate and involve future generations more fully in disaster risk management. The significant imbalance in financial allocations and international emergency assistance during disasters compared to the meagre amounts committed to building locally-based risk reduction

capabilities remains a disincentive for developing effective education and training programs in disaster-prone countries.

• Incorporation of risk education in sustainable national development

Risk is seldom taught in a systematic way on a broad, multidisciplinary basis. A critical challenge for more effective education and training about risk reduction is the need to broaden the base of association with the subject and the more commonly adopted topics of educational programs. The subject of risk needs to become more integrated elements of national economic growth and development. This implies a closer identification with both the causes of risk as well as planning the means by which it may be reduced.

• Educating about the social dimensions of risk

Current views about the relevance of subjects such as the socio-economic conditions of vulnerability, matters of social equity related to risk, and the promotion of means to motivate more popular participation within local communities all describe topics yet to be accommodated systematically in education programs. An emerging trend of advanced academic studies that are able to attract both students and working professionals from a variety of fields, including technical, social and administrative disciplines should continue to be encouraged and supported.

There is considerable scope also to address risk management within educational programs of public administration. By doing so, the continuity and managed integration of responsibilities inherent in civil service functions could provide a more sustained basis for making risk management an essential element of expected government practice at all levels. Much more can be accomplished by introducing risk awareness into secondary and even primary educational programs through innovative programs of teaching science, geography, ecology, and civic responsibility.

- **Institutional basis to transmit experience**

The managerial and organizational responsibilities in identifying, monitoring and managing risk remain insufficiently represented in educational and professional contexts. While specific aspects of financial risk management are routinely included within economics, financial investment and insurance curricula, parallel approaches of risk management within the technical, environmental or social contexts of a society are much less in evidence.

Future challenges in education revolve around developing individual capabilities and the creation of collective institutional capacities. Local communities must be aware of the risks to which they are exposed. They then need to institutionalise the technical and managerial abilities to assess and monitor them, and the political and popular structures to manage them.

- **Sustained commitment to risk reduction education and training**

A longer term vision is needed to build education and training processes that will contribute to culture of prevention. Investment in the development of human resources can be sustained only to the extent that the values of risk management are embedded within the education and training capabilities of disaster-prone communities. There is a pressing need for innovative means to convey shifting organizational relationships and the mosaic of interests involved in shaping people's understanding and developing professional abilities for the future, with an increasing expectation of substantive private sector involvement in their realization.



4.3. Public awareness

The development of increased public awareness about hazards and the understanding of disaster risks are vital elements in any comprehensive strategy for disaster reduction. Public awareness should be conducted through all possible means, including in schools, in particular through the media and other official, public, professional and commercial means, at all levels of society. There is a responsibility for government direction and civic commitment to lead and encourage the public awareness of natural hazards and risk on a continuous basis, but the ultimate accomplishment of creating a culture of prevention rests with the popular understanding and public participation in furthering those values.

The importance of public awareness to effective disaster risk reduction cannot be overstated and assumes many different forms. Some of these are presented in the following sections:

- Public awareness as a primary element of risk reduction
- National public awareness initiatives
- Special international events and major activities
- The important role of the media
- Local community experience promotes public awareness
- Local relevance, community experience and traditional knowledge

Public awareness as a primary element of risk reduction

The promotion of public awareness about hazards and the creation of widespread understanding about disaster reduction have always been recognised as a crucial function of disaster risk management strategies. The Yokohama Strategy and Plan of Action noted in the mid 1990s that future strategies needed to develop a global culture of prevention as an essential component of an integrated approach to disaster reduction. It specifically cited the improvement of awareness within vulnerable communities themselves as a primary future requirement.

For this reason, increasing public awareness about natural and related technological hazards and the risks they pose to societies and economies has become one of the four key objectives of the International Strategy for Disaster Reduction (ISDR). Even more relevant in practical terms, public awareness serves to convey knowledge about existing solutions that can reduce the vulnerability to hazards in order to build a global community dedicated to making risk and disaster reduction an accepted public value.

To ensure political commitment in the planning and implementation of risk reduction measures, it is essential for all stakeholders first to be aware of the hazards they are likely to face and the importance that risk reduction holds for their daily lives. Public awareness, in addition to education, is a process through which people living in hazard-prone areas can realise and understand that they live in areas of risk, know the specific dangers that they are exposed to, learn the meaning of warnings that are issued and participate in the policy and decision making processes to take appropriate action to reduce risk. It is even more important for them to be motivated to take appropriate prior actions to plan their development and protect their lives and minimise property damage.

There is a basic responsibility of government authorities to inform the public about the nature of prevalent hazards and the changing conditions of risk. However, the routine dissemination of information and the conduct of activities to sustain a current sense of awareness also must be undertaken by other sectors of the society. The inclusion of risk information in all forms of education and professional training is crucial and a successful program of pub-

lic information must necessarily include professional and civic groups and both national and local authorities. The media too fulfils the role of informing the public in increasingly information-driven societies. There is a widespread recognition that practical tools and guidelines to carry out such programs remain inadequate in part because of the limited exchange of information about what is being accomplished globally in the field.

Individual commemorative occasions or one off public displays that are not associated with daily livelihoods and social responsibilities of the public are unlikely to have much enduring effect. They only go so far in arousing public interest or motivating widespread popular participation, so more strategic approaches need to be conceived and supported. By contrast, even if extreme events may be considered extraordinary in themselves, they have a great potential for dramatically illustrating hazardous conditions elsewhere. In this respect, the prevalence of risks that display severe consequences nearby or in similar social settings can provide a powerful impetus for sustained public interest. The timely and widespread circulation of lessons learned from disasters and the follow through necessary to apply the practical procedures that can reduce risks, can contribute to others prior to similar losses being suffered elsewhere.

Having witnessed the damage to public infrastructure in California during the Loma Prieta earthquake in 1989, the authorities in Seattle, Washington used the occasion to create a wider public understanding and support for fixing their own roads, bridges and other public works early in the 1990s. Work continued throughout the decade at a cost of more than \$150 million. When a magnitude 6.0 earthquake shook Seattle in 2001, the Mayor of Seattle observed that the sustained public awareness and support for their program to reinforce public infrastructure was money well spent. There was only one fatality and the primary city infrastructure largely survived with only moderate damage.

Public discussion and official assessment of the consequences of major earthquakes in India in recent years have resulted in political demands that have totally revised outdated state-wide programs of hazard awareness and disaster risk

Disasters increase public awareness

Experiences demonstrate opportunities to mount programs of public awareness and education with practical results following major disasters.

The impact of the El Niño event in 1997-98, hurricanes Georges and Mitch (1998), followed by the losses from the earthquakes in El Salvador (2001), had such an enormous impact on public understanding that they far exceeded what any planned publicity program could have ever accomplished in Central America.

Before, routine public information disseminated by disaster management authorities typically focused on emergency preparedness and crisis response issues. Since these events, the complex issues of risk have become associated with problems of poverty, social exclusion, lack of access to resources and untenable use of land.

There is now the recognition that values associated with risk reduction must be conveyed through wider public exposure and achieved by making permanent changes in educational curricula. The successful efforts to teach environmental consciousness throughout the formal basic education system in Costa Rica shows what can be accomplished with a coherent and sustained strategy.

management. The unprecedented floods experienced in several Southern African countries in 2000 resulted in public demands and political expectations for a wider regional discussion of the risks associated with recurrent natural hazards. Each of these occasions has resulted in the circulation of more public information with a resulting widespread public expectation of improved early warning procedures both to inform the population and to guide more appropriate disaster management policies.

The challenge that remains after an immediate crisis is to maintain public interest and increase involvement in public awareness programs. It is during these periods of less immediate threat that the important work in public awareness needs to be accomplished if greater future losses are to be minimised or avoided. The aim of public awareness programs should not be limited to conveying an understanding about hazards and risks to the public but rather it should



motivate and enable people to become involved in activities that can reduce risks to which they are exposed. Public awareness programs should have the long-term objective of creating new attitudes and changing behaviour. Therefore, information needs to be consistent, with principle components repeated over a period of time.

Extended involvement with public awareness can take many forms. A long-term commitment to risk reduction is best achieved by incorporating the subject throughout society, where people live and work, and by including it as a part of their daily livelihood experience or professional interest.

The enhancement of the appropriate values require recognition and direction from official authorities best realised by encouragement and support for public information activities implemented at local levels. Rather than focussing on specific hazards alone, some communities are turning their attention to the broader concepts of risk, by identifying, assessing and evaluating the various risks that threaten them.

Formal education and professional training discussed in another section is the most feasible mechanism to increase additional understanding about risks and to change public attitudes among different generations. By reaching into the past and drawing on earlier examples of local experience and traditional knowledge,

communities can identify additional measures to promote a wider public appreciation of hazards or local capabilities to manage risks. Knowledge of the immediate local environment, and particularly traditional practices associated with the management and sustained use of natural resources provide additional types of information that can be employed to reduce risks.

National public awareness initiatives

Most countries that have an active and well-supported national disaster risk management authority express a commitment to increased public awareness about hazards, risk and disaster reduction practices. They usually proceed beyond occasional commemorative events or the provision of posters, public announcements or handbooks, and have national platforms or committees bringing together representatives from various stakeholder sectors.

The Government of Australia conceived and sustained an excellent public awareness program throughout the 1990s that encompassed all aspects of the country's efforts to increase the awareness of hazards and reduce the risk of disasters. Examples of many of the informative manuals, posters, pamphlets, community hazard maps, and descriptions of related activities are included in a comprehensive review, the Final Report of Australia's Co-ordination Committee for IDNDR - 1990-2000 (EMA, 1999).

The Government of South Africa made use of its Green Paper and community meetings to develop a greater familiarity about local hazards and community risk issues prior to the publication of a White Paper on national policy and the drafting of a new national disaster management bill.

The National Disaster Management Office of Botswana conducted a survey and policy review late in 2001 to help in the development of a national public awareness strategy intended to relate hazard and risk reduction and national development objectives.

In recent years, the United States Federal Emergency Management Agency (FEMA) (www.fema.gov) has provided extensive public

Basic principles of public awareness programs:"

- ☑ They should be designed and implemented with a clear understanding of local perspectives and requirements with all materials reflecting local conditions.
- ☑ They should target all sections of society, including decision-makers, educators, professionals, members of the public and individuals living in threatened communities.
- ☑ Different types of messages, locations and delivery systems are necessary to reach the various target audiences.
- ☑ Sustained efforts are crucial to success, although single activities such as commemorative disaster reduction events and special issue campaigns can be useful if they are part of a larger, consistent programme.

information including links to many organizations engaged in disaster reduction activities.

In Mozambique, the National Disaster Management Authority (INGC) uses disaster simulations as well as a variety of public forums to conduct awareness-raising programs under the theme Towards a Culture of Prevention. A different location is chosen each year, usually a potentially vulnerable area near a provincial capital, and national leaders are invited to participate. Televised panel discussions, public exhibitions, university seminars and presentations in schools are also conducted. At a more practical level and with a longer-term perspective, projects such as tree planting or the distribution of drought-resistant crops, have been initiated during the event. The timing of these activities also serve to highlight meteorological forecasts for the imminent rainy season and announcements are made about emergency contingency plans.

These outreach campaigns have put the issue of disaster management on the public agenda but the message has been directed largely to urban populations. While a principal objective in most of these activities has been to influence policy-makers and other significant stakeholders at the national level, a challenge remains to instil a culture of prevention among poorer rural communities, those most likely to suffer during a disaster.

China has made widespread use of publications, media and other forms of publicity to raise the public consciousness about the importance of disaster reduction. In the past decade, more than 300 books have been published about the subject, and more than 20 different newspapers and periodicals have been created to spread knowledge about disaster reduction throughout the many different sectors of Chinese society. In addition, numerous international publications and documents dealing with disaster risk issues have been translated into Chinese or adapted to Chinese conditions, and distributed widely. Future plans of the China National Committee for Natural Disaster Reduction (CNCIDR) to improve their public awareness program include greater use of television, broadcasting, video, and electronic means.

There are additional plans for CNCIDR to coordinate with educational departments to add

new content on hazards and disaster risk to curricula in schools, enabling youth to understand their own roles in reducing disasters. Similarly, professional organizations run disaster reduction training courses according to their own specific circumstances. The China Association for Science and Technology has mobilised scientific and technical personnel to contribute to the decision-making processes and has organized consulting services in disaster reduction for specific problems.

Special events and major activities

Every year since the early 1990s the UN has organized a World Disaster Reduction Campaign with the objective of raising awareness about disaster reduction through thematically related activities. This public awareness strategy calls on Governments and local communities to mobilise, for example, by developing risk maps and early warning systems. It urges Governments to develop and enforce building codes and to exploit scientific and technical knowledge for minimising the exposure to the risk of natural disasters. Other UN agencies and their program partners are also committed to carrying out this strategy by bringing people and expertise together in the search for solutions. The campaigns are based on a different theme every year. In 2001, the theme was Countering Disasters, Targeting Vulnerability. The 2002 campaign is mentioned below.

The theme of the 2002 World Disaster Reduction Campaign, is Disaster Reduction for Sustainable Mountain Development, chosen to parallel the world-wide celebration of the International Year of Mountains. Through a series of activities and special programs in many countries, the campaign will highlight increasing global awareness of mountain hazards and successful disaster reduction efforts undertaken in mountain areas. The primary message is that disaster reduction as an essential part of sustainable development planning can benefit mountain communities world-wide by avoiding the devastating set backs that natural disasters can cause. The annual campaign culminates on the International Day for Natural Disaster Reduction on the second Wednesday of October with activities to showcase examples of successful accomplishments in disaster reduction.



Case Bolivia

The lasting effects of these mechanisms can be illustrated by the experience of Bolivia. Since 1998, disaster reduction has been promoted in Bolivia through two programs. One program has focussed on supporting the national system for civil defence the other has emphasised measures that could prevent avoidable risks and increase the public awareness about disasters.

While several projects had been undertaken to involve more people in managing risks and using the information materials that had been developed, a new campaign, Risk Management: A new vision on disasters, was launched in 2001, to further the objectives of the ISDR. A workshop was organized in July 2001 by the Universidad Nacional Siglo XX de Llalagua to promote the campaign with financing provided by ACRA, an Italian NGO, with the technical support of a national specialist from UNDP.

Another workshop was held in August in the city of Santa Cruz on community-based disaster management, conducted within the framework of a pilot project of the Association of the Municipality of Santa Cruz and the German Agency for Technical Co-operation (GTZ).

Later in the year, one of the most important achievements was the approval of a new law directed towards improving risk reduction and disaster awareness. The law encourages the identification of key measures relating to disaster reduction that can be employed in the course of implementing projects that further sustainable development principles. To support this process, manuals have been prepared to guide people in local communities to assess risks, formulate practical policies, and then to apply risk management measures that can be incorporated in local development programs. These manuals will be tested in selected municipalities and then will be evaluated afterwards.

Case: Jamaica

A variety of local activities were conducted in Jamaica in June 2001, the country's official disaster preparedness month. A national church

service was held to launch the month, broadcast live on television and radio. The following day, a press conference was held to introduce the public to the themes of disaster preparedness month, which were then emphasised in public information campaigns the rest of the year. Specific issues were also presented concerning local planning.

- An evacuation sign was introduced, sponsored by Medigrace Jamaica, which could be used to guide people out of the Portmore area in the event of an emergency evacuation.
- The use and application of the Office of Disaster Preparedness and Emergency Management's (ODPEM) Geographic Information System was explained and highlighted. The use of computer technology in the National Emergency Operations Center was also highlighted.
- ODPEM highlighted their initiative to include elements of popular culture in conveying disaster preparedness messages effectively to the public. This included the participation of several popular music disc-jockeys and the promotion of commercial sponsorship to broadcast these messages.
- Two new brochures were launched for public information: ODPEM, who we are and what we do, and, Earthquake Awareness for Businesses.

One day during the month was disaster preparedness day in schools. The ministry of education called for an island-wide observance of the subject. Many schools participated in disaster related activities. A hurricane preparedness day for businesses was also held during the month with widespread support from the business community. Several companies organized exhibitions, conducted drills and invited speakers from safety-related organizations.

A major exhibition was held in the Portmore Shopping Mall in which about twenty organizations presented exhibits that displayed their products and services. ODPEM also displayed emergency supplies that people should use in the event of a hurricane. Finally, a seminar on contingency planning directed to business organizations was held at the conclusion of the month. With the objective to raise awareness about disaster planning and pre-

Sasakawa Award Winners - 2001

To promote additional public awareness about disaster risk reduction, every year the UN Sasakawa Award for Disaster Reduction is awarded during the International Day for Disaster Reduction. This international honour is given to an individual or organization for their outstanding contributions to the prevention of disasters and the reduction of vulnerability, consistent with the aims and objectives of the ISDR. The laureates and finalists of the award for the past two years are listed below. Further information about their activities and procedures for future nominations can be found on the ISDR website at www.unisdr.org

Laureate: Global Fire Monitoring Centre, Max Planck Institute for Chemistry at Freiburg University, Freiburg, Germany

For its long-term commitment to disaster reduction and continued research activities for the reduction of wildland fires world-wide, as well as for its multiple co-operation projects in developing countries, involving local communities.

Certificates of Distinction:

Philippines Institute of Volcanology, Manila Philippines

For its long-term commitment to disaster reduction and its leading role in disaster reduction activities in Central Asia, in particular with regard to earthquakes and volcanoes, with the involvement of local communities, and its impressive amount and high-quality supporting documentation on their many activities and projects.

Mr. Brian Ward, Asian Disaster Preparedness Center, Bangkok, Thailand

For being the initiator and founding father of the Asian Disaster Preparedness Center, now recognised as the leading institution for disaster reduction projects, training activities and educational projects in Southeast Asia.

Professor Isaac Nyambok, Department of Geology, University of Nairobi, Nairobi, Kenya

For his personal commitment to disaster reduction, and for establishing a postgraduate disaster management course in disaster reduction in Africa at the University of Nairobi that is accessible to all professional interests, including those of high-level government officials.

Certificates of Merit:

National Society of Earthquake Technology, Katmandu, Nepal

For its noteworthy awareness-raising and educational programs in disaster reduction, particularly in the field of seismic risk reduction, for the benefit and with the involvement of the local communities and decision-makers in Nepal, with a strong potential for implementation and for replicability for other kinds of natural hazards.

Oficina Nacional de Emergencia, Ministerio de Interno, Santiago de Chile, Chile

For its significant educational activities and awareness-raising programs about disaster reduction, in particular by the inclusion of communication strategies related to school security within its mandate in civil protection, as well as its strong presence and impact among national decision-makers throughout the Latin American and Caribbean areas.

Comisión Permanente de Contingencias, Tegucigalpa, Honduras

For its significant initiatives in the field of promotion and awareness-raising about disaster reduction, especially related to forest fires, as well as by working in close co-operation with the population to implement initiatives that realise local communities' vulnerability and specific requirements, and by placing emphasis on the development of communication strategies accessible to all segments of the population.

Nyos-Monoun Degassing Program Advisory Committee, Yaoundé, Cameroon

For the innovative design and implementation of the lake degassing initiative, applied in a developing country and with the involvement of local communities, and by serving as an example to refining the project further and extending its replication to reduce similar risks elsewhere in the region.

Sasakawa Award Winners - 2000

Laureate: The Fondo para la Reconstrucción y el Desarrollo Social del Eje Cafetero,
Manizales, Colombia

In recognition of its major achievements in disaster prevention in the Coffee region following the severe earthquake of 1999, by integrating basic elements of prevention such as land-use planning, hazard mapping, respect for seismic-resistant building codes into long-term reconstruction and rehabilitation programs. FOREC has contributed significantly to the sustainable development of the coffee region by restoring communications links and economic infrastructure, by promoting civil society and the involvement of local communities in the decision-making process and implementing decision-making at the local level.



Certificates of Distinction:

Dr. Roberto Aguiar Falconi, Center of Scientific Research, Army Polytechnic School, Quito, Ecuador

For his high-level experience and expertise in the prevention of seismic hazards disaster prevention and his contribution to scientific research in this domain.

National Disaster Prevention and Preparedness Commission, Addis Ababa, Ethiopia

For efforts in addressing the root causes of disasters and communities' vulnerability to disasters, and the Commission's inclusion of disaster prevention activities in the development process.

The Central Committee for Flood and Storm Control, Hanoi, Vietnam

For its significant efforts in the field of disaster prevention, despite scarce national resources and limited capacities, in particular for its implementation of flood control programs and flood early-warning systems, awareness-raising initiatives and training activities carried out at the national level.

Certificates of Merit:

General Directorate of Civil Protection, Governorate of Grand Alger, Algiers, Algeria

For efforts in introducing elements of prevention in rescue programs, in particular the sustained efforts in carrying out training activities for disaster prevention including participation and organization of international forums on the subject.

National Directorate General for Disaster Management, Budapest, Hungary

For its significant experience in the field of disaster preparedness, in particular in information sharing, initiatives in the field of flood control and the prevention of water contamination as preventative measures contributing to sustainable development.

paredness, participants came from many different business sectors to learn about topics such as establishing a planning team for risk reduction and conducting vulnerability analysis.

Case: Costa Rica

On International Day for Disaster Reduction, Costa Rica's National Risk *Prevention and Emergency Response Commission (CNE)*, the country's focal point for disaster reduction, organized a community exercise in disaster preparedness. It involved an evacuation drill based on the likelihood of a local river flooding

and then causing mudslides affecting four communities near the old Costa Rican capital of Cartago.

A massive public awareness campaign about earthquakes was also launched with media support, supplemented by a poster designed by CNE to inform people about the importance of preventive measures that would reduce the impact of an earthquake. The Inter-institutional Emergency Commission of the University of Costa Rica organized a forum on the role of the media in disseminating information on disasters. In Uruguay, the Ministry of Education's Emergency and Disaster Commission organ-

ized a workshop with the support of the OFDA/USAID, the National Emergency System, and the local government. The National Red Cross Society of Uruguay attended the International Day for Disaster Reduction, as well as local representatives of civilian, political, and military organizations, school children, and the media. The objective was to strengthen local communities by creating awareness of social responsibility, identification of hazards, prevention and risk, especially directed at children. One focus of the workshop was for the participants to compose risk and vulnerability maps relevant to their surroundings. Another meeting was held three weeks later for the participants to share their information and experiences about the presentation and composition of their various risk maps.

Many countries use the occurrence of a major national disaster in the past to commemorate this day (or week) from year to year in a public awareness day for disaster preparedness and risk reduction. This is the case in Colombia, where the devastating volcanic eruption of Nevado de Ruiz on November 13, 1985, swept away whole villages and left more than 25,000 people dead. National exercises, school and media activities take place each year to maintain the awareness of such impacts. The same happens in Peru, where the earthquake and avalanche in Cajon de Huaylas on May 5, 1970, killed more than 67,000 persons.

The important role of the media

In terms of media involvement, there is much that needs to be done. The prevailing media coverage about hazards and risk remains overwhelmingly related to disaster events and the immediate dramatic aftermath of surveying damage or the provision of emergency assistance to survivors. With a few noteworthy examples, widespread coverage about potential or recurrent hazards which affect a specific area or reporting about existing disaster risk management practices are much less in evidence.

● A professional's viewpoint: What the media says, and why.

The media tends to reflect the mood of the community it serves. If there is already debate about the exposure to natural hazards or concern about disaster awareness, then journalists are likely to amplify and focus this concern. If there is no local interest in the subject, then a local newspaper, television or radio program is unlikely to launch and sustain the discussion. There is, however, a moment to trigger such attention and to inspire media professionals to take an intelligent interest in wider disaster subjects. This moment is in the immediate aftermath of an earthquake, flood, forest fire, landslide, hurricane or tsunami.

Paradoxically, such moments also underscore huge cultural gaps that exist between journalists and the engineers, scientists, health teams and administrators who want to promote wider public understanding about risk. The issue is a simple one. News people want the story. In the first bewildering hours after a catastrophe, there is often no direct news at all. There is instead silence. Roads are cut, communications are severed, water and power supplies are interrupted and the civic authorities and hospitals that should be the source of information are themselves part of the disaster. At such moments, reporters phone frantically to find university or government-based specialists who might be prepared to speculate on what might have happened, or the possible reasons for the disaster. When approached urgently, by often previously unknown questioners, these experts tend to worry about reputations for scholarly accuracy, mature judgement and political soundness. They often shrink from comment, apologetically promising to offer thoughtful analysis when firm information becomes available.

This is a mistake. News people have no choice. They must report on a disaster that has just happened even if they have only the sketchiest details. If an informed and thoughtful expert is hesitant to comment based on limited information, media reporters will go in search of a less-informed and less-thoughtful commentator who will.

It is at such moments that disaster risk management professionals have a golden chance to describe the pattern of loss and destruction. They can drive home the lessons of risk awareness and known procedures that can reduce those risks. They should seize on the chance to do this, in vivid, clear and



even chilling language, at every moment for the next 24 hours. They should do this because - since the media reflects the community it serves - if the media is listening, then the people are listening.

Once television cameras get to the disaster zone, as images of crushed children and weeping relatives and toiling rescuers begin to flood the public, the imagery and the grim statistics of suffering will dominate the news. And then who will want to hear somebody talking in academic terms, about monitoring hazards or mitigating future risks ?

"Professional newspapermen love disaster - it is their business - but don't rely on them to be very different from the rest of the community. The independent commercial media survives and thrives by reflecting the community it serves. If a community is complacent, then there is a fair chance that its journalists too will take the placid line... If people don't die in thousands, it is not a disaster, and therefore not news. The preparedness message gets only a limited airing."
T. Radford, The Guardian, 1999

There are, however, some signs of change. Public reporting of disasters has begun to include references to human actions that have contributed to the severity of an event, particularly as they may relate to the loss of life and property. Increasingly, questions are being raised about the responsibility of public officials in either contributing to, or tolerating hazardous conditions. Media reporting was outspoken about the inadequate quality of construction and placement of many houses that were destroyed by the Turkish earthquake in Izmit, in 1999.

Reporting about the extensive losses suffered in the Venezuelan mudslides in 1999 queried why the informal settlements had been constructed in such potentially hazardous conditions and questioned whether extensive deforestation had contributed the disaster.

The extraordinary floods that raged through Algiers in 2001 were reported as having been caused, in part, by unserviceable drainage systems. So far, such inquiry happens after the consequence of an unmitigated hazard becomes a political or newsworthy event.

In a more far-sighted outlook, some national officials seek to relate distant events to their own more immediate conditions. The response to the ISDR questionnaire of Western Samoa noted that one of the most important issues to be addressed in Western Samoa was for the media to be committed to providing coverage of major world disasters and catastrophes. Journalists were encouraged to describe relief responses in both the short and long term, so that the full coverage and not just dramatic highlights would influence their audiences to act with greater attention to disaster preparedness. The National Red Cross Society in Western Samoa also made radio broadcasts on disaster preparedness with disaster-related discussions about such topics as public health, housing, warnings, food, community participation, and first aid.

Mozambique is a country where an important objective of public awareness campaigns has been to develop the media as a better source of public information about hazards. The National Disaster Management Authority (INGC) has made media relations a priority for improving public awareness as the need for more accurate reporting was a recurrent theme expressed by journalists, district administrators, and other local authorities. Now, disaster management officials are working together with technical specialists in the national weather service and professional journalists to involve the media more effectively as a means to issue early warning and hazard alerts.

The media has played an increasingly valuable role in disaster management from the time of the exceptional floods in 2000 when it served as an important catalyst for emergency action by the international community. Subsequently in October 2001, the National Meteorological Service provided an incentive by inaugurating their own new television studio supplied with professional media equipment provided through Finnish development assistance. In this way, the country was able to increase its own capacity to provide better public information and education about the routine weather as well as potential hazards that may threaten the country.

Despite the expanded coverage in the country, the most important medium for social commu-

nication remains the local language radio network of Radio Mozambique. This service broadcasts information regularly about prevention and disaster risk reduction measures, as well as communicating warning alerts at the time of imminent hazards. INGC has also worked with the World Food Program to conduct training seminars for journalists in order to improve the quality of reporting, and an annual prize has been proposed for the best disaster reporting.

Local community experience promotes public awareness

Some of the most effective means of public awareness can take place at the local community level with the added advantage of involving the participation of a cross-section of the local population.

The Community Action Group for Floodwater in the Old Community of Rodenkirchen (Bürgerinitiative Hochwasser, Altgemeinde Rodenkirchen) is a non-profit association founded in a district of Cologne, Germany, after the severe flooding of the Rhine River in 1993 and 1995. This group advocates the interests of more than 4,000 residents in matters of local flood protection. In 2001, the community action group sailed the boat Pegellatte ("Water Depth Gauge") up the Rhine from Cologne to Basle, Switzerland staging events and conducting discussions in 18 towns and cities together with other community action groups and representatives of local authorities. In 2002 the group will take their floodwater campaign boat downstream from Cologne to the Rhine delta. The overall promotional efforts of the campaign for greater awareness about flood issues is not limited to Germany alone, as the Group's trips also go through parts of France, Switzerland and the Netherlands. As a Bürgerinitiative Hochwasser spokesman says emphatically, "The aim is to win over the solidarity of ALL Rhine River residents, because we can only combat flooding together". In fulfilling their own vow, the community action group cooperates closely with the German Committee for Disaster Reduction (Deutsches Komitee für Katastrophenvorsorge) and the Rhine Emergency Floodwater Organisation (Hochwassernotgemeinschaft Rhein).

A number of public awareness projects are currently underway in South Africa covering a variety of communities at risk. Ukuvuka: Operation Firestop aims to reduce the risk from wildfires in the Cape Peninsula. The campaign was launched in the Western Cape Province in February 2000 after fires that burned land along Table Mountain behind Cape Town. The Ukuvuka Campaign has a four-year mandate to achieve its goals of transferring lessons learned about effective conservation measures and biodiversity linked to social engagement, and how those methods can be passed on to other communities.

In Operation Firestop, the primary objective is to protect the land and vegetation by controlling alien plant species and by rehabilitating the fire-damaged areas they often inhabit. A related aim is to help people and their communities create employment through training and poverty relief for disadvantaged people by protecting the most vulnerable communities from fire and promoting co-operation and social cohesion among them. A third goal is to assist in the implementation of integrated fire management plans, particularly in areas close to urban centres.

Elsewhere in South Africa, other public awareness campaigns about disasters are also underway. The Tshwane Metropolitan Council embarked on a campaign within urban communities on a variety of local risks including informal settlement fires, the spread of diseases, floods, extreme weather conditions, pollution and HIV/AIDS.

The Western and Eastern Cape Provinces jointly implemented an innovative I-SPY awareness campaign. This program involved the distribution of information boxes, which were small cubes with circular magnifying lenses placed in two of the sides. Information about community hazards and means to reduce risks could be seen by peering through the glass that enlarged the information printed on the inside of the box. As the information was depicted in pictures, the messages were able to cross language barriers.

The disastrous events of recent years have shown that a large part of the Latin American and the Caribbean population, particularly people living in rural areas, remain largely

To know what to do- Tsunami in Papua New Guinea

Papua New Guinea (PNG) is highly susceptible to tsunamis because of its topographical conditions and the frequency of earthquakes and volcanic activity in the surrounding seas. In 1998, an earthquake measuring seven on the Richter Scale occurred with the epicentre only 30 kilometres from the coast of north-western PNG. The resulting massive tsunami struck coastal villages of the Aitape region almost immediately, claiming more than 2,200 lives. While the country had experienced many tsunamis, previous experience was not passed on to new generations, so people knew little about the imminent threat of tsunami hazards.

Many residents who felt the earthquake did not seek refuge from tsunamis immediately and this contributed to the many casualties. At the request of PNG authorities, the Asian Disaster Reduction Center (ADRC) in Kobe, Japan decided to transfer the benefits of Japanese experience to local communities in PNG. ADRC produced posters and pamphlets in both English and local languages, also including many pictures and illustrations, and distributed them to residents and school children living in coastal areas. The information was also used and distributed further by the PNG National Red Cross Society. So the lesson to beware of tsunamis when an earthquake occurs and to seek refuge on higher ground has spread to more people in the country.

A short time later, a submarine earthquake measuring eight on the Richter Scale affected a wide area north-east of PNG in November 2000. However, while it created a tsunami that destroyed thousands of houses, there were no deaths. The fact that this time nobody stood on the beach to watch the sea after the earthquake, as happened in the Aitape tsunami in 1998, can be attributed to the joint efforts of the PNG Government and ADRC in creating better tsunami disaster awareness. ADRC continues to work in this area following its commitment to provide guidance to neighbouring countries with similar problems.

Source: ADRC, 2001



unfamiliar with basic aspects of disaster preparedness and risk reduction practices. As reducing the impact of disasters requires that people improve their knowledge and replace passive and sometimes destructive behaviour

with active and constructive approaches, some organizations have sought an imaginative way to reach this widely dispersed audience.

"Before the 1993 tsunami occurred in the Sea of Japan, residents of the fishing village at Aonae had taken three steps. They had produced a tsunami hazard map to identify areas susceptible to tsunami flooding; implemented and maintained an awareness/education program on tsunami dangers; developed an early warning system to alert coastal residents that danger is imminent.

About 1,400 people were at risk of dying from the one-hour tsunami on 12 July 1993, that flooded the village within 15 minutes of the earthquake. Upon feeling the earthquake shaking, most villagers immediately evacuated to higher ground. This action saved the lives of 85 per cent of the 'at-risk' population."

Eddie Bernard, 1999

Nepal is one of the most disaster prone countries of the world with floods, landslides, fires, earthquakes, windstorm, hailstorm, lightning, glacial lake outburst floods or avalanches happening every year. As both access and communications are difficult in much of the country because of its extreme geographical features, information from the central government about hazards and disaster risks is often difficult to convey. People in remote areas are not easily provided with sufficient knowledge to reduce their immediate risks.

Under such conditions, the Government of Nepal has sought to disseminate disaster management information by training local leaders.

In 2001, government officials, ADRC and local NGOs conducted training courses for local village chiefs, teachers, scouts and women leaders from 30 villages in 10 of the most disaster-prone districts of the country. The courses dealt with the national disaster management system, knowledge about hazard-prone areas and possible countermeasures to reduce the

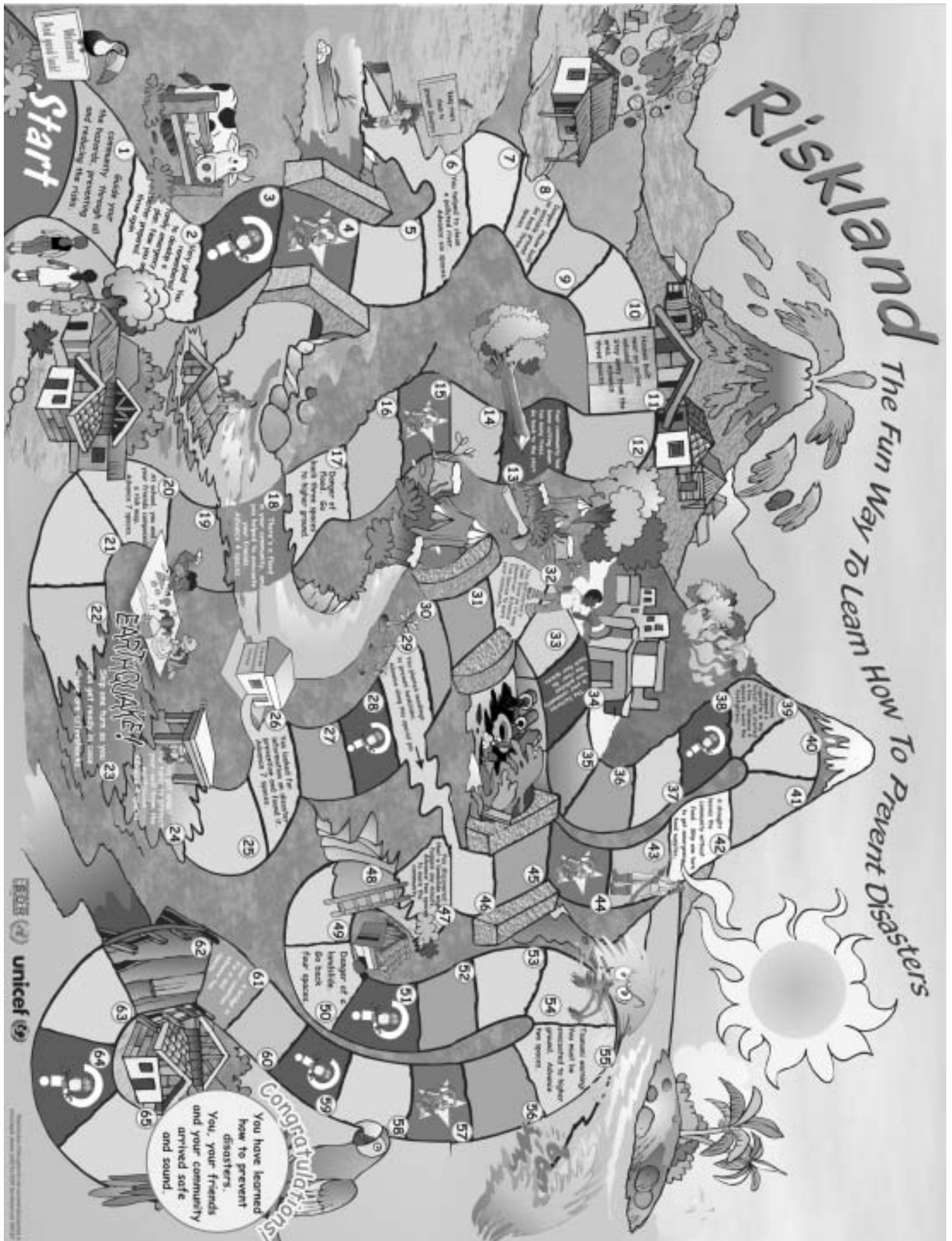
potential risks. The participants had an opportunity to learn about the causes, consequences and possible countermeasures of natural disasters, such as the relationships between increased deforestation and floods. A radio broadcast service was utilised for the first time to disseminate disaster preparedness information.

Soap operas for disaster reduction - radio and TV

PAHO, the International Organization for Migration (IOM), UK/DFID, the NGO Voces Nuestras, CEPREDENAC and the ISDR secretariat have teamed up to produce and broadcast a radio soap opera, called "Tiempos de Huracanes" (Hurricane Season), about disaster management and risk reduction in Latin American and Caribbean countries. The story takes place in a rural farming community in which experiences of the characters are used to instruct listeners about measures that can reduce the impact of floods, earthquakes, hurricanes and other hazards that can affect their own livelihoods. The dialogue focuses on everyday issues close to listeners' own experiences.



The program consists of 20 episodes that are broadcast annually, before and during the heavy rainfall and hurricane season. The pilot program is also available on a CD-ROM from the sponsoring organizations and a Memorandum of Understanding is planned with Radio Netherlands for reproduction and widespread distribution of the soap opera.



Riskland- a fun way to learn how to prevent disasters is an educational board-game, developed by UNICEF and the ISDR Secretariat in Spanish and English. The game conveys messages that help children understand how some actions can reduce the impact of natural or human-induced disasters, while others can increase their vulnerability.

See: www.eird.org

Future challenges and priorities

Effective public awareness to increase the understanding about hazards and risks, and most importantly to motivate a collective commitment to establish a culture of prevention, requires sustained activities in several complimentary areas, even though the time immediately after a major disaster is ideal to strengthen these awareness activities. These include the following priorities for future attention:

- Official policies that promote the value of disaster risk reduction
- Public education and professional training as primary tools
- Developing an expanded role for the media
- Increasing the value of public events
- Using multiple interests to publicise risk issues

Official policies that promote the value of disaster risk reduction

Under all forms of government, official authorities and local leaders have a responsibility to provide information and the means to ensure public security. In this respect, there is considerable scope to inform and advise the public about natural and related hazards, and the risks they pose. The direction, encouragement and material support to establish the value of disaster risk reduction is most productive when they originate from the leadership within the community. The creation of broad and non-partisan political support is equally important if sustained financial and budgetary allocations are to be ensured for increased public awareness leading to the creation of a culture of prevention.

While the variety of activities which motivate public safety are essentially educational in nature, they are dependent upon the consistent use of information across different segments of a society. To become more effective, they should continue to take account of the specific needs and localised concerns of different groups of people. Conscientious programs of

public awareness need to be continuous, and part of the public discourse into the various sectors of Government policies. Public awareness and understanding cannot happen by chance, nor result from exposure to a single campaign, although devastating catastrophes have frequently provided opportunities for launching public awareness campaigns.

Professional training and formal education as primary tools

As there are few specialised courses currently devoted to disaster risk alone, there is a challenge for educational authorities as well as professional training institutions to develop these programs. As has become more evident in some areas, there are already efforts being made to introduce more risk issues into the training of professionals such as engineers, meteorologists, urban planners, and many types of physical scientists. There are many additional areas of instruction such as environmental management, public administration, geography, and most of the social sciences which have not typically regarded risk awareness as part of the syllabus. Creating familiarity about natural hazards needs to start in primary and secondary school. As important institutions in most local communities, schools and educators can serve an important role in motivating students to become involved in exercises, public discussions, and other activities that promote disaster reduction among family and community members outside the classroom. Schools can become the centres for development of community knowledge and skills for disaster risk reduction (see chapter 4.2 on education).

Developing an expanded role for the media

There is a need for more frequent and better-informed media coverage about risk reduction before a disaster occurs. However, if the community itself was more interested in this subject, the chances are that the media would reflect this interest. Risk reduction programs can all be improved by including media representatives that are well informed about the issues, themselves.



Increasing the value of public events

Special or periodic commemorative events have demonstrated that they serve a useful role in raising the public visibility of natural hazards or by reflecting on the consequences of earlier unmitigated disasters. But they are no substitute for longer term and more substantive commitments to foster continuous public exposure to the subject. Public or special events can be useful to illustrate that while there is no possibility to be safe from all risks, there are graduated steps that can be taken within a community to minimise existing hazards or to develop an improved state of resilience to manage future risks better. It is important that additional activities be conceived on an ongoing basis, so that public interest does not fade after the special event.

Using multiple interests to publicise risk issues

One of the biggest challenges for government officials and interested professionals in promoting risk awareness is to remove the subject from the sense of crisis or trauma that ordinarily accompanies it. Disaster risk reduction is not an emergency service awaiting the time of need. Rather, the subject can be placed in the midst of daily concerns of people where they live and work, among the people and property which they value. Hazards need not become disasters with the widespread suffering and loss which they suggest, if people are sufficiently conversant with the nature of the risks involved, and what they can do to reduce their own exposure beforehand. This involves the full participation of the people most exposed to risks. Public awareness strategies can motivate people to collaborate in different enterprises, supported by their various talents and multiple resources.



A faint, light blue world map is visible in the background of the top half of the page. The map shows the continents and is centered on the Atlantic Ocean.

Chapter 5

A selection of disaster reduction applications

This chapter discusses different applications of disaster risk reduction, as outlined in the graphic representation presented in chapter 1. These efforts become possible after previous activities to identify and assess risks and institutional capabilities are in place.

The selection of disaster reduction applications discussed in this chapter is not exhaustive, it serves to illustrate the scope of activities and applications in the field and in certain cases, assess their strengths and weaknesses. The chapter begins with environmental management - an area often neglected by traditional disaster managers - and concludes with early warning systems - a crucial link to effective preparedness and response activities.

- 5.1 Environmental management
- 5.2 Land use planning
- 5.3 Protection of critical facilities
- 5.4 Networking and partnerships
- 5.5 Financial and economic tools
- 5.6 Early warning systems



5.1 Environmental management

A healthy environment enhances the capacity of societies to reduce the impact of natural and human induced disasters, a fact largely underestimated. As disasters undermine both socio-economic development and environmental management efforts, there is a compelling need to explore how environmental mismanagement changes hazard and vulnerability patterns.

The use of environmental management and knowledge tools as a strategy for reducing vulnerability to risk should be promoted. Environmental actions that reduce vulnerability need to be identified and applied by disaster reduction practitioners. Quantitative measurement of these actions will determine their acceptance and application in political and economics arenas. Platforms for integrating environmental management within existing policy frameworks and international strategies on disaster reduction, sustainable development and poverty reduction will build a safer world. National and regional governing institutions can best increase societies' resilience to disasters as part of a global environmental management effort. Instilling disaster thinking into environmental performance is a win-win proposition.

This chapter begins with a description of some of the **links between disaster reduction and environmental management**. The following **environmental management tools** are then described and questions about their **relevance and application** in disaster risk reduction strategies considered.

- Environmental legislation
- Environmental policies and planning
- Institutional arrangements
- Environmental impact assessments
- Reporting on the state of the environment
- Ecological/environmental economics
- Environmental codes and standards.

Applications of these tools will be illustrated through examples pertaining to wetlands, forests, fisheries and agricultural systems, barrier reefs and islands, mangroves, coastal areas, watersheds and river basins, freshwater, mountains, as well as to environmental issues such as biodiversity, climate change, desertification/land degradation.

■ Environmental management as a tool to reduce disaster risk

Environment and disasters are inherently linked. Environmental degradation exacerbates the impact of natural disasters. It affects natural processes, alters humanity's resource base and increases vulnerability. The degree to which environment can absorb impacts, increase overall resilience and provide effective and economical solutions to reduce disaster risks is therefore jeopardized. Furthermore, societies' traditional coping strategies are challenged.

Practices that protect the integrity and diversity of nature and ensure a wise use of natural

resources provide solutions to reduce vulnerability from which both the environmental and disaster communities will benefit. Although the inherent links between disaster reduction and environmental management are recognised, little research and policy work has been undertaken on the subject. The intriguing concept of using environmental tools for disaster reduction has not yet been widely applied by many practitioners. Hurricane Mitch highlighted in dramatic fashion the indispensable role of sound environmental management in sustainable development and natural disaster mitigation. Therefore, environmental management tools that have the potential to make a substantial and cost-effective contribution to reducing the vulnerability to natural hazards



should be identified, adapted and adopted. In this regard, a crucial element to enhance the conservation of nature to reduce vulnerability to disasters will be a true valuation of the ecological balance.

Environmental actions that reduce the vulnerability to disasters are seldom promoted in disaster reduction strategies and usually appear only as a beneficial but unplanned side effect. But these activities will add to the options for disaster reduction. Widely disseminating examples of their application to relevant actors will encourage their use. Links between the disaster and environment communities will benefit from efforts made to use similar language and approaches. Once tools and policies are developed, capacities will need to be built locally in vulnerable regions to assess and respond to environmental sources of vulnerability and use environmental tools to reduce disaster impacts. The *World Conservation Union (IUCN)* and the *International Institute for Sustainable Development (IISD)* have launched an initiative to promote the use of environmental management to reduce the vulnerability of communities to the growing threat of climate change and climate-related disasters. The *Stockholm Environmental Institute (SEI)* was also involved. It serves as an important step to translate the intuitive recognition of the protective function of natural systems into useful products for practitioners.

Ecosystems are interdependent networks of organisms of a naturally defined eco-zone that function as a unit. Examples include natural forests, wetlands, deserts, lakes and mountain regions. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an viable way. Thus, the application of the ecosystem approach will help to reach a balance of the three main objectives of sustainable development: conservation, sustainable use and the fair and equitable sharing of the benefits arising out of the utilization of resources.

At present, environmental management tools do not systematically integrate trends in hazards occurrence and vulnerability. Similarly, disaster reduction practitioners do not systematically explore the advantages of using environmental management tools and approaches. Some benefit might be drawn from the fact that environmental tools were essentially developed

Lessons learnt from Hurricane Mitch

“So far, relatively little is being channelled to attack the root causes of vulnerability, or to contribute to the non-structural mitigation of disasters through sound environmental management, integrating regional and integrated territorial planning at a scale that goes beyond individual plots or local communities...”

For these issues to be addressed, there is a need to integrate risk management into environmental policy. How do healthy ecosystem contribute to abating risk? What has been the environmental impact of land concentration, misuse of wetlands and massive deforestation? ... Finally, the long term environmental security of Central American societies will depend to a significant degree to the capacity for adaptive and cross-scale *In Situ* management of key buffering ecosystem functions. More applied research is needed on the linkages between local forest management practices and their effect on hazard mitigation.

There are encouraging initiatives which seek to contribute to more secure human livelihoods through empowering local communities to manage risk locally. There is a growing interest in the restoration of key forest ecosystems, geared to providing local communities with more adapted livelihoods and a secure environment. Mitigation is best applied locally, but require adequate linkages into the policy sphere to guarantee the long term governance of the region.

The new quadrennial programme proposed by the IUCN, provides a key framework in which to apply these ideas to the Central American context. The post disaster context is ripe for proposing innovative approaches to disaster prevention and mitigation.”

Source: P.Girot,
IUCN/CEESP Mesoamerica, 2001

The World Conservation Union (*IUCN*) and the *International Institute for Sustainable Development* (*IISD*) have joined forces to promote the use of environmental management and policy tools to reduce vulnerability of communities, especially the poor and marginalized, to the growing threat of climate change and climate-related disasters. The project seeks to:

- identify environmental actions that reduce the vulnerability of social and economic systems;
- enhance the role of these activities by offering a tool kit of options with detailed examples of their application to relevant actors in research, advocacy, policy-making and industry;
- build the capacity of local institutions in regions and countries vulnerable to climate-related disasters to assess and respond to the environmental sources of vulnerability;
- create a platform for integrating environmental management measures that reduce community vulnerability into existing policy frameworks and international strategies on disasters mitigation, climate change adaptation, biodiversity conservation and poverty alleviation.

The initiative is guided by a task force on climate change, vulnerable communities and adaptation composed of a multidisciplinary group of experts from the fields of climate change, disaster reduction, sustainable livelihoods and environmental management and policy. Working from different points of departure, members will explore how natural resource mismanagement contributes to the vulnerability of human systems, and how enhanced management can provide tools for vulnerability reduction.

It will produce the following:

- case studies that improve the understanding of environmental factors which shape vulnerability to climate-related disasters, and the options for adaptation within policy frameworks;
- guidelines for reducing vulnerability to climate change and climate-related disasters using environmental management tools;
- a network of institutions at the regional and national level with the capacity to assess and address vulnerability to climate-related disasters.

from a risk management approach, environmental/social impact assessment processes being traditionally geared towards identifying risks as early as possible and then addressing them in the design phase of plans or projects.

Furthermore, synergies might exist between research work on disaster reduction and on the integration of environmental concerns into decision-making and development planning. The IDNDR conclusion that “environmental protection, as a component of sustainable development and consistent with poverty alleviation, is imperative in the prevention and mitigation of natural disasters” needs to be put into practice.

Environmental management can become a cost-effective tool for disaster reduction while serving many other objectives including conservation of biodiversity, mitigation of adverse global environmental changes and poverty alleviation.

The protective role of some ecosystems are more recognised than others and are begin-

ning to be better documented. For example, important wetland functions include water storage, storm protection, flood mitigation, shoreline stabilization and erosion control. These functions are also essential for sustainable development. The value of these functions are considerable as technical alternatives are often more expensive. However, benefits from wetlands are under threat from natural disasters including storms, drought and floods which will be further exacerbated by climate change.

Wetlands also suffer from increased demand on agricultural land associated with population growth, infrastructure development and river flow regulations, invasion of alien species and pollution. The relationships between climate change and wetlands deserves more attention by policy makers.

Adaptive capacities of ecosystems to absorb sudden shifts in climatic, geological or biological components is a key feature increasing disaster resilience. In this regard, traditional

Global environmental issues and disaster reduction

Climate change

Consequences: extreme weather events, changes in boundaries, structure and functioning of ecological systems (forests), food security, water availability, sea level rise

Solutions: reforestation, adaptation programmes, including early warning, disaster preparedness

Loss of biological diversity

Consequences: loss of natural resources and diversity interfering with essential biological functions such as regulation of water runoff, control of soil erosion, loss of resilience to disturbances and environmental change

Solutions: conservation/restoration (forestry, agriculture, coastal zone management)

Freshwater degradation

Consequences: water quality and scarcity, droughts, health risks, economic impact of land degradation on water resources, increase in floods due to poor land use that pollutes water

Solutions: water resources management, land use management

Desertification and land degradation

Consequences: improper resource use, food security, loss of ecosystem productivity

Solutions: alternative livelihood programmes, sustainable land and natural resources use programmes, natural environment and development planning

Environmental systems contribute to disaster reduction and security

Maintaining and rehabilitating resilient environmental and social systems form key building blocks for disaster reduction and security. The fire and smoke episode of 1997-98 in Southeast Asia, Russia, the Americas and the Mediterranean helped focus attention on an increasing problem. The application of fire in land-use systems and forest conversion was associated with the extreme drought caused by the El Niño southern oscillation event which created conditions for the escape and spread of uncontrollable wildfires. While some fires were deliberately set to cover up illegal logging, most of them were intended to convert forest to other land uses. Small farmers, plantation and timber companies, government settlement schemes and subsidy policies were responsible for damages. Better knowledge and monitoring is necessary to distinguish well-balanced natural fires beneficial in maintaining land-use systems from those fires which destruct societies and environment. Basic structural improvements, accompanied with improved legislative, economic and technical basis are needed to make physical infrastructure, natural and human systems and water management more resilient.

societies have great adaptation capacities to cycles of environmental change. It is known that living with floods strategies are cost-effective, relatively easy to implement and more compatible with the environment, and can more easily be incorporated in long-term development planning at little extra cost.

Forests play an important role in protecting against landslides, erosion, floods and avalanches. They also safeguard against drought. As shown in Switzerland, continuous care brought to forests including rejuvenation, careful diversification of species and structural stability ensure an optimal protective role and save money from disruptions caused by natural hazards.

The Yangtze river floods in 1998 showed the consequences of the loss of healthy ecosystems. As a consequence, the Chinese government banned logging in the upper watershed and

increased reforestation efforts, and prohibited additional land reclamation projects. China carries out flood prevention and water resources protection as a means to lessen the impact of landslides and floods. Barrier reefs, barrier islands and mangroves contribute significantly to the mitigation of hurricane risk, storms and tidal surges.

Sound watershed management that combines parks protection, reforestation, sustainable forestry and agricultural practices is critical to protect downstream communities, livelihoods, agricultural lands and economic infrastructure such as roads, ports, hydroelectric dams, and irrigation systems. The crucial environmental services provided by integrated watershed management must be recognised when making policy and investment decisions. This becomes even more important in light of the international or inter-provincial nature of river basins.

Environmental legislation

Agenda 21 (see chapter 6.1) notes that “laws and regulations suited to country-specific conditions are among the most important instruments for transforming environment and development into action.” Legislative responses to environmental problems testify of countries’ appreciation of the adverse impacts of environmental degradation on socio-economic systems. Many developing countries have by now adopted legislation dealing with a broad range of issues including protection of water resources or biodiversity conservation.

Framework environmental legislation mostly deals with cross-sectoral issues including establishment of environmental standards and norms, the use of economic instruments for environmental management, environmental impact assessment procedures, institutional settings and coordination at the national and local levels, dispute settlement, information, education and public participation.

Framework environmental statutes and basic environmental laws helped overcome the organizationally fragmented and uncoordinated approach to environmental management. More than 65 developing countries have adopted such legislation since the 1970’s. A continuing process of legal and institutional innovation shows a commitment towards sustainable development. It also provides a vehicle for disaster reduction strategies. It also provides a vehicle for disaster reduction strategies.

National environmental laws provide some basis and direction for the implementation of environmentally sound disaster reduction planning. Ways to ensure that environmental laws and disaster reduction strategies are mutually supportive, consistent and in compliance with each other should be explored.

Disaster reduction specialists should be encouraged to anticipate environmental requirements under applicable laws and design projects to address these requirements, avoid problem areas, gather necessary information and coordinate closely with environmental institutions. Also, the objective of environmental laws could explicitly address the requirements of disaster reduction by reinforcing the protection of those

natural ecosystems that have a protective function. In this spirit, **Bolivia** is harmonizing its Environmental Act with its Risk Reduction and Disaster Response Act.

The existing body of multilateral environmental agreements also provides a good basis to enhance options for disaster reduction. Among these are the Ramsar Convention on Wetland Preservation, the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD), and the United Nations Convention on Biological Diversity (CBD). These legal instruments are negotiated at the international level

Most common environmental laws and institutional arrangements

- Constitutions (environmental component)
- Institutions (national and sectoral)
- Environment Action Plans: national (NEAP), local (Local Agenda 21), sectoral (biodiversity, desertification, climate, etc.), specific national goals and targets (where available)
- Legislation - including environmental acts/laws on environmental impact assessment (EIA)
- Command and control measures (standards, bans/limits, permits)
- Mechanism for monitoring and enforcing legislation
- Non-binding guidelines, voluntary codes of conduct (ISO 9000 and 14000)
- Greening operations at governmental level
- Environment litigation and judicial interventions (court cases)
- Mechanisms for tracking impact and progress (environment performance)
- Bilateral and multilateral agreements (e.g. Mekong River Commission, SADC Protocol shared waters, CBD, UNFCCC, UNCCD)
- Ratification/implementation of international agreements
- Regional environment/sustainable development bodies and organisations (e.g. South Pacific Regional Environmental Programme (SPREP), Caribbean Conservation Authority (CCA))
- Financial mechanisms
- Transboundary environment laws (e.g. concerning international waterways, UN Law of the Sea)
- Trade policies (e.g. trade agreements, WTO policies and regulations on the sustainability of resource use)

The themes of concern to many multilateral United Nations environmental conventions are of great importance in **Central America**. These issues are the increasing occurrence of drought and desertification, protecting biodiversity, preservation or re-establishment of wetlands and the anticipation of the socio-economic consequences of global climate change. Basically, as all of these concerns have crucial relationships with risk and disaster reduction concepts, the synergy between them is of growing importance in the region. Potential changes in rainfall patterns, increased hurricane incidence and strength, the loss of ecological resilience and natural ecosystem protection, rising sea levels, coastal degradation and the loss of mangrove swamps, presage new risk conditions in the future, and the need for new adaptive, mitigation and prevention schemes, implemented on an incremental basis.

IUCN has worked throughout Central America to broaden its role in risk reduction and to coordinate with risk specialists in promoting project activities. The promotion of synergies between multilateral environmental conventions has led to more appreciation of the close relationships that exist between efforts to promote community adaptation and resilience to the natural environment and to reduce the risks of disasters. A forum organized by the Ministry of the Environment in El Salvador in October 2001 was built around these concepts and it sought to achieve more common understanding and to explore opportunities by which adaptation practices could be applied in different zones of the country.

but are implemented through national policies, strategies, action plans and laws. More details on some of these instruments can be found in chapter six.

Existing legal instruments and ongoing work on sustainable mountain development are also pertinent to disaster reduction. For example, the *Alpine Convention of 1989* places some emphasis on natural hazards and addresses land use planning, soil and landscape conservation, water management, forests and farming. Specific obligations to reduce the impacts of natural and manmade disasters, including land use planning, watershed management,

2002, as mountains are the theme of the 2002 ISDR campaign.

Disaster reduction goals can also be integrated into non-binding instruments such as regional strategies for biodiversity or the implementation of Agenda 21. In this regard, the *New Partnership for Africa's Development (NEPAD)*, an initiative to promote the socio-economic

Klang River (Malaysia) Flood Mitigation and Environmental Management Project

Funded by the Asian Development Bank and undertaken under CBD, the project objectives are to improve environmental conditions, including those that worsen flooding, through an integrated river basin approach that addresses environmental and economic development needs, and reduce the adverse socio-economic and environmental impacts of flooding in the Klang river basin. Some of the considerations affecting environmental management and flood mitigation are integrated river basin management, solid waste management, sediment trapping, tributary corridor improvement and flood forecasting and warning systems.

and early warning, are foreseen in future regional mountain ecosystem agreements. These issues will be dealt with throughout

Legislation dealing with wetland protection

The purpose of wetland protection legislation is usually to minimize the degradation of wetlands and to preserve the beneficial values of wetlands. This means that for development activities, alternatives to wetland sites or limiting wetland damage must be considered. Such provisions usually apply to acquisition, management, and disposition of land and facilities, construction and improvement projects, activities and programs affecting land use, including water and related land resources planning, regulation, and licensing activities. Valuable information produced includes detailed wetland maps, studies and reports on wetland characteristics, documentation of compliance and consistency with floodplain management programs.

The China National Wetlands Conservation Action Plan finalized in 2000 is an example of a specific environmental legislation supporting disaster reduction.

development of Africa, deserves attention. Its draft programme of action includes six priority areas: land degradation, desertification and drought, wetlands, climate change and cross-border conservation and management of natural resources.

Environmental policies and planning

As in the case of environmental legislation, environmental and disaster reduction policies need to be mutually supportive as part of the sustainable development agenda. The critical gap between macro economic policy-making and environmental hazard considerations needs to be addressed. Sustainability and long-term benefits will result from integrating hazard thinking into decision-making relating to environmental practices.

Designing a **national environmental action plan (NEAP)** is a formal standardised process that is widely used. Characteristics of disaster reduction and environmental policies are similar. Both are meant to meet local need and sustainable development requirements, produce multiple benefits, rest on extensive participation of the public and all relevant sectoral and disciplinary stakeholders. Socio-economic goals, including poverty reduction, expansion of food security, improvement of human settlements conditions, maintenance of resource base for future generations will be met if environmental problems and risk are reduced.

Some of the features of integrated environmental/disaster reduction policies include:

- Assessment of environmental forces of hazards occurrence and vulnerability
- Assessment of environmental actions that reduce vulnerability
- Assessment of environmental consequences of disaster reduction actions
- Consideration of environmental services in decision making processes
- Broad-based and interdisciplinary approach that will ensure the integrated use of natural and social sciences in disaster reduction planning and decision making
- Partnerships and regional approaches to land use and nature conservation
- Reasonable alternatives to conflicts concerning alternative uses of resources

- Advice and information to involved actors in enhancing the quality of the environment

Water policies (water pricing and hydropower regulation) offer an example of environmental policies with a beneficial impact on disaster reduction. They can be designed to promote sustainable use of water and allow adjustments depending on seasonal forecasts to avoid floods. Water policies guarantee that work on wetlands, floodplains and open spaces to store and cleanup runoff is undertaken. Furthermore, flood and drought risk management are increasingly looked at in the context of water resources and therefore depend on effective international water management.

World Bank integrating environmental management and hazard reduction

The Dominican Republic - National Environmental Policy Reform. While not explicitly addressing natural hazard vulnerability, the project perfectly matches hazard mitigation concerns as its objectives include curbing deforestation and degradation of watersheds and coastal zones. Its development objective is to establish the basis for improved environmental management by defining environmental policy reforms and elaborating a national environmental management programme.

St. Lucia - Integrated Watershed Management Project. The project was initiated in 1994 in response to damages resulting from floods and landslides related to tropical storm Debbie. Apart from structural rehabilitation, it also supported the formulation of a Watershed Management Plan, which would serve as the basis for more integrated and sustainable development of key watersheds and strengthen the Government's capacity in environmental management and flood preparedness.

Similarly, policies promoting sustainable management of fuel wood and development of alternative sources of energy will reduce deforestation and contribute to flood, avalanche and landslide control. Programmes undertaken as a result of commitments under the biodiversity, climate change and desertification conventions will also reduce vulnerability through enhanced natural resource management. The relationships between market prices, trade policies and environment are complex and sensitive. Trade policies based on sound environ-

mental consideration also contribute to reducing disaster impacts.

While most regions try to strengthen regulations, there is also a shift towards deregulation, increased use of economic instruments and subsidy reform, reliance on voluntary action by the private sector and more NGO participation. National environmental policies that encourage voluntary agreements as a tool to conserve natural engineering solutions will

Bangladesh Coastal Greenbelt Project: a project serving environment and disaster reduction

Undertaken by the Department of Forest, under the Ministry of Environment and Forest, the project's main objectives are to:

- Prevent loss of life and damage to property by cyclone, storms and associated tidal surges
- Protect and improve the coastal environment through increased vegetation
- Help alleviate poverty by generating income through increased tree cover and derived products
- Increase forest resources
- Increase coastal embankment stability
- Establish industries based on forest plantation
- Increase multiple use for land
- Create popular awareness on sustainable forest management.

From Bangladesh State of the Environment Report, 2001

increase disaster resilience. Even though not binding and in many cases restricting long-term planning, they have some interesting potential. Donations compensated by tax benefits, leases, covenants controlling land use, charitable deductions are examples of such tools.

Several countries and regions in the world include natural disaster reduction in national environmental action plans.

One of the ten programmes of the National Environmental Action Plan of **Haiti** deals with natural disaster management; it is based on a decentralized and participatory planning approach including NGOs, the private sector and bilateral and multilateral donors.

Jamaica gives very high priority to climate change/sea level rise and natural and environmental disasters in the implementation of the *Small Islands Developing States (SIDS) Programme of action*.

The *Caribbean Planning for Adaptation to Global Climate Change (CPACC)*, funded by the *Global Environment Facility (GEF)* and executed by the *Organisation of American States (OAS)*, is one of the most important initiatives in coping with global climate change in the Caribbean. It supports the development of a policy framework for integrated planning and management for cost-effective response and adaptation to the impacts of global climate change. It incorporates specific tools such as disaster contingency planning.

In 1999, the *UN Food and Agriculture Organization (FAO)* developed a Draft Plan of Action aimed at helping SIDS countries meet the challenges of economic change, environmental degradation and natural disasters. The programs focus on agricultural trade, intensification and diversification of agriculture, fisheries, sustainable management of land, water and forestry resources, and environmental protection and strengthening national institutions. The Plan would improve disaster preparedness by promoting measures to reduce the impact of hurricanes and cyclones on agriculture and coastal fisheries. The Plan would assist the countries to assess their national meteorological and hydrological services and support early warning systems at national and regional levels.

The *South Pacific Regional Environment Programme (SPREP)* has, for many years, incorporated many disaster-related activities into its program as part of its mandate to manage the shared environment of the Pacific region. While these activities are spread throughout SPREP's programs, most have been part of the *Regional Climate Change Work Program* which emphasises the impact of extreme weather in the Pacific region and the relationships between climate change and natural disasters. SPREP is also implementing PIC-CAP which will focus on vulnerability assessment and adaptation options.

Another pertinent SPREP activity is a project on *Integrated Coastal Zone Management in the*

Case study: Watershed management for natural disaster vulnerability reduction

Watersheds are necessary for agricultural, environmental, and socio-economic development. Watershed physical and biological resources provide goods and services to human populations, including water protection, attenuation of natural disasters by regulating runoff, protection of coastal resources and fisheries, protection of the environment, and protection of productive lowlands. The economic benefit of upper watershed protection is not easily estimated nor is it required to appreciate the key contribution of well-managed upper watersheds to downstream beneficiaries. Watershed management programs need to build on existing environmental initiatives. The following elements are required for successful watershed management:

- No permanent structures in floodplains
- All watercourses having buffer strips
- Intensive agricultural activity not permitted on slopes greater than a set percentage reflecting land capacity
- Clear cutting of forests limited, with forest conservation and sustainable forest management stressed
- Institutional body formally established to link and address conflicts
- Public participation of both men and women in management decisions
- Effective management plans and enforcement of environmental and zoning regulation
- Regional environmental impact assessments to ensure that cumulative impacts of economic activities are sustainable

Impediments to comprehensive watershed management include:

- Inadequate economic valuation of environmental services
- Inadequate institutional structure and appropriate land use practices
- Inattention to socio-economic issues contributing to poverty, a degraded environment and natural disaster vulnerability
- Actions to implement watershed management activities:
- Strengthen municipal authorities and their capacity to address land use and watershed management issues
- Establish a macro national management strategy
- Support sound land use planning, ensuring public participation in watershed planning and ecosystems protection, including gender concerns
- Support policies and market-based incentives that favour reforestation and sustainable forestry on steep upper watersheds, promote participation of private sector through the climate change Clean Development Mechanism
- Require downstream beneficiaries to pay for watershed services
- Support critical watershed protection and restoration of key ecological systems to mitigate disaster impacts
- Support local NGOs to clarify land tenure issues and facilitate access by rural farmers to formal land markets
- Establish international watershed management frameworks
- Pursue a research agenda incorporating economic valuation of environmental services, innovative financing, analysis of the relationship between land use/environmental management and the magnitude of losses from natural disasters.

From *Watershed management for hurricane reconstruction and natural disaster vulnerability reduction*, USAID, 1999



Pacific Islands. Coastal hazard management is a major component of the project as it includes hazard mapping and the development of disaster reduction strategies for coastal areas. In order to realise the full potential of the resources in the region, SPREP collaborates with other organisations to expand its role in assisting Pacific small island developing states to integrate disaster management, sustainable development and sound environmental practices into national planning strategies.

Institutional arrangements

Environmental legislation and policies require co-ordinated organizational structures to support their implementation. The creation of new ministries responsible for the environment and of high level inter-ministerial and interdisciplinary policy advisory councils is still recent started after the Stockholm conference in 1972. Environmental ministries exist nowadays in some 23 African countries and 11 Asian countries.

Environmental functions can sometimes be performed by parastatal agencies integrated in other ministries such as housing, planning, construction, land use, agriculture and forestry. Co-ordinated organizational arrangements rationalise environmental protection and minimise fragmented sectoral approaches diffused throughout numerous government departments and local authorities that do not correspond to interactions inherent to ecosystems. Disaster reduction concerns have a place in specific environmental legislative and institutional means that promote coherent implementation of sustainable development policies. For example, almost all Caribbean countries have strengthened their environmental administrative capacities to integrate environmental considerations into physical planning.

Environmental management requires co-operative solutions, cutting across many disciplines and sectors, involving community groups, NGOs, the private sector, governmental institutions, the scientific community, and international organizations. So does disaster manage-

Involvement of the El Salvador Ministry of the Environment in risk and disaster matters

The impact of Hurricane Mitch in 1998, and the earthquakes in El Salvador in 2001, led to an increased awareness at the Ministry of the Environment in El Salvador about the relationship between development, the environment and disasters. Recent favourable experience collaborating with local community associations and NGOs in the Lower Lempa Valley Risk Reduction Project provided organizational precedents for more direct involvement by the ministry in risk and disaster matters. Following the 2001 earthquakes, the Minister of the Environment convened a committee of national and international experts to consider the creation of a new technical agency to deal with risk management issues. An executive paper created the National Service for Territorial Studies (SNET), in the Ministry of the Environment and Natural Resources in October 2001. SNET is an autonomous government agency with annual budget of about US\$ 2 million.

SNET has four divisions, three of which relate to monitoring the country's geology, hydrology and meteorology. This is the first time that these disciplines have been housed in the same institution in El Salvador. The fourth division deals with integrated risk management issues and develops vulnerability and risk scenarios.

Consideration also is being given to the formulation of a national risk reduction plan that would prioritize, guide and orient future risk management activities in the country and establish a basis for coordinating the many professional interests and different actors in the field.

SNET breaks with the tradition of adding risk reduction issues onto already established emergency disaster response or civil defence plans. By expanding on the prior experience of *The National Institute for Territorial Studies in Nicaragua* SNET may be a first step towards establishing a comprehensive risk management system in the country. It may well serve as a model for other countries, as **Guatemala** has recently requested a feasibility study to be conducted for a similar approach. Another project financed by the IADB in the **Dominican Republic** is currently evaluating a far greater role for the Ministry of the Environment, which already has legal authority to act in the area of land use and disaster reduction.

ment. Therefore organizational frameworks in place for environmental issues can be expanded to serve the needs of disaster risk reduction as part of sustainable development planning.

Many public agencies are experiencing cut-backs. Therefore, asking environmental agencies to integrate environmental considerations in other policy domains would save resources. This will require linking work in science, policy, environment and vulnerability reduction. Implementation of sustainable hazard reduction measures will need an appropriate macro planning organizational framework organizational framework establishing the critical link between policy objectives and field performance.

Multi-stakeholder processes (MSP) are one of the recent innovations to promote dialogue to achieve sustainable development. This dialogue model was initiated in 1998 by the *UN Commission on Sustainable Development (CSD)* and has since been adopted by other international forums. MSPs aim at bringing together all major stakeholders (non-state and government actors) in a new form of communication, decision finding (and possibly decision-making) on a particular issue.

MSP are based on equity and accountability in communication and representation between stakeholders. They are also based on principles of transparency and participation, and aim to develop partnerships and strengthen networks between stakeholders. MSP cover a wide spectrum of structures and levels of engagement. They are suitable for those situations where dialogue is possible, where listening, reconciling interests, and integrating views into joint solution strategies seems appropriate and within reach. Each situation, issue or problem prompts the need for participants to design a process specifically suited to their abilities, circumstances, and needs. MSPs have emerged because there is a perceived need for a more inclusive, effective manner for addressing urgent sustainability issues.

During the preparations of the World Summit for Sustainable Development (WSSD), stakeholders have come together to work out how to do their part to implement the sustainable development agenda. Major inputs to the discussion on disaster reduction and sustainable

development that fed into one of the ISDR background papers was drafted through multi-stakeholder electronic forums. The added value of a multi-stakeholder approach, namely increased quality, credibility and outreach, ensures an increased sense of ownership and commitment for collaborative actions plans. Search conferences are also participative processes that raise commitment for action and are applicable to collectively design disaster reduction plans.

Environmental impact assessments

Legislative and regulatory frameworks for *Environmental Impact Assessments (EIA)* already exist and require strong institutional support, the commitment of governments, aid agencies and civil society, as well as a monitoring processes.

Risk reduction considerations could be further

The Environmental Impact Assessment (EIA) is a policy making tool that serves to provide evidence and analysis of environmental impacts of activities from conception to decision-making. An EIA must include a detailed risk assessment and provide alternatives solutions. It must be thorough and well documented and must provide the public an opportunity to participate in accordance with the law. The EIA report usually provides a detailed and rigorous analysis on which the authority can decide whether to approve a proposal and under which terms and conditions. Once a particular project is selected, it is monitored to ensure that conditions for approval are adhered to and that the benefits from the EIA are achieved. Monitoring, implementing and auditing within the EIA process provides feedback to further improve it.

assimilated into the requirements for EIA. A more comprehensive EIA could evolve towards a periodic vulnerability assessment to take into account the dynamic nature of vulnerability. An expanded EIA process could provide a basis to ensure that proposed initiatives would include considerations of both disaster reduction along with lessening environmental impact. Further it would allow for an assessment of potential problems as well as benefits of disaster risk reduction activities.

Additionally, disaster reduction specialists could use the EIA model as an example to increase comprehension of disaster impact assessments and to reorient it to become a plan-



ning tool. Fundamentally, a post event impact assessment is a reactive assessment of damage already occurred and not part of the planning process, although results can feed into future planning.

Further cross-fertilization between disaster reduction practitioners and environmental managers will generate better EIA techniques and practices for use in disaster reduction.

Investment in mitigation measures does not necessarily reduce vulnerability and the socio-economic and environmental consequences of such measures need to be assessed. A well designed EIA process incorporating disaster risk will be key in encouraging the private sector and individuals to consider how their own actions impact vulnerability factors. To end on a cautious note indicating that there is still a long way to go until EIA's potential is realized, a study carried out in MERCOSUR on the use of EIA showed that even though all countries had adopted EIA as a preventive environmental management tool, only Brazil had significant experience in this area. It is intriguing to note that emergency actions and actions that restore facilities to pre-disaster conditions are usually exempted from environmental impact assessment and documentation.

Examples of the integration of disaster reduction concerns into EIA are scarce. Through its EIA, the *Caribbean Development Bank (CDB)* is asking its borrowing member countries to include disaster mitigation measures that can serve to reduce the risk associated with investments in their development projects proposals.

In India, the regulation on environmental clearances for port projects requests an EIA report, an environment management plan, a risk analysis study and a disaster management plan. The regulation specifies that the disaster management plan should be prepared on the basis of the risk analysis considering worst case scenarios with respect to specific cases such as oil/chemical spillage, fire, explosions, sabotage and floods. It encourages green buffer zones whenever possible.

In Viet Nam, an environmental sustainability program in the framework of *Partnerships to Mitigate Natural Disasters (NDM)*, provides technical assistance for integrating environ-

mental considerations into natural disaster mitigation plans. The relationship between natural disasters and environmental degradation will be studied and guidelines for the environmental implications of disaster mitigation projects produced.

Reporting on the state of the environment

Given the importance of natural resources as enduring ways to reduce disaster risk, it is vital to have a regularly updated picture of their health and ability to fulfil their buffering task. Some of the most relevant reporting agencies include:

- UNEP State of the Environment (SoE) reporting undertaken in the context of periodic Global Environmental Outlooks (GEO)
- IUCN environment profiles
- SoE reports for projects financed by the World Bank and GEF, as well as other funding agencies
- OECD environmental performance reviews
- UN CSD national reporting on implementation of Agenda 21, national assessment reports and country profiles
- National communications required by the Conference of the Parties of the climate change, biodiversity and desertification conventions.

The objective of these reporting systems is to assess the present and future situation of natural resources and the environment, including emerging issues on environmental management and legislation and development issues.

The objective of these reporting systems is to assess the present and future situation of natural resources and the environment, including emerging issues and recommendations on environmental management and legislation and development issues. They also inform on implementations means.

Reporting is a qualitative assessment tool and a framework for policy analysis and decision-making. Finally, reporting facilitates the measurement of progress towards sustainable development. Efforts of countries to meet their environmental and sustainable development goals are scrutinized in order to improve their performance in environmental management and

The **Bangladesh 2001 SoE** report prepared under the aegis of UNEP for GEO 2002 has a well developed and detailed section on natural disasters, which includes:

- General introduction on the types of disasters affecting the country
- Pressures on the environment that exacerbate natural disasters including geographical settings, physiography, hydrology and environmental pressures
- State of natural disasters: floods, cyclones, droughts, abnormal rainfall, hailstorms, lightning, tornadoes, earthquakes and erosion
- Impact of natural disasters: climate change, agriculture, salinity intrusion, fisheries, ecosystems and biodiversity
- Structural and non-structural responses
- Suggested options as future measures
- Conclusion

The report describes in detail the disaster management bodies and their main functions and responsibilities.

Excerpts from a table in the Bangladesh SoE report

Issue	Pressure/Cause	Impacts	Responses
Flood	Excess flow in monsoon Improper infrastructure development 92% of total catchment area across border Drainage congestion due to river bed siltation Deforestation in upper catchment area	Disruption of communications and livelihoods systems Loss of agricultural production Disruption of essential services National economic loss Loss of human lives and biodiversity	CDMP (Comprehensive Disaster Management Plan) FAP (Flood Action Plan) National Water Policy Flood forecast and inundation modelling Dredging of river bed Construction of embankments with sluice gates



develop principles, guidelines and effective strategies to better set their priorities.

Natural disaster concerns are more or less identifiable in the above mentioned reporting systems, links between environmental management and flood damage (e.g. lack of integration between water management, transport policy and nature conservation objectives) being most frequently described. However, they can produce essential baseline and vulnerability information on which to develop disaster reduction policies (see boxexample from Bangladesh).

Economic incentives/disincentives for disaster reduction

include:

- Tax incentives, subsidies and loans to compensate landowners or discourage certain land uses
- User charges: fees for downstream beneficiaries (domestic water use, agriculture, hydropower, fishery, recreation)
- Transfer of development rights to avoid undesirable development
- Easements: legal agreement to restrict type and amount of development taking place on a property
- Land purchase/property rights: usually restricted for exceptional lands (restricted land leases)
- Fines/liability system for damages caused to human settlements or environmental services
- Pricing structures to discourage unsound use of resources

Existing reporting guidelines could easily be updated to include a requirement to systematically report on the environmental features and resource necessary to prevent environmental degradation that will lead to an increase in disaster risks. The process of environmental reporting could also be designed to contribute to the record of ways in which societies mitigate risk by cultural adaptation and their appraisal of natural resources.

Environmental mapping, in which community members are asked to locate relevant environmental features and resources on a self-created map of their territory, could be used for risk mapping. Maps representing physical features, such as roads, houses, soil types and vegetation, could include social and risk phenomena,

e.g., access to resources by specific groups or household wealth. Community involvement in map building provides an occasion to discuss resource management issues.

Ecological and environmental economics

It is essential to obtain an accurate picture of true health and wealth of the socio-economic and socio-ecological situation of a nation in assessing progress towards sustainable development. Of the three interactive spheres of sustainable development – social, economic and environmental/ecological – economic considerations, in many ways remains dominant, both in influence and in its measurement. Proving that disaster reduction integrating sound environmental management makes economic sense is a major challenge when confronting decision-makers.

Environmental economics, also referred to as ecological economics, provides a visible way to link environmental management and disaster risk reduction in sustainable development. It utilizes the tools and mechanisms of economics to measure in currency terms, the value and costs regarding various aspects of the environment such as well-functioning ecosystems, pristine environments, biodiversity and the costs associated with resource and ecosystem depletion.

In conventional economic frameworks, natural resources, in terms of their worth for human use, have been considered. Beginning in the 1970s, economic mechanisms began to be adapted in order to measure more accurate representation of the socio-ecological aspects of the community.

Until quite recently, the study of environmental economics has been predominantly in academia, related research institutions, in multilateral and bilateral organization and in the large international environmentally-oriented NGOs. As environmental issues become increasingly everyday news, decision makers world-wide have started to examine ways in which socio-ecological values and costs can be measured and incorporated into economic and political discourse. There are numerous national models, including the older forms of National Resource Accounts (NRA), National Systems for Environmental Accounting

(NSA) and the System for Environmental Economic Accounting (SEEA). These tools work to reduce fragmentation and overlap of activities that have often resulted in confused policies towards agriculture, tourism and environmental management. Additionally, they pose a unique opportunity to develop more robust indicators of sustainable development. Quantifying aspects of socio-ecological considerations are a huge challenge for risk reduction and environmental management practitioners alike, as is advancing these concerns from the back burners of economically oriented political agendas.

From a practical point of view, grants, funds, loan guarantees, investment partnerships, and environmental incentives are some of the tools countries can use to promote water management, hazard mitigation, environmental conservation, coastal zone management etc., that serve both environmental and disaster reduction goals. Money generated by trust funds for ecoservices envisaged under multilateral agreements can be injected in disaster reduction activities. The potential to use creative environmental debt reduction strategies can also be explored. Debt-for-nature swaps are used to protect crucial natural services and implicitly contribute to disaster reduction. Innovative thinking to combine debt-for-disaster reduction swaps and debt-for-nature swaps could be initiated. This would help the poorest countries implement disaster reduction activities as part of their poverty alleviation strategy.

To maximize the protection of environmental services for disaster reduction, the current situation of remedial payment, where environmental services are compensated for, should be changed to a system where such services are paid for. In **Costa Rica, Colombia, Ecuador, Guatemala and El Salvador**, projects financed by the World Bank introduce the concept of payments to obtain a variety of environmental services, including sustainable natural resource management, watershed and forests protection, conservation of biodiversity, reduced vulnerability to floods, improved water quality and reduced sedimentation.

Environmental codes and standards

Coping with environmental and natural hazard risks will require better environmental and disaster risk management. Avoiding economic losses through improved proactive environmental management and performance is possible with the implementation of *Environmental Management Systems (EMS)* following procedures such as the ISO 14000 family of standards. The *International Organization for Standardization (ISO)* develops voluntary technical standards which add value to all types of business, administrations and public utilities operations. ISO 14000 is a set of generic tools for developing, implementing, maintaining and evaluating environmental policies and objectives. They contribute to making the development, manufacturing and supply of products and services more efficient, safer and cleaner. Organizations establish their policies, objectives and levels of ambition. These quality standards constitute a *responsible care* approach, which combines safety and prevention of technological disasters.

If upgraded to include disaster resistance, standards for EMS, including environmental auditing, life cycle assessment, environmental labelling and environmental performance evaluation could reinforce business imperatives, proving the case for applying ISO 14000 to disaster reduction.

ISO certification also provides an important basis for communication with businesses, government, financial organizations and environmental groups. We should add people at risk and the disaster community to this list. If the certificate provides information about the capability of the organization to achieve its stated environmental objectives, it has the potential to provide information on its capability to reduce vulnerability to disaster risk and achieve its stated disaster reduction objectives. Another benefit of certification is the scope for marketing. In the same way that we see green or environmental labelling, we could see disaster resilience labelling. Relevant work in this area has started in Australia, for example.



Future challenges and priorities

From the issues described in this chapter, the main areas for action that stand out are:

- Exploration of the links between environmental degradation and changing hazard occurrence and vulnerability patterns.
- Identification and description of environmental knowledge and tools that can be applied to reduce vulnerability to risk.
- Economic valuation of environmental actions.

The identified knowledge and tools could then undergo modification and testing to be well adapted to case specific situations. Disaster and environment practitioners could apply the tools which would result in a greater sense of ownership and commitment. Capacities for use and

regular improvement of these tools would also be developed. To achieve this objective, development of a common language and exchange of practices and experience among experts in disaster risk management, environmental management, sustainable development and economics should be encouraged. In this regard, innovative forms of communication should be explored.

Some adjustments in policy frameworks to reflect this new approach to disaster reduction might be necessary. As would be close collaboration with institutions working on climate change adaptation, biodiversity conservation, land degradation, wetlands management, sustainable development and poverty alleviation. Finally, integrating risk management into environmental policy and vice-versa will require full community participation.

challenges



5.2. Land use planning

There is a fundamental need in disaster risk management to recognise the relationships between population growth, the physical demands of human settlement, short and longer term economic trade-offs and the most appropriate use of available land. While the application of informed and consistent planning practices are crucial to minimise the potential loss of physical assets or environmental capital, a greater principle lies in treating the landscape itself as a valued resource to manage risk. Failure to act on this basis is to invite disaster.

Both the opportunities and the difficulties of employing land use and planning practices for disaster risk reduction are reviewed in the following section:

- The importance and difficulty of land use planning
- A delicate balance and measured benefits
- Principles regarding land use management and urban planning
- Case examples

The importance and difficulty of land use planning

Land use planning that is carefully designed and rigorously implemented is the most useful approach to managing urban or population growth and minimising associated risks. It is also one of the most challenging to implement because of the often conflicting values about land held by different segments of the population.

In many societies, cultural, social or economic attributes associated with land can form the basis of some of the most contentious issues among people, particularly at local levels. Reference has already been made in the preface to the economic attractions which flood plains or volcanic slopes hold for inhabitants. In other countries wetlands are drained to become industrial parks or housing estates.

The determination and wide acceptance of the most suited use of land, whether it is privately or publicly held, is demanding enough. It becomes even more daunting if there are variously held views about the role that land can, or should play in terms of reducing collective exposure to risk. Questions invariably revolve around whose land, whose risk and who is to benefit. Too often, the desire for short-term gains are prone to override anticipated benefits that stretch further into the future.

For these reasons, land use management and the related aspects of regional or territorial

planning, have to be considered as natural extensions of conducting hazard assessments and risk mapping. They essentially must take account of the spatial parameters of physical vulnerability considered in accordance with the broader social and economic requirements of a society. Such forms of planning used to be considered as a largely technical exercise, but planners and local political authorities are increasingly realising that members of affected communities have to be consulted and involved throughout the process.

Account also needs to be taken of neighbouring or adjacent communities which are not always of the same country, kinship or socio-economic standing. Actions taken in their own interest by one group of people living along a river can easily have a significant bearing on diminishing the fortunes or increasing the risks of others who live downstream or on the opposite shore.

Government authorities need to play an essential role in the judicious assessment of such relative merits, but there is equally a requirement for popular involvement in determining the basic parameters of what should constitute acceptable levels of risk. The informed participation of the public is also essential in the development of municipal or territorial standards and the acceptance of regulatory practices if otherwise seemingly intractable social, environmental and economic challenges are to be addressed successfully.



A failure on the part of government to implement effective land use and planning practices is to invite disaster. As one commentator has observed, while long a function of local governments, land use planning regrettably has often been done with little reference to exposure to risk. Consequently, inadequate, ill-informed or non-existent land use planning can contribute to increasing the vulnerability of communities exposed to hazards. Landslides that destroyed a housing development in the city of Santa Tecla, El Salvador following the January 2001 earthquake represent one such example. Most likely, there are hundreds more examples in all countries.

■ A delicate balance and measured benefits

The conscious recognition of the role of land use management and planning practices as viable means to reduce disaster risks are part of larger risk scenarios, best considered in local community contexts.

Regulatory approaches which emphasise land use planning to reduce future flood disasters have proved effective in some countries with advanced economies, but evaluations reveal that they too are being weakened in numerous ways. This in turn is leading to calls for refinements in regulatory strategies. Unfortunately, regulatory approaches are much less applicable to developing countries with the burgeoning of megacities, inadequate housing and basic services for large percentages of the population, a rising tide of migrants and unmanaged, informal economies. Unfortunately, it is in such places where the need for planning is greatest.

Some hazard specific examples with regards to land use planning are briefly presented.

● Earthquakes, volcanic eruptions and avalanches

Seismic microzoning allows for identification of earthquake prone areas at a local scale. This can be used to maintain low levels of building density or directly avoid the development in such areas. Microzoning has proved to be particularly effective for the establishment of setback distances from active fault-lines, within which building is not permitted (see Box).

Land use in California, U.S.

In many counties and cities of California, setback ordinances are a major device that is applied to enforce seismic safety. Thus, building and stability slope setbacks can be recommended where proposed development crosses known or inferred faults, as well as where unrepaired active landslides - or old landslide deposits- have been identified. Setbacks can also be used to impose the appropriate separation of buildings from each other to reduce pounding effects. This phenomenon is most common in urban areas where structures of different heights, resulting from different constructions methods, are combined in close proximity. Another type of setback regulates the distance from buildings to sidewalks or other areas that are heavily used by pedestrians. The main purpose of such setbacks is to reduce the loss of life and injury arising from collapsing buildings during an earthquake.

Source: adapted from K. Smith, 1997

Risk arising from volcanic eruptions can also be substantially reduced by means of limiting the development in hazardous areas. In that sense, volcanic hazard mapping provides the basis for land use regulations, as well as critical information for developing effective evacuation plans.

Some countries have well established zoning methodologies for mass movement related hazards, such as landslides and avalanches. That is the case for Switzerland, where a three colour-coded zoning system guides the development of both public and private buildings.

The Swiss code has been applied in many parts of the world. The map on next page showing a landslide-prone area in the zone of Paccha, in southern Ecuador, illustrates the use of hazard maps with the aforementioned three colors code. This map is one of the results of a large research project on natural hazards in this region of Ecuador, PRECUPA, sponsored by the Swiss Humanitarian Aid and Disaster Relief Unit (SDR) between 1994 and 1998. Based on the findings of this project, a new ordinance for the use and occupation of the urban land has been promulgated, allowing a safer expansion of this area.

Land use in Switzerland

Based on hazard maps, charts of degrees of danger are developed in order to guarantee a homogenous and uniform means of assessment of the different kinds of natural hazards affecting Switzerland (floods, snow, avalanches, landslides, etc.). Two major parameters are used to classify the danger: the intensity and the probability (frequency or return period). Three degrees of danger are defined and are represented by the colors red, blue and yellow. The estimated degrees of danger have implications for land use. They indicate the level of danger to people and to animals, as well as to property. A description of the magnitude of damage which could be caused by an event is based on the identification of threshold values for degrees of danger, according to possible damage to property. The danger zones can be delineated on the local plan, together with areas suitable for construction or zones where additional protection is required. The degrees of danger are initially assigned according to their consequences for construction activity: areas where buildings are not allowed (red: high hazard); areas where building must follow safety requirements (blue: potential hazard); and areas without building restrictions (yellow/white).

According to Art. 6 of the Federal Law for Land-use-Planning, the cantons must identify in their Master Plan all areas that are threatened by natural hazards. The Master Plan is a basic document for land-use planning, infrastructure coordination and accident prevention, that allows for early detection of conflicts between land-use, development and natural hazards.

Source: Olivier Lateltin and H. Raetz, 2001

● Floods

Flood management strategies are constantly being rethought. One approach draws upon observations of flood adaptation in traditional societies in which communities learned to reduce their exposure and vulnerability to floods through a variety of techniques. These include building modifications such as the stilt

houses of Malaysia, or effective social measures like the mutual aid that is often evident in strong and supportive kinship relationships within local communities.

Therefore, modern strategies need to adopt a sustainability perspective and emphasise the wiser use of flood plains and coastal flood zones. Such an outlook is grounded in antici-



Central Committee for Floods and Storm Control (CCFSC), Hanoi, Vietnam, 2000.

Principles regarding land use management and urban planning for risk reduction

The following principles apply not only to land use management plans, but in particular in the context of risk reduction strategies.

1. **Land use management plans form a shared basis for sustainable development and risk reduction strategies.**
 - As the *physical and spatial projection* of the social, economic, environmental and cultural policies of a country, land use management includes various planning tools and management mechanisms. They are necessary for a productive but sustainable use of the national territory and provide for the successful regulation of the economic life of a country.
2. **Land use management operates at different geographical scales** which require different ranges of management tools and operational mechanisms.
 - *At the national level*, sectoral economic policies are tied into the administrative framework of provincial or territorial jurisdictions.
 - *At the metropolitan level*, strategic plans are formulated for sustainable urban development.
 - *At the municipal level*, municipal ordinances and regulatory plans define local land use management practices.
 - *At the local or community level*, management plans encourage participatory management for community works and urban projects.
3. **Land use management involves legal, technical, and social dimensions.**
 - *The legal and regulatory dimension* includes laws, decrees, ordinances and other regulations adopted by national and local governments.
 - *The technical and instrumental dimension* includes planning tools and instruments that regulate uses of land and strive for the best balance between private interests and the public good.
 - *The social and institutional dimension* includes those mechanisms which include citizen participation in land use management practices, such as consultations, public hearings, open municipal sessions and plebiscites.
4. **Land use management encompasses integral services and individual sectoral interests.**
 - *Integral or dominant issues* revolve around the provision of essential services or related infrastructure, such as water, energy, transportation, communications – and as now recognised, risk management.
 - *Individual sectoral issues* include housing, health, education, agriculture, natural resources, the economy and trade.
5. **The practice of land use management proceeds through three stages.**
 - *Strategic planning*
 - *Administration and fiscal control*
 - *Follow-up and monitoring*
6. **Successful land use management plans will confront challenges.**
 - *Tensions or vested interests*, that can occur between government and private interests, national and local interests, or instruments of the state and the population.
 - *Dynamic factors*, such as population growth, migration, conflicts over the use, demand for, or supply of services.
 - *Factors specific to risk management*, including the changing extent or nature of vulnerability, major fluctuations in land values, urban services and environmental services.
7. **Successful strategic land use management requires essential resources.**
 - *A clear legal and regulatory framework* defines the competencies of the various stakeholders and the “rules of the game”, including the role of each actor in the various stages of planning.
 - *Access to information* on regulatory plans, land and property markets, public and private investment projects is crucial for ensuring effective citizen participation in decision-making.
 - *A decentralised fiscal policy* strengthens the capacity of local governments to raise revenue and to consolidate their finances in the interest of effective local administration.

Adapted from CERCA, UN-HABITAT, Central America, 2000

patory approaches: empowering local communities to make choices, promoting disaster resilience, improving local and socio-economic adaptive capacities, and ensuring intra- and inter-generation equity. These strategies embrace retreat from flood zones, by means of both accommodation and protective approaches as illustrated below. Previously heralded engineering remedies or hard defences, are increasingly being replaced by environmental considerations such as mangrove swamps or wetlands which can act as soft defences.

Successful communities or nations seek to strike a balance in which flood disaster potential is weighed against other socio-economic goals and benefits. They recognise that land use change in any part of a river catchment may adversely affect flood flows and are prepared to address source controls. They make increasingly informed decisions based upon sound, high quality information and stakeholder participation, and they frequently reassess flood risks. They seek to foster flood-resistant designs in physical, economic and social structures, partly through encouraging self-help and self-reliance. They equally value traditional or new and emerging technologies that may help increase resilience.

Case: Cuba

In Cuba, national land use planning and management are truly integrated into risk reduction considerations. For over forty years, the Institute for Physical and Spatial Planning, has been the responsible body for the implementation of physical planning in the country. Their planning system integrates all scales of political and administrative jurisdictions, from municipal to provincial and national levels, in addressing a wide range of land use-related issues. These include the management of natural resources, decisions about human settlements and the environment, hazards, vulnerability and risk.

The institute defines regulations and provides methodologies pertaining to risk reduction that include building codes and risk zoning to reduce the physical vulnerability of households and critical infrastructure, especially in flood-prone areas. These and related tools for implementing land use controls across the country

are supported by well-integrated conceptual, methodological and legal frameworks tied into the sustainable development processes of the country. In addition to the institute, the national civil defence authority and the hydro-meteorological service, are other key organizations in these strategies.

Primarily, two main mechanisms are used to implement land use policies. The first is planning tools that include land-use schemes applied at the national, provincial and supra-municipal levels, Plans for territorial and urban planning are implemented by provincial and municipal authorities. Once approved, these tools become legal instruments that regulate land use for public and private land holders. They are supplemented by feasibility or location studies, or other forms of detailed studies conducted to meet specific requirements.

The second type of mechanism employed consists of regulations and management practices. These include directives for the spatial allocation of investments that provide guidance for locating building projects according to land use criteria by the spatial location of building projects prior to their financial approval. The consideration of physical vulnerability included in the land use criteria of these directives, as well as environmental impact assessments, are therefore incorporated at this stage in land use planning.

As in other island states, coastal areas constitute the most fragile and complex ecosystems found in Cuba. Their increasing vulnerability to the impact of natural disasters has motivated the government to support studies on land use management. Schemes define guidelines for the use of coastal areas at the national level, identifying priority scenarios, where higher resolution studies need to be conducted. A hazard map for storm surges considered at the national scale, plus additional vulnerability maps, have been produced. The combined use of these maps allows relative levels of risk to be identified for settlements located in coastal areas. Several land use regulations have resulted from this study, including specific recommendations for retrofitting, resettlement and urban growth regulations for 107 coastal settlements.

A comprehensive study has been conducted in Havana Province, following analysis conducted in 1998 which revealed deficiencies in land use management. By working with the government, UNESCO contributed to develop this study. The reduction of vulnerability to disasters has been included as one of the main goals of this initiative. The implementation of measures will be undertaken over time, with financial commitments from both the government and the local population. The communities have participated in different stages of the project, becoming more familiar with the issues of vulnerability and principles of disaster reduction. In order to reduce disaster risk for coastal settlements in this area, the following recommendations have been issued:

Direct measures:

- Prohibit the construction of vacation houses in existing settlements.
- Relocate the population vulnerable to disasters.
- Regulate and supervise the construction of new homes in the settlements.
- Retrofit and build homes adapted to flood conditions.
- Improve the drainage systems in and around the settlements.
- Improve the adequacy of potable water supplies and sanitation systems.
- Improve health and transportation services.
- Create employment opportunities.

Indirect measures:

- Improve the natural resilience of beaches.
- Improve the water irrigation systems near the coast.
- Rehabilitate the wetlands.

The city of Havana provides an example of urban planning in a coastal zone. The city has a conspicuous breaker wall or *malecon*, stretching 7 km along the sea, to reduce the impact of storm surges that periodically strike the city's coast. Inappropriate urban growth is reflected by the private houses and installations that have been located in the vicinity which is at high risk. A plan approved by the Administration Council of Havana in 1995, is now applied to all urban planning projects in these seaside areas. Thanks to the vulnerability zoning implemented through this plan, codes and standards for construction have been renewed with the aim to improve the organizational pro-

cedures, engage more effective means of construction, and promote sound rehabilitation in the area. Basements have been rebuilt, the heights of buildings regulated, and new landscape designs for public areas adopted.

In conclusion, land use management and urban planning in Cuba constitute economically and technically feasible tools for disaster reduction. Initiatives in land use management and urban planning have involved communities in the identification of local problems, in the planning process and in implementing the decisions taken about land use management. Revised legislation on disaster reduction based upon new methodologies has been applied, contributing to more effective implementation of disaster reduction activities. Moreover, the multidisciplinary and inter-institutional nature of the work undertaken in land use planning and management has helped to establish a conceptual and more methodological basis for effective disaster risk reduction. As the responsible body for disaster mitigation and relief activities in Cuba, the Civil Defence Service, has benefited greatly by a broader understanding of land use tools and their role in disaster risk reduction.

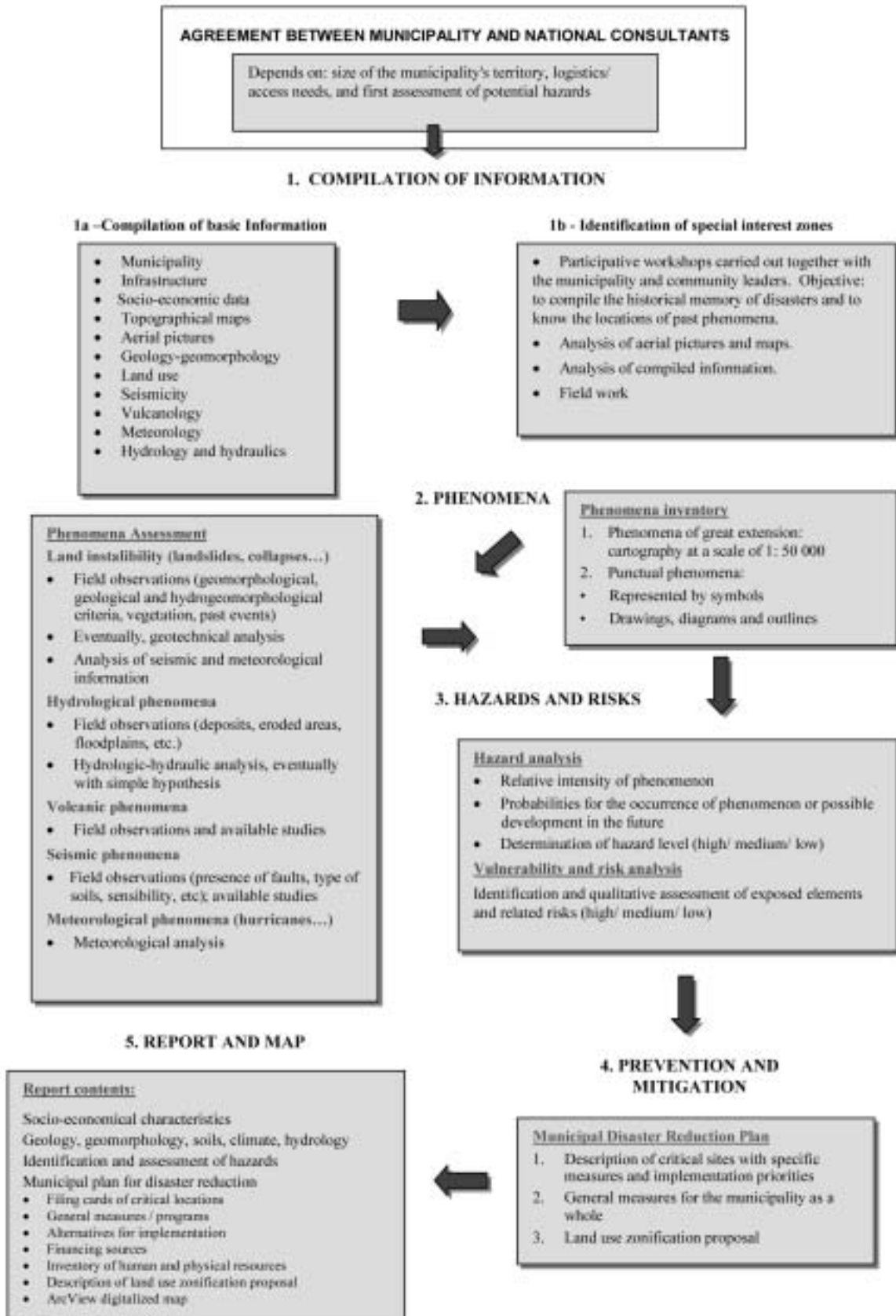
Case: Nicaragua

In Nicaragua in 2001-2002, more than 20 municipalities have been provided with tools for risk management, with a special emphasis on land use planning. These include the preparation of hazard maps, land use zoning proposals and municipal disaster reduction plans. They also include specific measures to reduce the risk of communities, considered by both local and national authorities. National profes-



Workshops with the participation of local actors in their own communities.

General methodology used for municipality studies





sionals, who received special training developed these tools by working in a participatory manner. Illustrations below show the process being used and examples of the results obtained in the project developed in the country with the support of the Swiss Agency for Development and Corporation (SDC).

The diagram on the previous page below illustrates the methodology used to produce a municipal study by the national professionals. The basis is a thorough, scientific, multiple-hazard and multiple-risk analysis of the whole study area, taking account of local knowledge and specialised information (steps 1 to 3). The core of the study is the elaboration of the municipal disaster reduction plan, which involves the production of the different risk management tools illustrated in the next figures.

Case: France

The *Plan for the Prevention against natural Risks (PPR)* is the main tool in the overall French strategy of natural disaster risk reduction. It aims at controlling the use of natural and rural spaces and expresses the responsibility to inform citizens about the risks they may be exposed to, as required under Article 21, of 1987. Citizens are able to familiarise themselves with the importance of risks, take measures to protect their housing and join authorities in establishing relief and evacuation plans.

The primary objective of the PPR process is to analyse the risks of a particular territory in order to establish hazardous areas. The plans are then able to introduce appropriate measures of urban planning and construction that take account of effective risk management practices. Zoning is one of the most common means undertaken following the evaluation of the degree of predictable hazards. Resulting risk maps form the basis of consideration which leads to the implementation of PPR and related legislation. The PPR is elaborated by state agencies and is implemented under the authority of the prefect of each department who approves it with regard to the needs of individual communities. The PPR is formulated for application to all citizens, enterprises and instruments of the government. It is a unique procedure which takes account of risk

analysis for land use planning. Presently, 2,350 communities are covered by a PPR. It is anticipated that by 2005, 5,000 communities will be covered.

An additional *Plan for the Soil Occupancy (POS)* also takes due consideration of natural hazards as outlined in the French Urban Code. The PPR is then annexed to the POS of the community. It complements other instruments which highlight the potential risks in various types of land use, natural resource protection, construction activities, and the administrative management of territories.

The French *Ministry of Land Use Planning and of the Environment (MATE)* has established a national list of communities at risk, which is updated twice a year from information supplied by prefectures. MATE has published these risk maps on the Internet for easy access by the inhabitants of communities, but also to underline their ready availability for use by decision-makers, notaries and insurance interests. Known as *Corinte for Communes à risques naturels et technologiques*, it is a database providing information on major risks by department, types of risk, individual risk analysis, land use planning (PPR), departmental consolidated files (DCS) and listings of prevention measures undertaken. This public service of the prefectures is available at www.environnement.gouv.fr and www.prim.net and it is regularly updated by MATE.

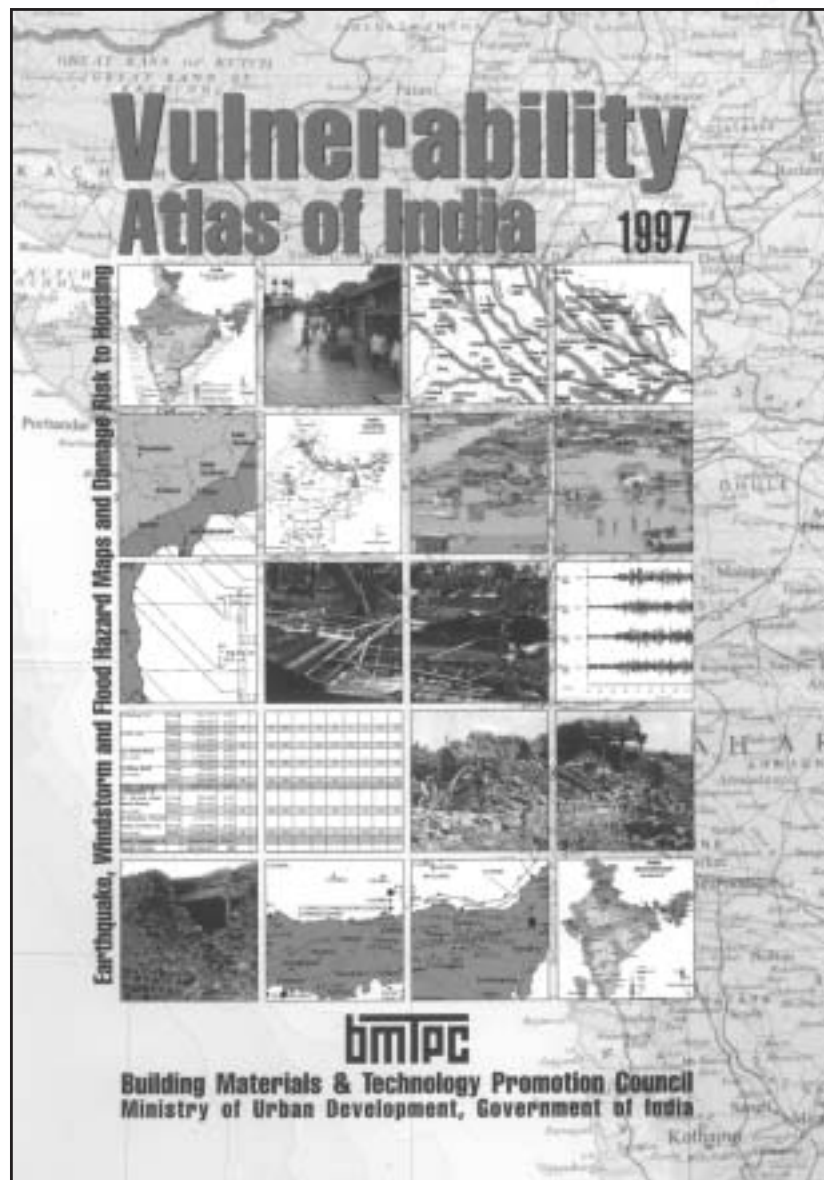
Case: India

In keeping with the objectives with the Yokohama Strategy, a Vulnerability Atlas of India was developed and ready in 1997. It has proved to be an innovative tool for assessing district-wide vulnerability and risk levels of existing building stock. The atlas has helped state governments and local authorities to strengthen regulatory frameworks by amending the building by-laws, regulations, masterplans and land-use planning regulations for promoting disaster resistant design and planning processes. The documents and methodologies for vulnerability and risk assessment, along with technical guidelines for disaster resistant constructions, have shown high potential for transfer, adaptation and replication. After the Gujarat earthquake in 2001 the relevance of the Atlas have

been highlighted and additional assessments in a more detailed scale is now being developed. Indian programmes have met with success in modifying land use by seeking to address community requirements so as to gain their commitment in ushering land use changes. A national policy backed by local effort is crucial to the success of these programmes.

Indian state governments are responsible for development plans, in particular those that contribute to natural hazards management, agriculture and land management. The first major initiative for preventing flood hazards in the Gangetic plains was in 1960-61 in the form of a soil conservation scheme in the catchment areas of the River Valley Projects as recommended by the National Flood Commission. The National Watershed Development Project for Rainfed Areas also aimed at promoting appropriate land use and the development of farming systems on watershed basis. A National Land Use Policy Outline adopted by the government of India presents a cohesive and coordinated strategy of schemes by various government agencies and others to ensure the optimal use of land. In this connection, a National Land Use and Conservation Board and State Land Use Boards have been established.

Indian experience has shown that measures to prevent disasters like drought and floods suc-



ceed to the extent that they focus on resource regeneration of the community living on the lands concerned. The approach has to be holistic and needs to address both spatial and temporal dimensions of land use. Sustainability and effectiveness of interventions depend on engendering appropriate land usage, for which peoples' participation in the planning and decision-making is an obvious requirement.



Future challenges and priorities

Land use management and planning are practised in many countries. However, as was mentioned at the beginning of this section, well-considered land use planning carried through to the successful accomplishment of reducing risks remains extremely challenging for a number of reasons. Competing interests or values associated with the various possible uses of land almost always become an overriding issue that can only be resolved from some common understanding being reached, either under law, official instruction, or through a common appreciation of relative risks.

There are an additional number of practical limitations to address to enhance land use planning as a tool for risk reduction, which include the following:

- The lack of current information about potential hazards affecting a specific location, and the nature and relative magnitudes of their possible impacts within a specific area.

- The high costs and protracted nature of multidisciplinary involvement associated with the technical aspects of hazard mapping or vulnerability and risk assessment activities.
- An inability to predict hazard events or for the community concerned to fully appreciate the possibility of risk.
- Hesitancy to commit funds for seemingly intangible benefits at a possible unspecified time in the future, overshadowed by clear and immediate opportunities for short-term gains.
- Local political or community resistance to accept the rationale for land controls, often compounded by weak or marginal interest in their enforcement. Licensing procedures are noticeably corrupt in many countries.

There are many links to the challenges described in chapter two related to risk assessments.

5.3. Protection of critical facilities

“The reality that somewhere between 75 and 90 percent of all earthquake fatalities result from building failures, highlights the importance of implementing mitigation measures specifically associated with building design and construction.”
Professor Ian Davis

All societies need to be highly selective in the identification and protection of their key resources and service facilities. These lifeline elements need enhanced protection from hazard impact so they can remain functional at the time of crisis or following a major disaster. Typical critical facilities and infrastructure include:

- Key infrastructure and utilities, such as communications, water, electricity and fuel supplies.
- Primary transportation links, such as main roads, rail links, harbours and airports.
- Public administration facilities, government offices, police, fire and emergency service facilities.
- Medical facilities performing critical public health and life saving functions.
- Schools and buildings with social value, important for public assembly or local identity.
- Key economic assets related to finance, commerce and manufacturing.
- Cultural monuments, museums and historic structures.

The discussion and examples shown in this section will focus on:

- The role of engineering and technical abilities in protecting critical facilities
- Protection of urban infrastructure
- Structural means, disaster-resistant construction
- Codes, policies and procedures
- Government examples, public demonstration of best practices
- Development of appropriate methodologies

■ The role of engineering and technical abilities in protecting critical facilities

Buildings, critical facilities and infrastructure are necessary for the effective functioning and well being of any society. It is therefore necessary to consider what has to be done to promote the development and application of appropriate standards of design and construction within what is often called the built environment.

In technical terms, the expertise and methodologies are available within the scientific and technical communities to generate appropriate standards of design and construction for damage resistant structures and critical facilities. The fact that they are spread across countries and individual fields of experience limits their use.

In many developing countries, people with the right training, skills and motivation are in short supply. At the same time, professional structures may be weak so that nationally recognised standards of professional qualification and conduct are lacking.

Many countries have adopted building codes requiring disaster-resistant design and construction. Their provisions and adequacy vary, but where they are rigorously applied the resultant buildings are more disaster-resistant than they might otherwise be. The problem is not so much that codes are inadequate but that they are not enforced effectively. Equally important but much more difficult and expensive to do, there is a need in particularly threatened areas or badly exposed critical facilities to strengthen, or retrofit, older buildings where practical.

The pressures of growing population and poverty, finance, corruption, inadequate skills and weak administration often combine to produce woefully inadequate standards of building control. There are other problematic areas, as well, in translating current knowledge into practice. Buildings erected by incoming or migrant segments of the population are usually constructed without specific permission and are not regulated by any building control procedures. Public authorities are hard pressed enough to provide basic water and drainage

Vulnerable building stocks

Following the earthquakes in Turkey in 1999, earthquake specialists from Istanbul's Bogazici University in Istanbul, summarized the reasons why the building stock of Turkey proved to be so vulnerable:

- Rampant code violations that led to disastrous results.
- The system was conducive to poor construction.
- High inflation meant very limited mortgage and insurance, an impediment to large-scale development, limited industrialization of residential construction.
- High rate of industrialization and urbanization lead to a need for inexpensive housing.
- No professional qualification of engineers.
- Ineffective control/supervision of design and construction.
- Corruption.
- Regulations with limited enforcement and no accountability.
- Ignorance and indifference.
- Government was a free insurer of earthquake risk.

services to serve the new population, much less to attend to how they house themselves.

The construction industry world-wide also has special characteristics, many of which militate against the achievement of high quality in the built environment. Contributing factors include the high proportion of small local firms, the one-off or unsupervised nature of much of the work, the risks in relation to the rewards, the ability to cut corners by covering up bad work and the lack of adequate training. Where the prevailing culture is lax or corrupt, local contractors will usually reflect it.

Local people can do something to protect themselves from the possible effects of disasters if simple advice is given and heeded. The extent to which this advice is provided is often limited and too often the professional communities themselves are not directly involved. The lessons based on experience, are clear. Engi-

neering studies of disaster damage are regularly undertaken and constitute a vital element in the design process. Codes and standards are reviewed in the light of such studies and have gained much from them, particularly when they have been undertaken in the early stages of post-disaster activity.

Aside from the common disregard for prevailing conditions of risk, improper design, poor construction and inadequate maintenance figure again and again as major causes of building failure and loss of life. Poor engineering, ineffective building control by officials and bad building practices within construction concerns produce a grim harvest, long after those people responsible have moved on to other projects. Much of the older building stock may have been constructed before the adoption of modern construction standards, but there should be no excuse for the failure of modern buildings.

Where they exist, national engineering institutions are committed to maintaining appropriate standards of professional ethics and competence among their members and to discipline those who deliberately break professional codes of conduct. By virtue of their national standing, they have contacts at senior levels of government and international engineering organizations. They are thus in a strong position to promote the importance of technical integrity, learning the lessons of disasters, identifying and assessing risks and employing disaster-resistant design and construction practices. They are also in a position to work for a better trained and more risk-conscious construction industry.

Lack of rewards for mitigation measures

A glaring omission in the newly crafted system in Turkey is, of course, the fact that no rewards have been worked out for mitigation measures. If homeowners decide to upgrade their buildings, this is currently not recognised in reduced [insurance] premiums, or increased benefits. ... too much emphasis has been placed on the purely technical measures of earthquake protection, but this has occurred at the expense of improved settlement and spatial planning policies.

Source: Gulkan, P., 2000

Ways to achieve a safer built environment need to be:

- Ambitious, grasping unique post-disaster possibilities to improve building.
- Stimulated by a range of incentives.
- Inclusive, with the attention of engineers being devoted to the creation of both safe engineered as well as safe non-engineered buildings.
- Focused on lifeline buildings and infrastructure, rather than on unrealistic projections addressed to all structures within all settlements.

Many national institutions maintain high standards of professional competence, but the extent to which those standards are reflected in pressure on government to improve the enforcement of building regulations, or in the professional supervision of engineers on the

ground is not necessarily so evident. They sometimes use the situation to their advantage and do little to encourage better standards. However, national engineering institutions are important agents for a safer built environment and high professional integrity, and this position must be maintained over the long term. Again, encouragement for the development of more effective national professional institutions and their increased influence in civic expressions of disaster risk management could become a more common area of interest among international agencies concerned with development.

Protection of urban infrastructure

Most cities experience natural hazards such as earthquakes, volcanic eruptions, floods, cyclones, and tidal waves, on a relatively infrequent basis. Yet, mounting losses to life and property, point to the fact that determining the risk to natural disasters is a dynamic process. It

What about non-engineered buildings?

“It remains something of a paradox that the failures of non-engineered buildings that kill **most** people in earthquakes attract the **least** attention from the engineering profession. At least two explanations for the neglect have been offered. One leading earthquake engineer explained that while the failure of non-engineered building construction was certainly a major problem, it should not be regarded as a problem for engineers. He believed that by definition, *‘non-engineered building is outside the engineer’s scope or mandate’*. The obvious follow-up question: *“therefore, in such a situation, whose responsibility is it to devise ways to create safer vernacular buildings to protect their occupants from earthquakes?”* remained unanswered, other than a vague suggestion that this problem was probably - *‘the province of local builders’*.”

Comments from another experienced earthquake engineer, this time in Japan, indicated a similar withdrawal from the subject. The engineer deeply regretted the serious problem associated with the poor performance of non-engineered buildings in earthquakes in Japan, and at a global level that certainly needed the attention of his profession. However, he believed that there was regrettably no money in Japan to fund the necessary research or implementation of improved structural measures for such low-cost structures. A rather sad case of *‘no money on the table, - no action on the ground’*”

“Fortunately there are notable, yet isolated exceptions to such negative attitudes or approaches including important work in Peru (Giesecke, 1999), Colombia, China and Bangladesh (Hodgson, Seraj, and Choudhury, 1999). One key center for research and development is the *Central Building Research Institute*, and the *Department for Earthquake Engineering at the University of Roorkee* in the State of Uttar Pradesh, India led by the pioneering work of Professor A.S. Arya on the strengthening of non-engineered construction. The groundbreaking World Bank-supported programme to retrofit village housing in Maharashtra, India following the Latur earthquake is an example of a programme that secured the technical support of Roorkee. (Government of Maharashtra, 1998).”

Source: I. Davis, 2002



will not be long before 50 per cent of the world's population is located in urban areas, with many people living in vast cities at risk of natural hazards. This is an inevitable development and the implications are profound. The level of risk depends not only on the nature of the hazard and the vulnerability of the elements it affects, but also upon the economic value of those elements. As communities grow larger, are more established and become more complex, the level of risk they face also increases.

Rapid urbanization in developing countries particularly, has led to the exponential growth of non-regulated housing. Population growth along coastal areas is exposing a greater number of people to the effects of severe weather. While these risks may be considered moderate in and of themselves, the rapid growth in population, investment and increasingly complex infrastructure associated with cities is thrusting an ever-greater number of urban citizens into higher categories of risk. With per capita city product exceeding 10 to 30 per cent of GNP,

the challenge of making cities safer can no longer be regarded as merely a local or altruistic concern.

Disasters are only one of the many risks that urban dwellers face. Naturally occurring hazards are commingled with other equally pressing urban issues, such as decaying infrastructure, poor housing, homelessness, hazardous industries, inadequate services, unaffordable and poor transport links, pollution, crime, insecurity, and conflict. The built environment is deteriorating at a rate that most cities cannot afford to address. Vulnerability of the building stock to earthquake damage in one large centre has been estimated at 170,000 older poorly maintained buildings, 320,000 non-engineered buildings and 400,000 newer buildings with inadequate lateral resistance.

There are examples that illustrate both a growing awareness to these issues in cities and communities alike and what is necessary to protect their essential services and related infrastruc-

Building Measures

There is a need to recognize the three distinctive contexts for the introduction of physical risk reduction measures into buildings or infrastructure, (each possessing different levels of opportunities for application):

- *Reconstructing* new buildings or through the repair of buildings
- *Constructing* new buildings, in normal circumstances
- *Retrofitting* existing building stock through strengthening programmes.

The order of opportunities to address each context is as follows:

Good Opportunity:

Reconstruction, with the introduction of mitigation measures, is always likely to be possible, even in countries with resource limitations. This is on account of high levels of political will and public demand for enhanced safety in immediate post-disaster contexts. Therefore, officials need to be sensitive to the excellent opportunities posed by reconstruction to introduce mitigation measures.

Moderate Opportunity:

Introducing mitigation into *new construction* is certainly attainable, if there are the additional funds available to pay for the improvements and if codes are in place with adequate enforcement. However, the introduction of mitigation measures into non-engineered buildings is surrounded by social, economic and cultural obstacles and thus remains an unsolved global challenge of major proportions.

Limited Opportunity:

The introduction of retrofitting for *existing buildings* will always be the most difficult context given the scale of building stock in any urban areas. For example, in the USA, the average turnover in the Nation's building stock is only 1 to 2 percent a year. Thus there is a vast potential cost associated with implementation in terms of securing the necessary finance as well as the cost of social and economic disruption.

Source: I. Davis, 2002

ture. The following cases demonstrate that while each involves technical and specialist inputs, a major key to the success has to be a greater degree of official interest and wider public participation if the commitment is to proceed beyond the stages of initial conception. An additional point that should not be overlooked is that there are often vital roles that need to be played by international organizations or development agencies in stimulating or supporting such initiatives.

Case: Disaster risk reduction in health facilities, water and sanitation systems in Latin America and the Caribbean.

PAHO started to work with vulnerability and disaster reduction for health facilities in Latin America and the Caribbean, with an emphasis on hospitals after the earthquake in Mexico City in 1985. This experience made it clear that it was not sufficient for medical and support staff alone to be prepared to attend to emergency situations, as had been the primary emphasis for preparedness planning prior to the earthquake, but that it was equally important for the political establishment and the public to undertake mitigation measures to reduce the vulnerability of the infrastructure.

During the past 15 years of work on this subject, a growing number of professionals and

academics have participated in the compilation of technical manuals about disaster reduction measures that should be applied in the construction, maintenance and retrofitting of health facilities. Additional work has been undertaken to conduct vulnerability studies and to elaborate the retrofitting of several hospitals to withstand earthquakes.

While a particular emphasis had already been placed on the development of disaster prevention initiatives for large health centres from the effect of earthquakes and hurricanes, subsequent events of the El Niño phenomenon in 1997-1998, as well as the floods in Venezuela showed an increased necessity to analyse water-related disasters and their impact on the health sector facilities.

The impact of disasters on infrastructure has considerable environmental and health consequences, in particular given the very specific vulnerability of domestic water supplies and the physical infrastructure necessary for sanitation. Health risks related to the disruption of water distribution and sewage systems in the aftermath of disasters, and particularly during floods, contribute greatly to related mortality. There is also now growing appreciation of the importance of ensuring proper maintenance and protection of systems for industrial water and wastes, so that they do not result in toxic or chemical pollution of water bodies.



*Retrofitted hospital
Photo: Osorio, PAHO*

Guiding vulnerability studies and mitigation measures in the the health sector

In order to ensure that technical knowledge is passed to other countries, PAHO will continue to promote an exchange of ideas between professionals and governments in order to advance the idea of preventing avoidable losses in the health sector from natural disasters. Despite technical advances that have been available to support health sector initiatives against natural disasters, many have not been implemented in new or existing health facilities. This has been due to either the lack of planning, insufficient resources or simply the lack of apparent interest on the part of government authorities or potential financial supporters. Unfortunately, many of these projects have failed, more from a lack of interest to do things responsibly than from a lack of resources.

This topic has provoked considerable interest in Latin America and the Caribbean. Although nothing has changed drastically from these efforts, an attempt has been made to move the agenda of disaster reduction forward by the publication and distribution of relevant information by PAHO and other institutions. Moreover, many hospitals have decided to reinforce their facilities in light of the risks of disasters. In order to further develop this successful approach of disaster risk reduction, there is a need to continue the promotion and organization of studies about vulnerability of the built environment and facilities essential to public health with the joint participation of the academic, private and health sectors.

Source: PAHO, 2002

PAHO has promoted this topic since the beginning of the 1990's in Latin America and the Caribbean. Nevertheless, vulnerability reduction in the services for water and sanitation systems yet has a long way to go. They so far have concentrated mainly on the immediate needs of the population without encouraging a wider analysis and application of disaster prevention initiatives. This is due to several reasons, with some related to the considerable number of institutions involved with water and sanitation and the absence of leadership at national or local level. It is also partially a result of the great geographical extent of these services and the complexity of the technical solutions involved.



Photo: Osorio, PAHO

Advances have been made in the development of technical manuals for disaster prevention and in the capacity to reduce the vulnerability of water treatment facilities against natural disasters, based on the experiences of individual countries. On the other hand, technical publications that fully list criteria for building or protecting critical facilities from damage by natural disasters have not yet been developed. A list of such criteria is vital for the construction, as most of those considerations are only available in the literature for building methods but they are not more widely elaborated for general awareness or utilization.

The result of these initiatives has been to familiarize certain organizations such as the *Pan-American Engineering Association for the Public Health and Environment – la Asociación Interamericana de Ingeniería sanitaria y Ambiental (AIDIS)* with prevention issues. In the same way, improvements have been made in the promotion of the topic in different sectors such as in the management of water facilities. This has allowed the topic of disaster risk reduction to be included in the legislative measures related to disaster management issues.

Some countries like Peru have established legal guidelines for the health sector to encourage the inclusion of disaster reduction activities in its action plans. However, there has been very little elaboration on the technical knowledge to

carry out these guidelines. For the future, it is vital that the universities, academic institutions and professionals assume the responsibility to promote the spread of this technical knowledge in order for these obstacles to be overcome.

With the exception of Costa Rica and Ecuador, there are presently very few countries that can show the execution of special projects to reduce the vulnerability of facilities against natural disasters. For instance, water purification facilities and related systems generally remain exposed to different types of hazards, even though many of these facilities supposedly have been upgraded to withstand their damaging effects. Only water treatment facilities have been improved to some extent, as the public availability of clean drinking water has been a top priority for disaster management emphasis in the wake of disasters.

Case: Canada

Canada's new *Office of Critical Infrastructure Protection and Emergency Preparedness (OC�PEP)* was established to enhance the protection of critical infrastructure from disruption or destruction, and to act as the government's primary agency for ensuring national civil emergency preparedness. This underlined the importance of critical infrastructure such as energy and utilities, communications, services, cybernetic systems, transportation, safety and government comprise as the backbone of the nation's economy.

Structural means, disaster-resistant construction

The design and construction of hazard-resistant structures constitute some of the most cost-effective means of reducing risks. The technical design and authoritative enforcement of building codes and related standards of construction are essential to protect the built environment from unnecessary loss or damage from natural hazards. Urban planners, architects, engineers, construction contractors and building inspectors all have important responsibilities to ensure that the physical aspects of planning and construction are technically sound and are suited to the circumstances of potential hazards in a specific location.

The engineering standards of buildings, life-lines, and housing are determined by the degree to which technical decisions are made, and followed through in practice, by construction professionals. It is they who must determine how effective a particular engineering solution will be in respect to an expected degree of stress or hazard.

However, much less attention is given to the equally important roles of investors, local political authorities and community leaders to fulfil their own professional and civic responsibilities. Together they have important roles to play in assuring expected compliance of standards implied by their investment, enforcement of legislation, or adherence to local procedures, regulations and standards. Even when assuming that codes have been based on current knowledge and developed experience, they ultimately are only as good as the extent to which they are employed and enforced. The state of Florida was regarded as having one of the most rigorous building codes in the US until Hurricane Andrew stripped away all pretences of compliance. Similar disclosures have arisen with unerring frequency *after* disasters have occurred, whether they happened in Japan, Turkey, Taiwan or India.

"In Turkey, the building construction supervision scheme is directed mostly to checking designs, when in fact violations occur at the construction site."

Gulkan, P.

In an effort to address some of these issues, the *Earthquake Engineering Research Institute (EERI)*, a non-profit professional association headquartered in Oakland, US, is conducting a joint project with the *International Association of Earthquake Engineering (IAEE)* located in Tokyo, Japan. Together they are building an interactive, dynamic, Internet-based *encyclopaedia of housing construction* used in all seismically-active areas of the world. The endeavour links more than 160 volunteer engineers and architects from over 45 countries, enabling them to consolidate and share data, as well as to access tools that can reduce the vulnerability of housing in earthquakes. The goal is to create a professional resource that is



useful not only for design and construction professionals but also for housing authorities, community planners, or other agencies concerned with hazard reduction and sustainable development.

Initial efforts of the project are devoted to compiling relevant information about all aspects of housing construction in seismic areas. These include architectural features, structural details, strengths and deficiencies under seismic loads, performance of materials in previous earthquakes, local construction practices, and common building materials used. Data is also compiled about the availability and use of insurance or other associated factors. An important feature of the database is that it accommodates information about construction features ranging from the basic aspects of non-engineered rural housing through all other ranges of intermediate technical consideration up to the sophisticated engineering practices employed in urban high-rise construction.

As the information is placed on the Internet, users can search the database by various criteria. In addition to basic country profiles, information can be retrieved on the basis of specific types of urban or rural construction practices, seismic hazards, building functions, type of building materials or structural systems employed. The information also relates to ratings of seismic vulnerability and even describes economic levels of inhabitants. It will be possible to compare the strengths and weaknesses of various construction techniques and strengthening technologies that have been tried in different countries. Likewise, comparisons can be displayed with the various types of building materials used, as well as indicating each country's perception about the performance of different types of construction.

The encyclopaedia will also include country-specific information, including background information about seismic hazards, codes and building standards, the size and rate of change in urban and rural housing, relative densities of urban and rural housing, general weather patterns and specific information about housing losses in past earthquakes. Users will be

able to generate graphs, tables and presentations, view photos and drawings, and print either short or long descriptions from any of this information.

Another institution addresses some of the same issues but with an emphasis devoted to infrastructure and their related components. The overall goal of the *Multi-disciplinary Center for Earthquake Engineering Research (MCEER)*, State University of New York at Buffalo, USA, is to enhance the seismic resilience of communities, through improved engineering and management tools for critical infrastructure systems, such as those related to water supply, electrical utilities, hospitals, and transportation systems.

MCEER works toward its goal by conducting integrated research, outreach, and education activities in partnership with the users of the centre's products. MCEER unites a group of leading researchers from numerous disciplines and institutions throughout the USA to integrate knowledge, expertise, and interdisciplinary perspective with state-of-the-art facilities in the field of earthquake engineering and socio-economic studies. The result is a systematic programme of basic and applied research that produces solutions and strategies to reduce the structural and socio-economic impacts of earthquakes.

Codes, policies & procedures

The development and enforcement of standards and codes to protect public safety is an expected responsibility of government. Codes should exist and apply to new construction as well as for retrofitting existing structures. Surprisingly, given the large number of towns and cities within reach of volcanic eruptions, few efforts have been made to develop building codes which increase the resilience of buildings to ash fall, the most widespread of all volcanic hazards.

Development of standards is easy but implementation is difficult because it requires prudent decisions and the accepted confidence in

Different perspectives of hazard-resistant building codes

(only slightly exaggerated)

A seismologist usually criticizes the stipulations of existing building codes that were prepared several years before because there is later evidence, which suggests redefinition of the earthquake hazard.

Engineers want to incorporate their recent research findings and press for stricter building codes. They are less concerned with stronger buildings themselves than with the adoption of their professional endeavours.

An investor or owner of a building does not want to spend the additional 2-5 per cent of the building cost to provide additional hazard risk protection for an extreme event that “probably will not happen, anyway”.

Contractors cannot be bothered with extraneous regulations and troublesome building inspectors, especially if their demands are going to reduce the profit margin of the construction.

The government has not been able to implement even the existing building code because of the lack of suitable implementation mechanisms, including building inspectors.

Decision-makers are afraid that the implementation of building codes may result in cost increases. They do not press implementation of building codes even for public construction. Public administrators are preoccupied with other pressing or important matters.

Politicians do not risk diminishing their popularity, as the enforcement of codes is considered to be an unpopular and restrictive process of control. Besides, there are other important aspects of the construction industry to attend to, like contracts.

The community does not understand the process and is confused, especially after a disaster.

The media recognizes a controversial topic when it sees one, particularly if people have been killed as a result.

None of the primary stakeholders seems to be discussing the problem in any common forum.

So, more vulnerable buildings continue to be built...

What is required to break this cycle ?

Courtesy of the Asian Disaster Preparedness Centre, Bangkok, Thailand.

“In Turkey, it is the national authorities that enact legal frameworks for disaster reduction. In the area of land-use planning and building code enforcement, responsibility lies with the local governments. Many deficiencies exist in both because local governments lack the necessary technical manpower for effective enforcement, and short-term populist tendencies are strong at that level. Unfortunately, the university curricula in these disciplines does not make explicit reference to disaster reducing concepts and measures.”

Turkey response to ISDR questionnaire, 2001

“Yes, we have building codes and related regulations, but ...”

“The Federated States of Micronesia have passed building code laws and regulations but have not fully implemented the codes due to difficulties in meeting the financial requirements called for in the building code laws.”

Micronesia response to ISDR questionnaire, 2001

“One of the most important issues to be addressed in Zimbabwe is the enforcement of laws and regulations that relate to building by-laws and the conservation of natural resources, such as stream bank cultivation, deforestation etc., causing the siltation of rivers and dams.”

Zimbabwe response to ISDR questionnaire, 2001

“One of the most important issues to be addressed in India is the strict implementation of laws including building codes.”

India response to ISDR questionnaire, 2001

“Building codes and other regulations are in existence, however the issue is enforcement. The matter is under discussion at various forums within Bangladesh, and the government is actively considering this issue.”

Bangladesh response to ISDR questionnaire, 2001

“The Cook Islands Building Control Unit has been stepped up to improve compliance with building codes and enforcement procedures by the introduction of experienced personnel drawn from commercial building construction.”

Cook Islands response to ISDR questionnaire, 2001

their applicability and affordability. Land use, planning and construction standards are most often decided upon and enforced at the local level. Promoting a culture of prevention within local authorities and communities must therefore be the central focus of any national disaster risk management strategy. The application of mechanisms and tools for enforcing existing building codes and zoning by-laws must be central to this effort.

For some years, South Africa has enforced legislation pertaining to building codes and construction within vulnerable areas, such as those based on a 50-year flood line. Recently the *Council for Scientific and Industrial Research (CSIR)* published the *Red Book*, which stipulates guidelines for the planning and design of human settlements. The planning and management of informal settlements are receiving increased attention from all levels of government as well as a greater focus in the offerings of tertiary educational qualifications. The establishment of economically, physically, environmentally and socially integrated and sustainable built environments is one of the most

important factors which will contribute to harnessing the full development potential of South Africa and addressing the needs of its growing population.

Experience demonstrates that there is a need to establish a system of planning controls and building by-laws that are:

- ✓ Realistic, given economic, environmental or technological constraints.
- ✓ Relevant to current building practice and technology.
- ✓ Regularly updated in the light of developments in current knowledge.
- ✓ Fully understood and accepted by the professional interests that relate to the legislation.
- ✓ Enforced, to avoid the legislative system being ignored or falling into disrepute.
- ✓ Adhered to, with laws and controls based more on a system of incentives rather than on punishment.
- ✓ Fully integrated in a legal system that operates without conflict between the different levels of administration and government.



Hong Kong
Photo: Munich Re



Government examples, public demonstration of best practices

Governments can set examples by insisting on the adherence to codes and by-laws in all public buildings. Similarly, government authorities can be required to build earthquake-resistant offices in seismic zones and locate other facilities in accordance with the best land use practices to set a public example of investing in risk reduction practices. The importance of such official leadership was emphasized in an international seminar on *Disaster Management and the Protection of Educational Facilities*, organized by the OECD in conjunction with the Greek ministry of education and the *Greek School Building Organization (SBO)*, in November 2001.

Development of appropriate methodologies

There are a number of initiatives and professional coalitions, which have been developed to encourage greater national or technical capacity building to protect critical infrastructure. Because of the strong engineering components involved, much, but not all of the motivation has come from seismic experiences and earthquake engineering fields. The success of the examples elaborated below can serve as guidance for the further development of similar initiatives that relate to different types of hazards. A similar approach towards addressing floods and urban infrastructure is a suggested consideration for the future. One example, already described in chapter two (p. XX) is the RADIUS methodology developed during IDNDR to assess urban seismic risk.

The *World Seismic Safety Initiative (WSSI)* began in 1992 as an informal initiative of members of the *International Institute of Earthquake Engineering (IIEE)*, and later became an IDNDR Demonstration Project active throughout the decade. It has since proceeded to become a model of dedicated professionals working together with minimal organizational structure to stimulate seismic risk reduction programmes in developing countries in Asia, the Pacific and Africa. Throughout its existence, WSSI has had four goals:

- Disseminate state-of-the-art earthquake engineering information globally.

- Incorporate experience and apply research findings in standards and codes.
- Advance engineering research by concentrating on problem-focused needs.
- Motivate governments and financial institutions to establish policies that anticipate and prepare for probable future earthquakes.

During its initial activities in Asia and the Pacific, WSSI emphasized better public awareness and government attention for earthquake safety, and sought to develop information networks that could serve as catalysts for action in earthquake awareness, education and risk management. An element of WSSI's success has been to focus on well-defined and modest regionally-based projects, including *Nepal's National Society of Earthquake Technology (NSET)*, *Uganda's Seismic Safety Association (USSA)*, and the *Global Disaster Information Network (GLO-DISNET)*.

By means of its extended technical membership, WSSI was also instrumental in the establishment of the *Earthquake and Megacities Initiative (EMI)* and worked together with the *International Association of Seismology and Physics of the Earth's Interior (IASPEI)* to prepare a global hazard map. Additionally, WSSI supported regional and national initiatives in the transfer and sharing of technology, extending the application of professional engineering practices related to risk reduction and increasing public knowledge for the improvement of structural response to earthquakes. By focussing on the demands of the 21st century, this programme increasingly seeks to pursue the aim of evaluating the effectiveness of mitigation practices in its area of concentration.

EMI was created as an outcome of the First Earthquakes and Megacities Workshop conducted in Seeheim, Germany in 1997. *EMI's* scientific agenda promotes multidisciplinary research to evaluate the effects of earthquakes on large urban areas and to develop technologies and methods for the mitigation of those effects. Within its programme, *EMI* promotes the establishment of comprehensive city-wide disaster management systems, and the development of tools for disaster assessment and disaster management such as information technology that enable megacities to understand their risk and take actions to reduce their exposure to disasters. The knowledge of hazards and risks is

intended to build institutional strength, to increase accountability and to trigger new initiatives.

In addition to supporting scientific research, EMI focuses its efforts on specific projects expected to have a high impact in accelerating earthquake preparedness, mitigation and recovery. Its projects constitute mechanisms for knowledge building and information sharing among scientists, practitioners and targeted end-users. These activities are aimed primarily at building and sustaining professional and technical capacities in the megacities of developing countries. EMI has focused its capacity building action plan on three main projects. The Cluster Cities Project (CCP) aims to create a network of large metropolises exposed to the threat of earthquakes so that they can share their experiences and coordinate their activities. The overriding objective is to enable them to increase their capacities for disaster preparedness, response and recovery. EMI serves to facilitate exchanges within the network and to coordinate joint activities in the project. The Regional Centers Project is an extension of the CCP. The EMI Training and Education Program involves the sharing of knowledge and information across different professional interest groups to build local and regional capacities.

EMI held three regional workshop in 2001, in connection with its Cluster Cities Project. At the Third Americas Cluster Project Workshop in Ecuador, three areas of cooperation were identified: community-based vulnerability reduction, population needs and health care delivery in disasters, and promoting a culture of prevention. The Oceania Cluster Cities Meeting took place in the form of a China-New Zealand workshop devoted to urban development and disaster mitigation. It resulted in a cooperation agreement between the cities of Tianjin and Wellington. The Euro-Mediterranean Cluster Cities Meeting was part of the 2001 Med-Safe Network meeting held in Naples. An ad-hoc coordination group was put in place in order to develop a framework for further Euro-Mediterranean Cooperation involving EMI cities and partners in the region.

EMI is also participating in the development of an interdisciplinary research programme

on hazard reduction and response in metropolitan regions currently being planned by the University Center for International Studies at the University of Pittsburgh, in the US. This programme will work closely with the Americas Cluster Cities project and is planned to be launched during 2002 at the Americas Cluster Cities Workshop in Mexico City.

The Megacities 2000 Foundation was established in December 1994, in the Hague, the Netherlands, following a request by UNESCO to the *International Academy of Architecture (IAA)*. The foundation collects, processes and disseminates information on the development of big cities. To this aim the foundation uses an Internet site, organizes lectures and produces publications.

GeoHazards International (GHI), a California-based non-profit organization is dedicated to improving earthquake safety in developing countries. Working together with the *UNCRD*, GHI is pioneering a method to assess and reduce earthquake risk in urban areas. The *Global Earthquake Safety Initiative (GESI)* method has been applied in 21 urban areas around the world and plans are under way for it to be extended to 30 cities in India.

Following the major earthquake in Gujarat, India in 2001, GHI is working in cooperation with the Indian NGO, *Sustainable Environment and Ecological Development Society (SEEDS)* and the Gujarat State Disaster Management Authority (GSDMA) to assess earthquake risk and to evaluate the risk management options for three cities. GHI has also signed an agreement with the *Regional Emergency Office of the Ministry of the Interior in Antofagasta, Chile* and the *Center of Scientific Investigation and Higher Education, in Ensenada, Mexico* to strengthen their collaboration in similar activities in those seismic-prone areas.

The *Kathmandu Valley Earthquake Risk Management Project (KVERMP)* aims to project sound earthquake management policies for the Kathmandu valley in Nepal, and to begin the process of implementing them. The experiences gained in this project should be useful for other earthquake threatened cities in developing countries, and should further establish NSET Nepal as a focal point for earthquake mitigation activities in the Kathmandu valley.



Future challenges and priorities

The primary challenge for enhancing risk management practices with respect to critical facilities is to place the value of the infrastructure in a broad context of sustainable development. Only then can the relative priorities be considered to provide an acceptable degree of protection to those assets. It is equally important that the full range of technical, social, and political procedures be brought to bear through measures of design and construction, land use and siting considerations, and the adherence to standards and regulatory measures.

The priority lays in the development and application of measures rather than in only understanding what should be done. The understanding and acceptance of procedures to encourage or enforce behavior that can provide a greater extent of resilience within a community, as well as the application of existing knowledge and techniques, remain a critical challenge.

Some specific challenges and priorities, which require further attention, include:

- How to deal with already existing, vulnerable building stock, which is impossible to improve or refurbish.
- Need to pay particular attention to informal settlements.
- Need for further efforts by training and academic institutions, supported among others by international development agencies, to support and train engineers and other professionals in disaster-prone countries as a means of enhancing disaster reduction efforts and the broader sustainable development process.
- Development of effective national engineering institutions to accompany governmental efforts in maintaining and enforcing appropriate standards
- Incentives to enforce existing building and construction codes and standards, as well as policies.

5.4 Networking and partnerships

*Objective of ISDR:
To stimulate multidisciplinary and inter-sectoral partnerships and expand risk reduction networks by engaging public participation at all stages of the implementation of the ISDR.*

Comprehensive disaster risk reduction covers a wide range of disciplines, sectors and institutions, calling for diverse and expanded forms of partnerships. The achievements from networking and resulting partnerships can be far more powerful than the total of individual or specialist contributions, alone. Thanks to Internet and global communications, the emergence of networks between officials from government, the general public, private commercial sectors and professional bodies is technically easy. However, these loose circles based on common interests, can only be successful if participants share the same willingness, motivation, commitment and desire to openly share information and experiences.

Networks and partnerships, ranging from communication exchange networking to full fledged and funded implementation partnerships, have great potential. This section is limited to describing some concrete examples of existing ones.

- Building links to reduce risk - extended partnerships and networking
- Cross-sectoral coordination and collaboration
- Technical and research networks
- Multidisciplinary, networked relationships
- Technical support for community partnerships
- Commercial sector and partnership interests

Partnerships are formed through cooperation. Cooperation results from the coordination of resources and abilities brought together through mutual respect, understanding and trust. Trust is a product of good working relationships between people and organizations. Good relationships and effective endeavours grow from time spent together in addressing common interests that yield mutual benefits.

Building links to reduce risk - extended partnerships and networking

The wide range of actors and diverse community, which deals with different aspects of disaster risk management, is obvious throughout this report. One important challenge which remains is to stimulate and develop ways on how to link the various schools of thought, knowledge bases, key actors and stakeholders relevant to disaster risk reduction.

Multi-disciplinary research, multi-sector policy and planning, multi-stakeholder participation and networking relevant organizations are fundamental, to address the many dimensions in which risk reduction efforts are actualized. Benefits that accrue from such connections include improved efficiency and cost-effectiveness, a unified strategic framework for decision making on issues of common concern,

lessening duplication of efforts, as well as mandating an appropriate division of responsibilities. Additionally, cutting edge knowledge from academic and research institutions can be cross-linked to the practical initiatives undertaken by relevant organizations. Fostering the association of community groups with larger scale organizations will work towards ensuring that a higher resolution of needs, capacities, cultural perceptions and traditional knowledge become more integrated in national, regional and international initiatives.

The spectrum of collaboration, processes and activities goes from various ways of sharing information to joint research and integrated databases through to participatory strategic planning and programming. The latter is the more difficult to achieve, but it is also the more effective. Some examples of the ways in which this process is realized are:



- ✓ communication networks/forums for dialogue;
- ✓ institutional partnerships via memorandums of agreements between agencies and organizations;
- ✓ formalized joint mandates, legislation, policies and plans within public authorities;
- ✓ multi-sector issue advisory groups;
- ✓ multi-disciplinary research projects;
- ✓ integrated databases;
- ✓ search conferences; and
- ✓ other participatory planning processes.

Technical and research networks

Disaster reduction and management require comprehensive knowledge about hazardous events, the likelihood of the occurrence and the possible impacts they can have on societies, as well as the social, economic and environmental implications related to vulnerability. Germany has substantial scientific and technical capabilities in these areas. Two complementary research networks have developed with the aim of using this experience to advance multi-disciplinary approaches to disaster research.

In 1999, the German Committee for Natural Disaster Reduction urged the creation of a *Centre for Natural Risks and Development (ZENEb)* (Zentrum für Naturrisiken und Entwicklung) to focus attention on sociological research about disasters in developing countries. Organized as a network based in the *Universities of Bonn and Bayreuth*, ZENEb involves people in Germany and from other countries who share an interest in the relationships between national development issues and natural hazard risks in developing countries. Within this professional network, general approaches to risk research in the context of sustainable development are examined in depth, and individual investigations and case studies are conducted in developing countries. An interesting feature is the development of indicators to describe the relative risks of different countries, where ZENEb has been collaborating with UNDP. Another undertaking is the set up a database of those indicators that may be used to frame socio-

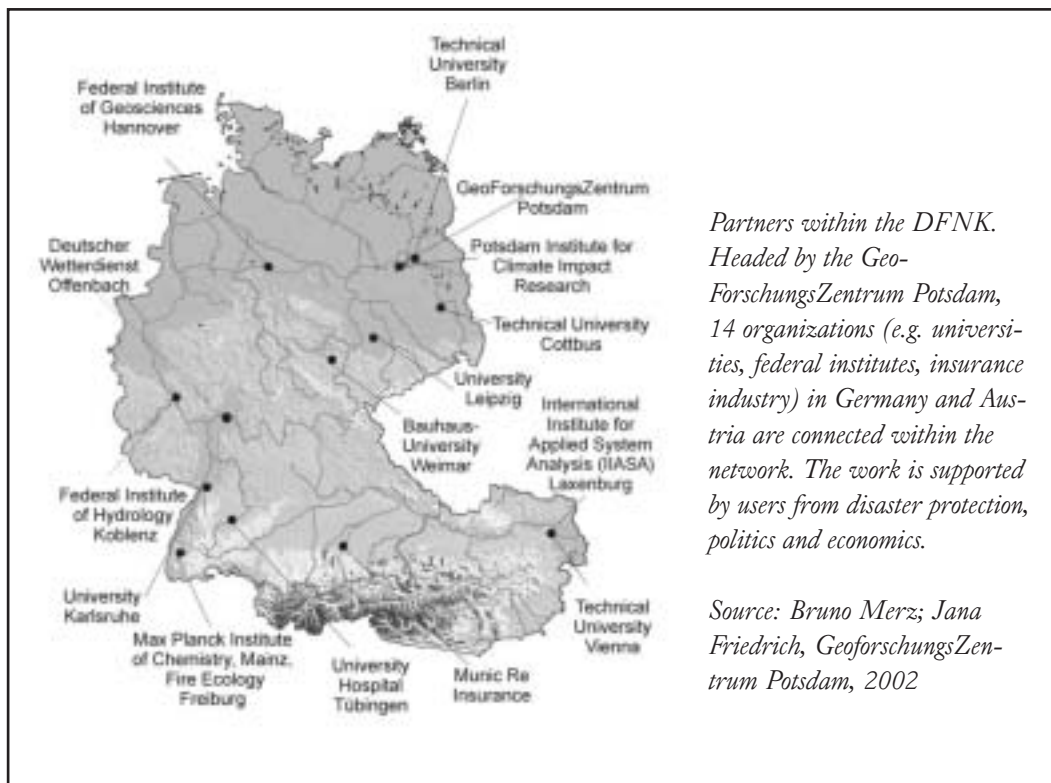
economic early warning systems (see www.zeneb.de).

Focusing more on natural hazard knowledge in the disaster equation, the German research institutions have formed the *German Research Network for Natural Disasters (DFNK)* (*Deutsches Forschungsnetz Naturkatastrophen*).

The goal of the network is to provide the scientific fundamentals of advanced risk management associated with natural hazards and to make that knowledge more widely available for users. Realistic scenarios are developed to estimate current levels of risk and the dynamic features of future risk due to global change in such areas as climate variability, increasing density of population and changing land use values in endangered areas. This information can be used for early warning purposes, in support of decision-support systems in disaster management, and for developing greater understanding of the issues among both political authorities and the public.

The 14 partner institutions shown in the figure below and the projects of the network are grouped into five clusters: storm risk assessment, flood risk assessment, earthquake risk assessment, forest fire simulation system, and databases and information systems. The joint user-oriented research requires close collaboration among the different clusters, which is aided by the information cluster. This provides data, synthesizes information and applies tools for higher-level information systems such as clearing house functions, data warehousing and near-real time transmission.

The city of Cologne was chosen as the initial area of interest for the combined assessment of floods, earthquakes and storms. The respective clusters apply extensive data sets, analytical techniques and simulation models to risk estimation processes so that current risks can be depicted, future risks detected, and safety recommendations made. A second regional emphasis has been placed on the Brandenburg region with Berlin as an adjacent focal point. There, the forest fire simulation cluster is monitoring the hazard, using simulations, and developing an early warning system.



Partners within the DFNK. Headed by the GeoForschungsZentrum Potsdam, 14 organizations (e.g. universities, federal institutes, insurance industry) in Germany and Austria are connected within the network. The work is supported by users from disaster protection, politics and economics.

Source: Bruno Merz; Jana Friedrich, GeoforschungsZentrum Potsdam, 2002

Rural networking support

Case: Mozambique – WFP - FAO – NGOs - Universities

A different form of partnership is required to address the vulnerabilities of rural environments where most Mozambicans live in a precarious balance between subsistence and desperation. Very small fluctuations in climatic conditions, localized flooding, or the outbreak of disease in neighbouring villages can plunge a normally stable family economy into severe difficulty. To identify these most vulnerable populations, a partnership has been formed in a *Vulnerability Analysis Group (VAG)*. Chaired by the government's *Department of Early Warning and Food Security (DAPSA)*, the programme includes the participation of WFP and the *Division of Nutrition in the Ministry of Health* working together with local communities to conduct research into chronic vulnerability. The joint initiative has provided analysis of nutritional indicators for the evaluation of chronic vulnerability and has compiled detailed profiles of food security conditions in virtually all districts of the country.

A number of other partners have contributed to related initiatives in this multi-disciplinary effort. FAO has provided funding to monitor food stocks in the country. In a complementary initiative, an *Agricultural Markets Information System*,

managed by Michigan State University in the USA, has been supported by USAID for nearly a decade, to research food security conditions, particularly in relation to rural markets and smallholder cash crops. This programme is currently developing provincial price information systems that can promote the improved commercialisation of farm products.

FEWSNET, an NGO also funded by USAID, works closely with VAG and has conducted several studies of local food economies, including those areas most affected by flooding in recent years. The project operates in conjunction with the *University of Eduardo Mondlane* in Maputo to produce a *Disaster Atlas for Mozambique* that will make disaster information and maps available online. An earlier initiative, *AEDES*, was originally an emergency information system created by *Medecins sans Frontieres (MSF)* during the drought in 1992, but it gradually evolved into a national vulnerability information system.

Case: Central America – USAID – EU - NGOs

The Central American Mitigation Initiative (CAMI) is an umbrella programme launched in 2001 by OFDA/USAID, with US\$ 12 million being channeled through NGOs for disaster reduction activities over a three year period. IFRC and Red Cross Societies, the Corporate

Housing Foundation, CARE, Catholic Relief Services, and other agencies operating in the region will concentrate on local levels of involvement, principally in municipalities, to create mechanisms that can motivate and involve further commitment from national level institutions. Risk reduction is the primary focus, and while preparedness and disaster response problems also are expected to be addressed, they will be integrated into the overall perspectives of reducing risks.

One of the more innovative CAMI projects is conducted by CARE International with partners in Guatemala, El Salvador, Nicaragua and Honduras. With an overall budget of more than US\$ 3.5 million and support coming from OFDA, the Canadian International Development Agency (CIDA) and CARE-USA, the project will provide training and technical support to develop a range of risk reduction activities in core municipalities in different high-risk zones of the four countries. The project strives to accomplish a trickle down effect among neighbouring communities by using people trained in the core municipalities. Benefiting from its association with LA RED which provided technical and advisory support for the project, CARE expects to fashion its other development projects in the region with more attention given to risk reduction.

During a recent drought in El Salvador, small grants were provided for severely affected population groups to develop pilot *Integral Sustainable Production Units*. These ISP units promote crop diversification, foster improvements in commercial practices, and create opportunities for improved food storage by utilizing crop techniques that are environmentally friendly. Based on the initial experience with this project, CARE-France presented a proposal to the EU to finance similar schemes in two other departments of the country, to improve the food security of 1,000 extremely poor families. Both projects are based on the participation of the population working through collective schemes using common lands to minimize their risks. This approach represents an alternative to the reliance on emergency food relief.

■ Networking support for community partnerships

In the beginning of IDNDR a group of social scientists, NGOs and people interested in the social dimensions of risk reduction in Latin

America got together in 1992 to constitute *La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED – The Latin American Network for the Social Study of Disaster Prevention)*. It was initially conceived as a mechanism to facilitate comparative research of natural disasters from a social perspective. It has developed into the focal point for hundreds of individuals and institutions working in the field of disaster and risk management in the different countries of Latin America and the Caribbean.

Inspired by LA RED, a similar network in South Asia has been organized by people committed to promoting alternative perspectives on disaster and vulnerability as a basis for disaster mitigation in the region. *Duryog Nivaran* (“disaster mitigation” in Sanskrit) aims to reduce the vulnerability of communities to disasters and conflicts by integrating alternative perspectives in the conceptual, policy and implementation levels of disaster mitigation and development programmes.

In 1997, *Periperi*, a network of “partners enhancing resilience for people exposed to risks”, was established by the Disaster Mitigation for Sustainable Livelihoods Programme (DiMP), University of Cape Town, with the support of OFDA/USAID and DFID. Originally composed of 16 different organisations from five Southern African countries, *Periperi* provides opportunities for a diverse range of organizations to work together across disciplines and national borders, to integrate risk reduction principles and technologies into ongoing sustainable development policy.

Case: Guatemala – Germany

The Peten department of Guatemala contains one of the largest tropical forest reserves in Latin America. The occurrence of uncontrolled forest fires during the annual dry season endanger the livelihood of the local population and has led to large-scale impoverishment and destruction of forest ecosystems and biodiversity in northern Guatemala. The government of Guatemala has embarked on a major programme to promote fire prevention and more effective means to combat them when they do occur. The programme is supervised by the influential authority of the Executive Secretary of the Presidency and involves the participation of several other governmental institutions using their own resources.

The *PRECLIF Project for the Local Prevention and Control of Forest Fires* is a complementary project to the government-sponsored programme, which promotes improved prevention and control of forest fires at the local level, employing local techniques in risk management. Project activities train members of the local communities to implement measures that can reduce the risk of fires, working closely in conjunction with the official municipal committees in charge of forest fires. The project has also supported other activities to strengthen community organizations such as the establishment of a radio network that links six rural communities to the *National Coordinating Agency for Disaster Reduction in Guatemala, (CONRED)*. A community network for Central America for risk management (Red Comunitaria para la Gestion de Riesgo) was involved in the implementation at community level.

This spirit of cooperation and expanded professional activities that have characterized the *PRECLIF Project* have also encouraged new and useful relationships between the *Global Fire Monitoring Centre* at the Max Planck Institute of Chemistry in Freiburg, Germany and the Guatemalan institutions involved with forest fire prevention and control. Professional visits have been exchanged, and a successful workshop was held in Peten to share experiences on the topics of forest fire prevention, management, and control.

There are three active volcanoes in Guatemala, and several communities have established themselves on the slopes of two of them. *Project PREVOL* is an effort to strengthen the disaster reduction activities conducted by the *Risk Management Department of CONRED*, and the national *Centre for Disaster Research and Mitigation (CIMDEN)* that works to reduce the risks from volcanic hazards. Both CONRED and CIMDEN have been implementing activities to promote preparedness for possible eruptions of Pacaya and Fuego volcanoes. With the support of the Humanitarian Office of the Ministry of Foreign Affairs of Germany, PREVOL has sought to expand those activities to improve the conditions of both disaster preparedness and risk reduction.

Resources furthered the assessment of local vulnerabilities and the use of locally generated information to manage risks at the community level. They are being used to increase the resilience of existing structures such as hanging bridges and to

protect community water systems. Locally generated data will be digitised and used to generate hazard and risk maps that can be displayed in the rural communities and thereby contribute to the formulation of emergency plans for local communities.

In addition to providing basic early warning equipment and training local emergency committees in 19 communities, PREVOL has been able to assist CIMDEN by improving its methods and abilities to conduct volcanic surveillance. This has included the supply of additional scientific instrumentation to complement efforts already underway by the *National Seismic, Volcanic, Meteorological and Hydrological Institute of Guatemala* and academic interests to monitor volcanic activity at Pacaya volcano.

The partnership has emphasized the crucial role of linking activities in disaster-prone areas with the interests of the national disaster reduction agency to encourage risk reduction. In this respect, all of the operations in PREVOL have been conducted by personnel from the Risk Management Department of CONRED, ranging from the installation of equipment, local community organization and training, and the design of risk reduction measures. Similarly, with respect to the sustainability of the project, a priority has been placed on developing and supporting the capabilities of national institutions, in particular those of the CONRED Risk Management Department.

Cross-sectoral coordination and collaboration

A positive example of an implementation partnership is *Project Impact*, promoted by the American *Federal Emergency Management Agency (FEMA)* in the later years of the 1990s. Project Impact was designed to change the way the U.S. deals with risks before disasters occur. Each community that participated in the programme was required to undertake a preliminary assessment of its natural hazard risks and to prepare a tentative strategy for reducing its long term vulnerability, drawing heavily on both multi-disciplinary and intersectoral partnership capabilities of the community itself. FEMA then offered technical expertise and some financial support as well as involving other federal agencies or neighbouring states in the process.

The objective of the programme was to put the latest technology and mitigation practices into the hands of local communities and to guide these local initiatives

through a complete risk assessment process. This allowed each community to identify and prioritise those risk reduction initiatives that would have the greatest benefits to the community. Within a few years, more than 250 communities, located in every state of the country, had benefited from Project Impact, involving more than 2,500 businesses in the process.

In 2001, FEMA's Mitigation Bureau was merged with the national flood insurance programme to become a very different department, known as the Federal Insurance and Mitigation Administration. Funding for Project Impact has been withdrawn or otherwise reallocated, and in the later part of 2001 the US radically redefined its perceptions of public risk.

There are other professional partnerships which remain to reinforce disaster risk reduction activities as every state in the USA has an office of emergency services. Both the *Network of State Hazard Mitigation Officers (NEMO)* and a *National Emergency Management Association (NEMA)*, which serves as a professional association of state emergency management directors, link wide ranging professional interests and disseminate information across the country.

Partnerships between central and local authorities, and public and private sectors are the most effective means to reduce the impact of hazards.
FEMA (US) Basic Principles, 1996.

In Gujarat, India, following the earthquake of 2001, other forms of effective partnership emerged through the collaboration of NGOs, government authorities, representatives of industry and the affected communities. One of several examples is the *Gujarat Rehabilitation Project*, a partnership forged between CARE-India, the Federation of Indian Chambers of Commerce and Industry (FICCI) and the government of Gujarat (GOG).

In part, because the local operational environment was politically charged, the resulting reconstruction process did not conform to previous or traditional approaches for organizing large-scale public works. There was also a need to foster the most productive forms of synergy between national and international interests, as well as promoting joint economic-governmental-community approaches for efficient implementation. There was a conscious effort to insure that the working partnerships would ensure participation by members of the community and that

processes would ensure that their priorities were represented in a rapidly evolving environment.

As a result, emphasis was given to address the acute shelter needs and to rehabilitate basic services including those related to health and essential needs for livelihood activities. The partnership demonstrated an opportunity to bring a combination of very highly skilled and valuable professional and technical resources to the project that would have been highly improbable were the activity approached solely from the standpoint of a governmental or NGO activity alone.

This initiative emphasized the values of community participation, developing additional livelihood opportunities, and incorporating improved risk reduction measures to minimize the effects of future hazards. The primary motivation of forming such a partnership was the shared interests of the collaborators to motivate a high level of community participation immediately following the disaster and to be responsive to the requirements of sustaining livelihoods in a manner that would establish a safe community environment.

The fact that all plans for housing and community facilities were designed to meet construction standards for both earthquake and cyclone resistance, and that they were approved by both the communities and the appropriate government technical departments, illustrate practical measures that contribute to the future reduction of risks for people who live in a naturally hazardous region. Additionally, by working during a transitional period between response and rehabilitation, the stakeholders could develop better opportunities for community mobilization, vocational training, the establishment of temporary community infrastructure, and to restart essential community activities like schools and markets.

Commercial sector and partnership interests

It is not possible to ignore the increasing economic demands for all businesses to become more efficient, with production schedules tied to smaller inventories and just-in-time deliveries. Elements of globalisation and far-reaching international trading practices expose businesses to potential disruption or loss through natural disasters.

It is because these factors, compounded by several extraordinarily costly and disruptive natural disasters during the later years of the 1990 that there has been a growing commercial awareness of a correlation between disaster preparedness, risk reduction and the survival of businesses. More than 60 per cent of the businesses affected by the Northridge earthquake in California in 1996 were out of business six months after the quake. Six years after the Great Hanshin earthquake in Kobe, Japan, the heavily damaged Port of Kobe has not been able to regain its previous competitive standing as the third busiest Japanese port.

Motivated by a desire to protect their own assets or their competitive standing in markets, commercial enterprises have invested heavily in business continuity services designed to assess and then mitigate physical or operational risks to their businesses. Local businesses, trade groups, corporate interests, labour organizations, NGOs and community leaders are all trying to find effective means to share their respective abilities and resources in the assessment, planning and reduction of the risks they share in their community. In recent years there have been important initiatives of corporate groups and other business-community relationships promoting disaster reduction activities in the common interest. Examples include the *Business and Industry Council for Emergency Planning and Preparedness (BICEPP)*, *Disaster Recovery Business Alliance (DRBA)*, *Public Private Partnership – 2000 (PPP 2000)*, and the *Institute for Business and Home Safety (IBHS)*.

A recent study conducted by the Benfield Grieg Hazard Research Centre of the University College London for DFID concludes that while in quite specific circumstances the potential for public-private partnerships may offer promise, in almost all cases they are neither easy to establish, nor to sustain without a common understanding and commitment to the values of risk reduction being shared by all parties involved. This can be very difficult to achieve considering the different organizational values and motivations, not to mention expectations, generally observed in commercial, government, and public interest organizations.

The proposed *National Disaster Management Policy of Mozambique* recognizes that the potential impact of disasters on commerce, industry and agribusiness can threaten the national economy of the country to an ever-greater degree. It is also aware that as the resources available to state structures relative to the business community diminish and as business enterprises assume responsibility for providing more essential services to the society, the private commercial sector needs to become a more crucial partner in all aspects of disaster risk management. Accordingly, strategies able to dedicate resources more effectively for preventing risks become essential, given the rapid expansion of the national economy.

With this in mind, the *National Office for Disaster Management- Instituto Nacional de Gestao de Calamidades (INGC)* has made collaboration with the private sector a priority, but certain areas of related risk will require much more attention in the future. Most significantly, the threat of serious industrial accidents or environmental disasters has increased with the development of large-scale industrial projects such as refineries or constructions of pipelines. The potential human and economic consequences of a severe cyclone damaging principal urban centres also needs to be fully considered in collaboration with the private sector's own economic interests. Such calculations should factor heavily in national economic policies for assured growth, but also to ensure measures that can protect related and essential public infrastructure.

With the growing economic impact of disasters, the private sector could be encouraged to become active both in their own risk management practices, as well as in the related contingency planning and disaster risk reduction measures of society. A strong case can be made that by lending their important political and economic influence to advocate for national strategies that can protect critical infrastructure and property assets on which their own businesses depend from avoidable losses, they would also be advancing their own strategic commercial interests.



Future challenges and priorities

The major challenges are to stimulate networks and partnerships at local, national, regional and international levels, with thematic or shared interests to work towards the objectives of disaster risk reduction. A need for coherence and unified criteria to support this in a common process is a challenge to address within the ISDR. Related priorities include:

- Enhance the critical relationship by linking actors for risk reduction with those of ecological management, social development and economic growth in order to ensure sustainable development at international, national and local levels.
- Provide incentives for the strengthening and/or building of national, sub-regional, regional and international coordination mechanisms and networks for information exchange, and the promotion of collaborative arrangements that can increase multi-disciplinary disaster reduction capacities.
- At national level, encourage the establishment of national committees or platforms for disaster reduction, with active community involvement and the participation of all relevant sectors, should be encouraged to facilitate common approaches, collection of information, undertaking of risk assessments and support to develop coherent strategies and action plans.
- In academic circles, stimulate cross-disciplinary efforts, networks and partnerships for integrated and applied research in all relevant areas of risk management, including gender-sensitive studies, cultural and social behaviour and resilience to disasters, early warning systems, hazard and vulnerability analysis, among other areas. One challenge in this regard is to pursue a common and widespread understanding of disaster risk and risk reduction practices.

challenges



5.5.- Financial and economic tools

In view of the exorbitant economic and social costs of recurring disasters, development assistance and financial tools and instruments for risk-sharing and risk-transfer are important for the application of measures for disaster risk reduction. The increasing involvement of international development banks and agencies in this area supports the strengthening of national and corporate commitment to engage in risk and vulnerability reduction. Insurance and reinsurance are essential instruments for recovering losses and supporting post-disaster recovery. Insurance schemes need to be complemented by other low-cost risk sharing mechanisms in poorer communities, such as kinship networks, microfinance and public works programmes to increase coping capacities. Additional tools and financial incentives are necessary to promote proactive disaster risk reduction investment. It is also important that all development projects include a critical consideration of disaster risks and vulnerability, and the policies and programs meant for reducing disasters risks are included in poverty reduction programs.

The first part of this section shows how some of the international development banks have already adopted policies and instruments to include risk reduction in their normal lending operations. In the subsequent part, a brief overview of specific financial instruments, such as insurance, microfinance and public works programmes, has been provided.

Development banks promoting investment in disaster risk reduction

The World Bank and regional development banks have emerged as one of the main sources of funding for recovery and reconstruction following a major disaster. A large number of governments in the developing world find themselves fiscally constrained to reallocate their resources for emergent needs following a large-scale disaster and turn to these financial institutions for immediate assistance. All these banks have therefore developed a sizeable portfolio of post-disaster recovery and reconstruction programs over a number of years. The World Bank has provided US\$14 billion in the last two decades for post-disaster recovery and reconstruction. These institutions through their large-scale lending are also in a stronger situation to support sustainable disaster risk reduction strategies. In the last few years, these financial institutions have come to recognize the strategic importance of these projects for implementing disaster preparedness, mitigation and emergency response programs.

Latin America and the Caribbean

While work related to the economic and financial aspects of disaster reduction is proceeding

at different paces reflecting different levels of interest throughout the world, Latin American and Caribbean countries have taken the lead.

Disaster vulnerability and economic development have been encouraged by influential regional institutions such as the *UN Economic Commission for Latin America and the Caribbean (ECLAC)*, the *Central American Bank for Economic Integration (CABEI)*, the *Caribbean Development Bank (CDB)*, the *Andean Development Corporation (CAF)* and the *Inter-American Development Bank (IADB)* as well as by the World Bank's *Disaster Management Facility (DMF)*. These organizations have recognised the value of disaster reduction measures in reducing and alleviating serious economic disruptions and thus in determining a country's path towards economic growth.

IADB is a very active lending institution in the field of disaster reduction with well-defined policies and activities, while other regional and international banks are still less focused in this area. IADB strategies to incorporate disaster reduction in development are outlined in *Facing the Challenge of Natural Disasters in Latin America and the Caribbean: An IADB Action Plan* (March 2000).



The following table summarises the plan of action and activities that IADB is implementing to fulfil its plan.

Instrument/activity	Example/description
Plan of action	<p><i>National systems for disaster prevention and response:</i> Building national legal and regulatory frameworks and programmes that bring together planning agencies, local governments and civil society organizations. Developing national strategies for risk reduction, and assessing intersectoral priorities, backed by separate budgets.</p> <p><i>Building prevention into the culture:</i> Developing and disseminating risk information and empowering citizens and other stakeholders to take risk reduction measures.</p> <p><i>Reducing the vulnerability of the poor:</i> Supporting poor households and communities in reducing their vulnerability to natural hazards and recovering from disasters through reconstruction assistance.</p> <p><i>Involving the private sector:</i> Creating conditions for the development of insurance markets. Encouraging the use of other risk-spreading financial instruments, and designing economic and regulatory incentives for risk reduction behaviour.</p> <p><i>Risk information for decision-making:</i> Evaluating existing risk assessment methodologies. Developing indicators of vulnerability and stimulating wide dissemination of risk information.</p> <p><i>Fostering leadership and cooperation in the region:</i> Stimulating coordinated actions to mobilise regional resources for investments in risk mitigation.</p>
Sector facility for disaster prevention (March 2001)	Strengthen disaster prevention and risk management systems through vulnerability reduction and improved preparedness to natural disasters. Help countries meet risk reduction objectives for development through consensus building on intersectoral priorities, strengthened institutions and launch of larger scale national programmes. The Dominican Republic and Bolivia are the first countries to benefit from the first operations.
Regular loans	Finance prevention and mitigation measures, such as through watershed management programmes, urban development projects and social development programmes, especially in hurricane or El Niño-prone countries.
Technical cooperation projects	Improvement of decision making in risk management (pilot countries are Barbados, Chile, Guatemala and Mexico). Development of vulnerability assessment methodology and measure performance of management tools for vulnerability reduction. Study of socio-economic impacts of El Niño. Sharing experience on climate change and severe weather events in Asia and the Caribbean.
Studies/papers	Study of financial market aspects of natural catastrophes, viability of new insurance, capital market and risk management techniques in the global and regional financial markets that may help mitigate the negative economic effects of natural disasters. A document exploring the variety of financial instruments and techniques that could be incorporated into the overall IADB strategy for managing risks associated with natural disasters is awaiting publication.
Disaster focal points and training	Identified at headquarters and in offices of borrowing countries. Disaster risk management training provided to staff, special briefings for executive directors on instruments for disaster risk mitigation.
Regional policy dialogue	Established a natural disaster network. First phase of a study on national systems and institutional mechanisms for the comprehensive management of disaster risk completed. Second phase will concentrate on Bolivia, Colombia, the Dominican Republic and El Salvador.
Cooperation with other agencies	<i>Organization of American States (OAS)</i> Working Group on Financing Within the Inter-American Committee on Natural Disaster Reduction. Continuous work with ECLAC, ADC, CEPREDENAC, the <i>Caribbean Disaster Emergency Response Agency (CDERA)</i> , ISDR, UNDP, the WMO and other UN agencies.
Puebla-Panama Plan	Develop efficient insurance markets and improve public and private-sector access to insurance and other financial risk transfer instruments.

Combined investment in economic development, environmental management and related risk factors has also been seen in the inauguration in 2001 of the *Regional Corridor Development "Plan Puebla-Panama"* (Puebla in northern Mexico) and its inclusion by the Mexican President, Vicente Fox, in his National Development Plan, supported by IADB.

This initiative seeks to accelerate integration and development in a region that covers nearly 375,000 square miles and counts 64 million inhabitants in Mexico and all seven countries in Central America. The principal objective of this plan is to overcome the region's vulnerability to natural disasters and address a long-standing infrastructure deficit that has prevented the countries from profiting more from their proximity to large foreign markets.

The Plan Puebla-Panama will include a project in the area of natural disaster reduction that will upgrade the quality of meteorological and hydrological information available in the region. The plan will also promote the development of a catastrophe insurance market to provide coverage for public infrastructure such as highways, bridges, schools and hospitals. This insurance is expected to reduce the need to raise funds for reconstruction and the premiums could act as an incentive for builders to construct public works that are more resistant to natural disasters.

CDB has adopted strategic and operational guidelines for assessing natural disaster management programmes. These initiatives seek to assist member countries in developing disaster management capabilities while they make sure that disaster management principles are integrated into CDB operations. With the support of OFDA/USAID, CDB is in the process of establishing a disaster management facility.

ECLAC is working with several other UN agencies on improving a socio-economic damage assessment methodology to promote investment in risk reduction especially focused on rehabilitation activities following major disasters in Latin America and the Caribbean.

Asia

The World Bank and Asian Development Bank (ADB) have supported a large number of projects for disaster recovery and reconstruction in Asia. These projects relate to emergency financial assistance, earthquake reconstruction, flood recovery and restoration, and cyclone reconstruction. There are a large number of post-disaster recovery and reconstruction programs in Iran, India, China, Bangladesh, Cambodia, and other countries in the region. Most recently, the World Bank supported a large earthquake reconstruction program in Gujarat, India.

The ADB has also supported a number of Technical Assistance projects for capacity-building in many countries. In India, ADB has initiated a programme, which goes beyond its traditional role of extending reconstruction loans after disasters to support long-term risk management. The ADB currently is supporting a technical assistance programme implemented by the ADPC in two Indian states, Uttar Pradesh and Uttaranchal. The project was formulated after the 1999 Chamoli earthquake and is focused on advising the two state governments in their review and efforts to strengthen existing institutional arrangements for disaster management.

Activities include the creation of state, district and village disaster management and mitigation plans, the development of community awareness videos and publications, and the establishment of a state-wide disaster management information system. The project is a pioneering initiative undertaken by the ADB to promote disaster reduction measures more proactively in the anticipation of future crises. It also represents an exemplary outlook in which disaster reconstruction programmes go beyond interventions to satisfy only immediate needs and aim at longer-term vulnerability reduction.

The World Bank and disaster reduction

The World Bank and borrowers today are developing a greater awareness of the need to mitigate or reduce the adverse effects of natural disasters before they strike (see more chapter six). A review of the Bank's disaster-related projects since 1980 recognised that in most of the projects, the full loan amount is not dedicated to mitigation and prevention measures, but rather includes one or more components dedicated to these objectives. Four countries alone – Bangladesh, Brazil, China and India – accounted for 40 per cent of the mitigation portfolio. Moreover, it is a concern that half of the top client countries for reconstruction projects do not appear among the main borrowers for these mitigation projects. There is scope for greater bank mitigation assistance to these countries that may help reduce demand for reconstruction. There is a trend of increased bank approval of mitigation projects over time, with 55 approved in the 1990s against only 40 in the 1980s.

The bank is reviewing its operational policies to respond, among other things, to the conclusions of its review of disaster-related projects since 1980 and to incorporate more considerations on disaster and vulnerability reduction activities in its lending operations.

The World Bank is supporting projects in Honduras and Nicaragua with more than US\$ 14 million committed to each country to improve municipal capabilities in risk management. Activities will focus on improving land-use and planning procedures based on hazard analysis and strengthening national risk and disaster management systems. The scheme works through umbrella municipal organizations, national disaster organizations and scientific and technical institutions such as the *Nicaraguan Institute of Territorial Studies (INETER)*. The World Bank is developing another programme with the *Organization of Eastern Caribbean States (OECS)* that will offer risk reduction loans to five countries to support capacity building, institutional strengthening, community preparedness and greater protection for key infrastructure.

Financial instruments addressing disaster risk reduction

Risk-sharing and risk transfer at national (macro), community (meso), and household (micro) levels cut down losses, improve resilience, and contribute to expeditious recovery. The efficiency of risk-sharing and risk transfer, however, depends upon the size of the risk pool and availability of financial instruments and services. In developed countries, governments, corporate entities and individuals engage in risk-sharing, which increases the size of risk pool, thus improving insurability of properties and assets, whereas in developing countries, the size of the risk pool is smaller, resulting into inadequate insurance coverage and pay off. A related requirement is the commercial application of specific instruments and services for risk-sharing at different levels.

Insurance, microfinance and public works programmes are examples of financial instruments and programs that can potentially be used for

Insurance in the Caribbean

United Insurance Company Limited, provides insurance services to several islands in the region, and offers 25 per cent discount on premiums for clients who have hazard resistant structures. They have also published two handbooks entitled *Professional Guide to Performance-Based Design Upgrade for the purpose of Achieving Hurricane-Resistant Construction* and *Guide to Making Your Home Hurricane Resistant* and have promoted their use to design professionals and householders.

Working Party on Insurance and Reinsurance: Whilst not an institution, this working party was developed as a CARICOM initiative. It seeks to minimise the overall economic costs and social effects of natural hazards in the CARICOM countries based on an increased emphasis on vulnerability reduction and a strengthened insurance industry – including increased self-insurance.

mitigation, recovery and reconstruction at different levels. Insurance can be used at the national, community and household levels, while microfinance services are provided at the community and household levels. Public works programs have their own specific context, and it could be undertaken to provide relief to households and communities struck by situations in which there are no income-earning opportunities. There could be a great deal of variation in their forms and applications. It is also likely that in a given situation a combination of these instruments may be required.

At the national level, improvement in the regulatory frameworks of disaster reduction including disaster-related insurance, building codes and land use planning will help ensure that infrastructure is properly sited and built to minimise damages as well as to reduce the costs of repair. This involves public insurance policy, market and regulatory incentives for risk and vulnerability reduction, protection against fluctuations in insurance/reinsurance prices, augmentation of insurance coverage at reasonable cost and backstop financial mechanisms.

One of the limitations of hazard mitigation insurance is that it is primarily a mechanism that will help after the disaster occurs. While some group-based insurance policies are linked to improvement in physical surroundings, there are not many examples of built-in incentives in insurance policies, which motivate households to invest in mitigation. On the contrary, availability of insurance may discourage investment in mitigation, as households may tolerate riskier practices after purchasing insurance policies.

Well-designed insurance schemes may encourage appropriate risk management by lowering premiums if compliance with building codes and land use regulations are observed. One example where the insurance coverage has been used as an incentive to undertake disaster mitigation or protection measures is the case of Florida in the USA after hurricane Andrew in 1992. In this case, the insurance industry promoted lower deductibles to wind storm insurance if building code compliance was achieved. The problem with this kind of incentives, however, is the certification process. Another limitation of insurance coverage is that the market for insurance is largely underdeveloped in poor countries.

Risk sharing and transfer: protecting investments and sharing the costs

The private insurance sector contributes important funding for reconstruction after disaster impact in developing countries, but it has made fewer inroads in developing country markets. In emerging economies, the state and the individual carry much of the cost of disasters. As a result, ad hoc funds transfers to respond to disaster emergencies disrupt planned development activities. Tools have to be developed to assist the very poor to more effectively manage disaster risk. This includes microfinance mechanisms that can deal with risks such as disasters and that build social capital and encourage risk mitigation for the very poor. In addition to that, measures may include safety nets and calamity funds, and informal mechanisms.

Source: DMF, 2001

Insurance policies should not be seen as a panacea to achieve disaster reduction. If losses from recurring disasters are too high, the availability of insurance coverage will be reduced and reinsurance costs will increase, which has happened in many parts of the world, for example in the Caribbean. Property insurance for reducing economic risk from catastrophes might no longer be available at reasonable prices in the future. In this regard, potential socio-economic impacts related to global environmental and climate changes need to be carefully assessed to anticipate and adapt to their consequences. The present retrospective claim calculation will no longer be commensurate to such changes. Therefore, a prospective underwriting approach is needed by the insurance industry.

Other financial mechanisms to promote disaster risk reduction and safety nets

An effort to explore additional and relevant private sector engagements and alternative financial instruments, both to serve as incentives for disaster reduction and as safety nets for recovery, is an ongoing interest. For example, guarantee programmes enable governments to mobilise larger amounts of financing with a given amount of support from the private sector. This mechanism has not been used for disaster reduction projects yet. However, it offers the potential to catalyse private financing either for public borrowers or private projects in developing countries. Private debt funds could play an important role in financing disaster recovery and prevention projects.

Corporate social responsibility

The research project, Corporate Social Responsibility and Disaster Reduction, conducted by the *Benfield Greig Hazard Research Centre (BGHRC)*, is looking at private-sector involvement in natural disaster reduction through social responsibility and philanthropic programmes, especially in developing countries.

Available at: www.bghrc.com

Microfinance

Microfinance, a hybrid of formal and informal financial services, has been a recent innovation, which has a great potential for helping the poor reduce their vulnerability to disasters. It started with credit, and has since come to include savings and insurance. These different instruments which now comprise microfinance service help families increase their coping capacity, through diversification of income (different types of jobs and capital, regular employment, opportunities for women). They also serve as a kind of insurance policy following disasters.

The need for small amounts of credit and flexibility of terms was the motivation factor behind the idea of microcredit. The *Grameen Bank in Bangladesh* pioneered the concept of microcredit in 1976, primarily for entrepreneurial activities of the rural poor. Many microfinance institutions have since been established to provide financial services to the poor on a non-profit-making basis.

These institutions have produced microcredit as an effective poverty alleviation instrument. The link between microcredit and disaster risk reduction relates primarily to increased capacity to cope with losses from disasters. Some initial experiences have also promoted investments in risk reduction measures. Nevertheless, disasters can also have negative impact on micro-financing institutions themselves. According to IFRC, the *Grameen Bank in Bangladesh* reported that around 1.2 million of their 2.3 million members were affected by the 1998 floods, which make repayment of loans difficult. This calls for finding ways to insure against credit, which may make loans more expensive.

One of the distinctive features of microcredit is that it is based on group lending. Communities

may access resources for building social and physical assets based on a shared perception of their vulnerability. The strong element of peer monitoring in microcredit programmes facilitates greater community participation. Microfinance also encourages savings by group members, which may be invested in mitigating hazards at the household and community level.

A number of microcredit programmes have included government subsidies. If governments provide incentives and subsidies for mitigation, it is feasible to combine it with microcredit so that households may access it for specific mitigation measures. Since mitigation requires financial resources, knowledge of hazard, mitigation options, and community efforts, microcredit models can bring together these essential ingredients.

Saving mechanisms

Another way to mobilise investment in mitigation is through savings. Households may be given incentives to save and invest these savings in improving their physical assets. *Morduch (1998)* has cited successful examples from Bangladesh and Indonesia of mobilising saving from poor households.

The savings mechanism was also successful in an earthquake reconstruction programme in the state of Maharashtra, India. Although the government provided assistance in cash and in-kind to households for seismic strengthening, it also organized self-help groups at the village level and encouraged them to save a part of their earnings. Most of the households participating in the seismic strengthening programme invested more money and resources through their own savings than the government assistance they received.

Public works programmes – a social safety net.

In many developing countries, public works programmes were taken up as a scarcity or drought relief measure. This was a need-based programme supported by governments. One of the most important examples was the *Maharashtra Employment Guarantee Scheme (MEGS)* in India, developed as a response to severe drought in 1970-71. This scheme, aimed at

building public and individual assets yielded better resources for rural communities. It took care of the basic entitlements by guaranteeing employment to the rural poor, including small and marginal farmers, landless agricultural workers and rural artisans.

The public works programme represents an important social safety net in dealing with situations of mass deprivation. Its effectiveness in protecting poor households from severe shocks is consistent with longer-term goals of economic growth and environmental protection. Public works programmes provide employment when households find it difficult to restore their productive assets. Public works programmes may also contribute to reduce physical risks, by engaging in structural measures. This was the case in Honduras after hurricane Mitch, when the *International Labour Organisation (ILO)* supported

several municipalities to implement intensive work plans to build protection works in river basins, as a means of protection but also to restore job-opportunities for victims of the floods and landslides. Food for Work programmes, employed by the World Food Programme and others, have also been shown to be useful both after disasters, and in promoting public works to reduce future risks and diversify economies.

However, some experience show that a number of public works programmes have not been satisfactory because they are not sufficiently targeted and suffer from inefficient implementation. Also, public works programmes have been more effective in dealing with droughts or famine, and its applicability to dealing with other natural hazards such floods and earthquakes have not yet been tested.

Future challenges and priorities

From the issues described in this chapter, the following main challenges and priorities stand out:

- Need for sustained support through national and international agencies for these financial instruments and programmes for establishing their viability in pre- and post-disaster situations.
- Need for setting up vulnerability reduction / mitigation / social funds for supporting these financial services. Such funds have been set up for many other development activities, and so they could be effectively used for the purpose of disaster risk reduction too.
- The need for continued encouragement for international development banks and development agencies to require risk assessment and management for new infrastructure development projects.
- The need for more systematic documentation and research on quantification of benefits of risk reduction and hazard mitigation.
- The need to further elaborate a strategy for involvement of the financial sector in disaster reduction. This also involves the insurance sector exploring how insurance incentives can encourage disaster risk reduction measures.
- Development of more specific financial tools aimed at the very poor. Microcredit or revolving community funds are solutions that need more attention and sup-

“In Canada, one of the most important issues in the development of disaster risk reduction is to be able to substantiate the savings from mitigation.”

Canada response to ISDR questionnaire, 2001.

port. It is necessary to evolve financial instruments that enable households to employ risk and vulnerability reduction measures.

The UN agencies and the development banks can come together to promote many innovative financial instruments and mechanisms in disaster preparedness, mitigation, recovery and reconstruction. Since a large number of agencies are participating in this program, mobilization of resources for promoting financial and non-financial services for disaster risk management should not be difficult.

In addition, regional policy dialogues could be supported to facilitate exchanges in several areas such as governmental strategies and practices for financing catastrophe loss, including loss to government-owned assets like infrastructure and government buildings, obligations to reimburse losses due to natural disasters, and new financial policy alternatives.

Other areas which require more study and understanding are, on the one hand the detrimental effects of deregulation and economic interconnection, and on the other hand, the beneficial effects associated with trade opportunities and economic competitiveness.

5.6 Early warning systems

The ultimate goal of hazard forecasting and early warning systems is to protect lives and property. They therefore constitute one of the key elements of any disaster reduction strategy. To serve the people effectively, they need to be integrated instruments designed to link the scientific and technical initiators of warnings and those who identify vulnerabilities, the intermediaries composed of public authorities who issue warnings and emergency instructions, disseminators and processors of sector-specific products, and the ultimate users of the warnings in local communities. Robust, accurate and timely means of reliable and understandable communications are essential. Effective early warning procedures should be part of the national institutional and legislative frameworks for disaster management and have redundancy built into the system. To be fully successful, early warning must be complemented by professional services, training and capacity-building activities and the allocation of resources, to enable timely actions to be taken to avert loss or avoidable damage.

This section begins with the current status of early warning thinking. An effective early warning system is built on three requisites:

- Political responsibility to promote early warning strategies;
- Participation and knowledge of the public;
- Support at the international and regional levels;

completed by the following three elements:

- Technical identification and monitoring of hazards;
- Multidisciplinary, multi-agency and intersectoral communications;
- Institutional services to react to warnings; and concludes with

Current status of early warning thinking

Early warning has always been considered a cornerstone of disaster reduction. From the outset, IDNDR had set as one of the targets to be attained by all countries by 2000, ready access to global, regional, national and local warning systems and broad dissemination of warnings. During the past decade, significant activities, events/conferences and programmes had promoted the feasibility and added value of early warning, and identified major strengths and weaknesses of early warning capacities around the world. These included the 1994 Yokohama Strategy and Plan of Action for a Safer World, the Declaration of the 1998 Potsdam Early Warning Conference and the Early Warning Programme Action Plan for the Future presented at the IDNDR Programme Forum in 1999. Specific concerns were also addressed related to climatic phenomena such as El Niño (Guayaquil Interna-

Elements of the early warning chain:

- ☑ **Forecast and prediction** of impending extreme events, on the basis of scientific knowledge and monitoring results
- ☑ **Warning processing and dissemination** of information from the first segment together with information on the possible impacts on people and infrastructure (i.e. vulnerability assessment) to the political authorities and to the threatened population. The information includes appropriate response-oriented recommendations
- ☑ **Reaction** to warnings based on a proper understanding of the information by the population at risk and local authorities, and subsequent implementation of protective measures.



tional Seminar on the 1997-1998 El Niño Event: Evaluation and Projections in 1998), or to specific circumstances such as those of small island developing States (Barbados Global Conference on the Sustainable Development of Small Island Developing States in 1994).

Renewed efforts at all levels to integrate early warning as an essential component in the culture of disaster reduction have always been

encouraged by the United Nations General Assembly. Recently, the crucial importance of early warning was again validated by IATF for ISDR which identified early warning as a priority area for its future work and created a specific working group on early warning, described later in this chapter.

Advances in science and technology during the last decade have reinforced the possibilities of

Guiding Principles for Effective Early Warning

THE OBJECTIVE of early warning is to empower individuals and communities, threatened by natural or similar hazards, to act in sufficient time and in an appropriate manner so as to reduce the possibility of personal injury, loss of life and damage to property, or nearby and fragile environments.

RISK ASSESSMENT provides the basis for an effective warning system at any level of responsibility. It identifies potential threats from hazards and establishes the degree of local exposure or vulnerability to hazardous conditions. This knowledge is essential for policy decisions that translate warning information into effective preventive action.

Several groups must contribute to this empowerment. Each has a set of essential overlapping functions for which it should be responsible:

Members of vulnerable populations should be aware of the hazards and the related effects to which they are exposed and be able to take specific actions themselves which will minimize their personal threat of loss or damage;

Local communities should have sufficient familiarity with hazards to which they are exposed, and the understanding of advisory information received, to be able to act in a manner to advise, instruct or engage the population in a manner that increases their safety or reduces the possible loss of resources on which the community depends;

National governments should exercise the sovereign responsibility to prepare and issue hazard warnings for their national territory in a timely and effective manner, and to ensure that warnings and related protective guidance are directed to those populations determined to be most vulnerable to the hazard risk. The provision of support to local communities to utilize information and to develop operational capabilities is an essential function to translate early warning knowledge into risk reduction practices;

Regional institutions should provide specialized knowledge, advice or benefit of experience in support of national efforts to develop or to sustain operational capabilities related to hazard risks experienced by countries that share a common geographical environment. Regional organizations are crucial to linking macro-scale international capabilities to the particular needs of individual countries and in facilitating effective early warning practices among adjacent countries; and

International bodies should provide means for the shared exchange of data and relevant knowledge among themselves as a basis for the efficient transfer of advisory information and the technical, material and organizational support necessary to ensure the development and operational capabilities of national authorities or agencies officially designated as responsible for early warning practice.

early warning reducing the consequences and especially the human losses from natural disasters. To give but a few examples, forecast time and location of landfall of tropical cyclones is now 48 hours in advance; the warning time of tornadoes has doubled in one decade; and warnings of drought are now issued several months in advance. The development of new information technologies and the very rapid spread of global communications have considerably increased the availability of information and early warnings about natural disasters. These technological advances now enable better monitoring, prediction and forecasting of extreme weather conditions. Significant improvements in global observation systems have also enhanced the early detection of medium-term abnormal climatic conditions such as El Niño events, and will contribute to warnings of long-term hazards associated with environmental change. Sophisticated early warning systems can only become effective with the free and unrestricted exchange of meteorological data throughout and among societies, and with similar attention given to the expression of warnings so that the people for whom they are intended can understand them.

However, the ability to deliver this vital information to the public in the locations where it is most likely to be affected by disasters has not always enjoyed similar success. Local mechanisms for communicating risk, or downscaling the interpretation of alerts to relate to local conditions or experience, remain very weak in many cases. Sophistication has to be weighed against local capacities, needs, resources and traditions. Moreover, information about the adverse impacts of disasters on people and infrastructure (i.e. vulnerability and risk assessments) that is necessary for informed decision-making is often missing. Even where abilities and procedures do exist, communities do not often respond appropriately to them, because there is a lack of planning, resources or viable protective options that they could utilize in a timely manner. Ironically, in many documented cases, the perceived threat of losing their property to looters when unprotected during a time of evacuation, is considered a greater threat by many people than a loss caused by a severe weather disaster.

Elements for effective early warning are well documented. Guiding principles for effective

early warning resulted from several years of work undertaken under the aegis of the IDNDR Early Warning Programme, by experts associated with all aspects of warning practices and for various types of hazards. The different sets of these guiding principles are reproduced throughout this chapter as they still provide a clear and comprehensive basis for the early warning process. The challenge to be met in the coming years is to translate these accepted principles into concrete action-oriented modalities.

By way of introduction to the specific issues of concern to improve the effectiveness of early warning, the Mount Pinatubo example illustrates the added value of early warning systems and describes the factors that contribute to the effective warning of populations at risk.

Early warning for the 1991 eruptions of the Pinatubo volcano, the Philippines: a success story

Early warning for the 1991 eruptions of the Pinatubo volcano is a success story in that the number of deaths compared to that of those at risk was small despite the magnitude and violence of the eruption. The success was due to a number of factors that illustrate the important issues in this chapter: timely identification of the hazard and delineation of vulnerable areas, successful application of state-of-the-art monitoring and surveillance techniques, accurate prediction of the destructive phases, timely issuance and dissemination of easily understood warnings, prompt action of key civil defence officials and disaster response workers, and timely evacuation of majority of inhabitants at risk.

The positive aspects of the experience highlighted the value of the following: state-of-the-art monitoring equipment and techniques, international cooperation based on mutual respect, sustained intensive public education, active involvement of selected scientists as spokespersons for awareness and dissemination purposes, open and speedy communication lines between science people and civil defence officials, good relationship between scientists and the media adapted from

Punongbayan and Newhall, 1998

Early warning is not a technical and even less a technological issue, but a human and organizational one. Satellite coverage and state-of-the-art surveillance techniques are now sufficient and the most difficult part, which is composed of the following requisites, remains to be tackled.

Political responsibility to promote integrated early warning strategies

The first requisite for achieving an effective early warning system is recognition of the value of early warning in protecting the interests of societies and communities. Political willingness to use it as a meaningful policy instrument for disaster risk management will derive from this acknowledgement. However, commitment is not enough. Mobilizing the necessary political, human, technical, material and financial resources is needed to underpin better warnings that can avoid, or at least reduce, risks. Governments need to support legislation, administration, contingency planning and operational procedures including inter-ministerial/inter-agency relationships. Well-developed decision-making capacities will avoid disasters that occur because predictions are considered as being too uncertain. Governments need to take the initiative to establish, and thereafter, maintain the necessary collaborative framework needed for the functioning of credible and accountable warning systems. They have the responsibility to promote integrated early warning strategies so as to gain wide support for the implementation of governmental decisions at times of crisis. Political initiatives and support will guarantee the technical and social relevance, usefulness and efficiency of early warning strategies. One element that should increase political commitment towards early warning strategies is the availability of indicators to measure their effectiveness, especially in terms of losses avoided and recipient satisfaction.

The following are examples of successful national early warning systems in use.

Mauritius offers an interesting example of institutional arrangements according high priority to early warning of cyclones. The explicit specifications of the principal elements of the cyclone warning dissemination system, including roles and responsibilities (with details of warnings and their dissemination) are set out in the Cyclone and other Natural Disasters Scheme (1995). The Mauritius Meteorological Office is part of the Prime Minister's Office. The Central Cyclone Committee, a well-administered and communication-oriented central body, provides leadership to ensure the effectiveness of the warning system. This

endorsement from the political centre of Mauritius is a particularly strong and commendable feature of its disaster planning from which others elsewhere can learn. A high degree of legitimization is accorded by this support. Effective leadership is provided from a central government committee in the area of disaster preparedness (including the warning system), mitigation and recovery (UK Flagship Programme, 1998).

SADC countries have long focused attention on drought and resulting food security issues for which early warning and preparedness mechanisms have been developed over the last twenty years. However, recent extreme weather events have encouraged a wider perspective for early warning and more comprehensive disaster preparedness activities. Such a shift conveys the understanding that potential disasters are rooted in the relations between human actions, environmental conditions, management of natural resources and the climate. Therefore additional warning requirements need to be addressed through policies that can provide an integrated regional early warning and disaster preparedness framework. Necessary steps have been taken through the development of a framework for a multisectoral disaster management strategy supported by UNDP.

Another step forward was made through the process launched by SADC heads of State and Government following the devastating floods in Southern Africa in early 2000. This initiative provides a good example of political willingness to improve early warning and preparedness capacities. A review of the contributions that meteorological and hydrological services provide to early warning and disaster preparedness resulted in recommendations for political decisions to boost regional early warning strategies. Recommendations included the need for SADC countries to create a policy that is more focused on regional requirements for early warning and disaster preparedness. To achieve this, the formulation and progressive implementation of a structured regional approach was proposed, able to link increased national capacities to improve early warning. It was also recommended that adequate funding be provided to national institutions to equip them with the necessary facilities and tools to maintain their high level of public service in the national interest, and to enable them to

In **Cuba**, a national hurricane preparedness plan is practised every year before the start of the hurricane season, when the early warning system is tested. The system is activated at the first information notice by the military authorities and civil defence, involving the political party authorities and all provincial or municipal government officials, representatives of all administrative and political institutions, companies, co-operatives, etc. Planned measures are then activated according to different levels of warning, including an Informative Phase, a Cyclone Alert, a Hurricane Alarm and a concluding Rehabilitation Phase, if required.

Hurricane Michelle, Cuba, November 2001 - a success story

Hurricane Michelle formed in the Gulf of Honduras on the 2 November, 2001, landed on Cuba 4-5 November, reaching wind speeds of up to 220 km/h (category 4 Saffir-Simpson-Scale). Michelle has been the strongest hurricane affecting Cuba in the last 50 years.

Upon early notice from the Institute of Meteorology the evacuation plan came into action.

Twelve provincial and 150 municipal headquarters for civil defense involving 87000 people were activated. More than 5000 vehicles were deployed for evacuation, etc.

Over 700,000 persons were evacuated, of which 270,000 for a longer time and provided with temporary accommodation and basic needs. 777,000 animals were also moved to safe areas. Reports indicated only 5 fatalities and 12 people injured.

Nevertheless, a major economic setback was the result of the hurricane. Principal damages were to building infrastructure, agriculture and communications facilities.

contribute more effectively to early warning and disaster preparedness systems on a regional basis. Another recommendation was further development of comprehensive implementation and contingency plans by countries that integrate early warning systems, disaster preparedness and related mitigation activities into overall national disaster management frameworks.

Thanks to UNDP support, the *Viet Nam Disaster Management Unit (DMU)* is benefiting from a nationwide information system that provides a combination of real-time information to the *Central Committee for Flood and Storm Control (CCFSC)*, the primary Government agency for disaster management. The system provides early warning information, updates on developing disaster situations, and related information about damage or needs assessments through a computerized network linking CCFSC-DMU, the national hydrometeorological services and all of the 61 provincial committees for flood and storm control.

The system is also able to draw on information supplied by the Ministry of Agriculture and Rural Development. Internet provides an expanded opportunity to disseminate timely warnings about floods to the public and to address immediate emergency requirements, or disseminate general information related to disaster management. Since early 2001, the project has benefited from more advanced information technology provided by additional funding from OFDA/USAID. Expanded activities include the design of weather and natural disaster warning systems based on computer graphics for use by Viet Nam Television to enable the dissemination of more effective public warnings. Flood maps for all of the central provinces in Viet Nam are being created with the latest GIS technology, accompanied by training that will encourage its effective use by provincial and local authorities. A new flood-hazard alerting system is also being designed for the areas most prone to rapid or flash flooding.

Public knowledge and participation

The second requisite for an effective early warning system is public participation in the design, implementation and assessment of warning formulation and dissemination. The following principles were developed to provide concrete guidance for the application of early warning at the national and local level. They cover the issues discussed in this subsection.

Early warning messages should reach, be understood, believed and personalized by the public at risk to enable it to take action to reduce its vulnerability to hazards. Therefore community involvement is necessary to design locally efficient and socially relevant early warning systems. Such involvement permits a continuous dialogue between users and

authorities to make collective decisions and choices. Investment in modern technology and top-down professional expertise to forecast hazards and issue warnings can only be justified if warnings effectively reach every citizen likely to be affected. In this regard, there is much to be gained and learned from providing support to grass-roots bottom-up approaches. Communities and NGOs that represent their interests are key elements in operating early warning systems, i.e. disseminating messages, operating and maintaining warning equipment, organizing training and regular testing to avoid surprises at times of crisis, raising awareness of the responsibility people have for their own survival, providing motivation and coping strategies, avoiding confusion, contradiction and conflicts.

Principles for the application of early warning at NATIONAL and LOCAL levels

1. Early warning practices need to be a coherent set of linked *operational responsibilities established at national and local levels of public administration and authority*. To be effective, these early warning systems should themselves be components of a broader programme of national hazard mitigation and vulnerability reduction.
2. Within each country, the *sole responsibility for the issuance of early warnings for natural and similar disasters should rest with an agency*, or agencies, designated by the Government.
3. The *decision to act upon receipt of warning information is political in character*. Authoritative decision makers should be identified and have locally recognized political responsibility for their decisions. Normally, action resulting from warnings should be based on previously established disaster management procedures of organizations at national and local level.
4. In the chain of political responsibility, initial hazard information is often technically specialized or specific to a single type of hazard authority. To be applied effectively, *warnings need to be clearly understood and operationally relevant to local agencies* that are more frequently oriented towards non-specific hazard functions.
5. Early warning systems must be *based upon risk analysis* that includes the assessment of the occurrence of hazards, the nature of their effects and prevailing types of vulnerability, at national and local levels of responsibility. The warning process should *lead to demonstrated practices that can communicate warning and advisory information* to vulnerable groups of people so that they may take appropriate actions to mitigate loss and damage.
6. *Locally predominant hazard types and patterns*, including small-scale or localized hydrometeorological hazards related to patterns of human, economic or environmental exploitation, must be incorporated if early warning is to *be relevant to risk reduction practices*.
7. There is a continuing *need to monitor and forecast changes in vulnerability patterns, particularly at local levels*, such as sudden increases in vulnerability resulting from social developments. These may include conditions of rapid urbanization, abrupt migration, economic changes, nearby civil conflict or similar elements that alter the social, economic or environmental conditions of an area.
8. The *primary responsibilities must rest at local levels of involvement* for producing detailed information on risks, acting on the basis of warnings, communicating warnings to those individuals at risk and, ultimately, for facilitating appropriate community actions to prevent loss and damage. A high resolution of local knowledge and developed experience of local risks, decision-making procedures, definitive authorities concerned, means of public communication and established coping strategies are essential for functions to be relevant.
9. Groups of people that exhibit different types of vulnerability will have different perceptions of risk and various coping strategies. *Locally appropriate warning systems will provide a range of communication methods and should provoke multiple strategies* for protection and risk reduction.
10. *To be sustainable, all aspects of the design and implementation of early warning systems require the substantive involvement of stakeholders* at the local and national levels. This includes production and verification of information about perceived risks, agreement on the decision-making processes involved, and standard operational protocols. Equally important abilities involve the selection of appropriate communication media and dissemination strategies that can assure an effective level of participation in acting upon receipt of warning information.

The following boxes provide a summary of the benefits of public participation and indicate factors that facilitate this process.

Benefits of public participation include:

- Improved understanding of warnings as a complex social process;
- Identification of warning recipients;
- Identification of resources available at the local level to tailor message contents, dissemination channels and response options (including empirical knowledge of hazards and local coping strategies);
- Access to most vulnerable community groups (an effective early warning system is one that caters adequately and equally to remote and other vulnerable social groups with special needs or limited access to resources, including remote island communities, squatter settlements, disabled and elderly people, tourists and fishermen);
- Better understanding of user needs and preferences in terms of product-type and application, as well as display of information;
- Social support for public policies and decisions, mass evacuations, for example;
- Enhanced credibility of warning messages;
- Easier improvement of early warning systems based on feedback analysis from warning recipients.

How can public participation be facilitated?

1. Political commitment to create the conditions for allowing public involvement.
2. Early start in the warning design process in order to allow time for trust-building.
3. Definition of how participation will be organized.
4. Provision of all necessary information to community leaders and civil society representatives.
5. Advertisement and wide sharing of the process through the mass media, for example.
6. Testing of warning options; monitoring of implementation.
7. Maintenance of communication and iteration (feedback with users) during the process.
8. Institutionalisation of feedback procedures and assurance of sustainability/maintenance of the system.

Adapted from B. Affeltranger, 2002

The following examples show several facets of public involvement, participation and knowledge. They display useful practices such as public involvement in warning dissemination, strengthening of local capacities, the application of local experiences and public participation in the design of early warning systems.

For the past thirty years, the Bangladesh Red Crescent Society's *Cyclone Preparedness Programme (CPP)* has disseminated warnings and assisted cyclone-affected communities along 710 kilometres of the Bangladesh coastline in the Bay of Bengal. Equipped with hand sirens, megaphones, transistor radios, signal lights and flags, first-aid and rescue kits, more than 30,000 volunteers act as the communications channel through which the CPP head office in Dhaka relays weather bulletins from the Bangladesh Meteorological Department to more than ten million people living in areas of high cyclone risk. CPP has demonstrated that

disaster preparedness programmes can be successful through the use of community-based management methods and basic forms of technology that can link appropriate and effective warning systems to distant providers of life-saving information. Selected volunteers serve as "information lifelines" for people at times of threatening cyclones.

Through the CPP communications network, high-frequency radio broadcasts are transmitted from the capital city of Dhaka to field stations equipped with additional very high frequency (VHF) radio receivers, where information is then passed on to the volunteer unit teams by way of transistor radios. Local information on the progress of an approaching cyclone or the resulting effects after it has passed through an area is likewise transmitted back to the central office. The network has also proved to be an important asset for relief operations after a cyclone.



The CPP volunteer training and public awareness programmes are central to its success and well-founded reputation. Public awareness about the risks associated with cyclones is conveyed by the volunteers themselves and demonstrated through drills and demonstrations, dramas and folk songs. Printed materials, the use of films and videos and targeted publicity campaigns supplement the regular use of the radio and television media to build a common understanding of basic elements of early warning and cyclone protection behaviour.

It is the dedication and tireless efforts of these volunteers—and all who support them with their understanding, support and respect—that contributed to the CPP receiving Thailand's "Smith Tunsaroch Award" in 1998 in recognition of the volunteers' efforts to protect the people of Bangladesh.

Informal and social networks have been found to reinforce warning dissemination systems in Mauritius. It appears likely that small, isolated island communities such as Mauritius have particularly strong and effective social networks, which considerably help warning dissemination. Informal personal and community networks can be highly effective in disseminating warnings and deserve the right appreciation from those issuing formal warnings. They usually benefit from an organizational and popular culture in which preparation for cyclone and cyclone warning and response are to some extent embedded.

Source: UK Flagship Programme, 1998

The **RELSAT Project (Strengthening of local structures and early warning systems)** was implemented in pilot zones in each of the six Central American countries between November 1998 and December 1999. The project was financed by the *European Commission Humanitarian Aid Office (ECHO)* and realized in the context of long-term community-based disaster risk reduction cooperation between CEPREDENAC and the *German Agency for Technical Cooperation (GTZ)*.

The purpose of the project was to establish efficient and reliable early warning systems with regard to floods, tailored to the realities and capabilities of the selected pilot zones. Howev-

er, as the main characteristics of the six zones were comparable, regional action was possible at a local level. As pilot zones, they served as examples that demonstrated the experiences local communities had had in applying local disaster management techniques, supported by national and regional structures that were competent in the area of disaster reduction. The main activities implemented during this process were:

- Analysis of the zones of risk and of the specific demands (risk maps, interviews, participatory planning);
- Training of the local population in flood-fighting measures;
- Selecting, training and equipping observers and analysts in the watershed of the affected river;
- Improving communication capacities among the individuals and institutions involved;
- Developing contingency plans and implementing evacuation exercises in the pilot zones.

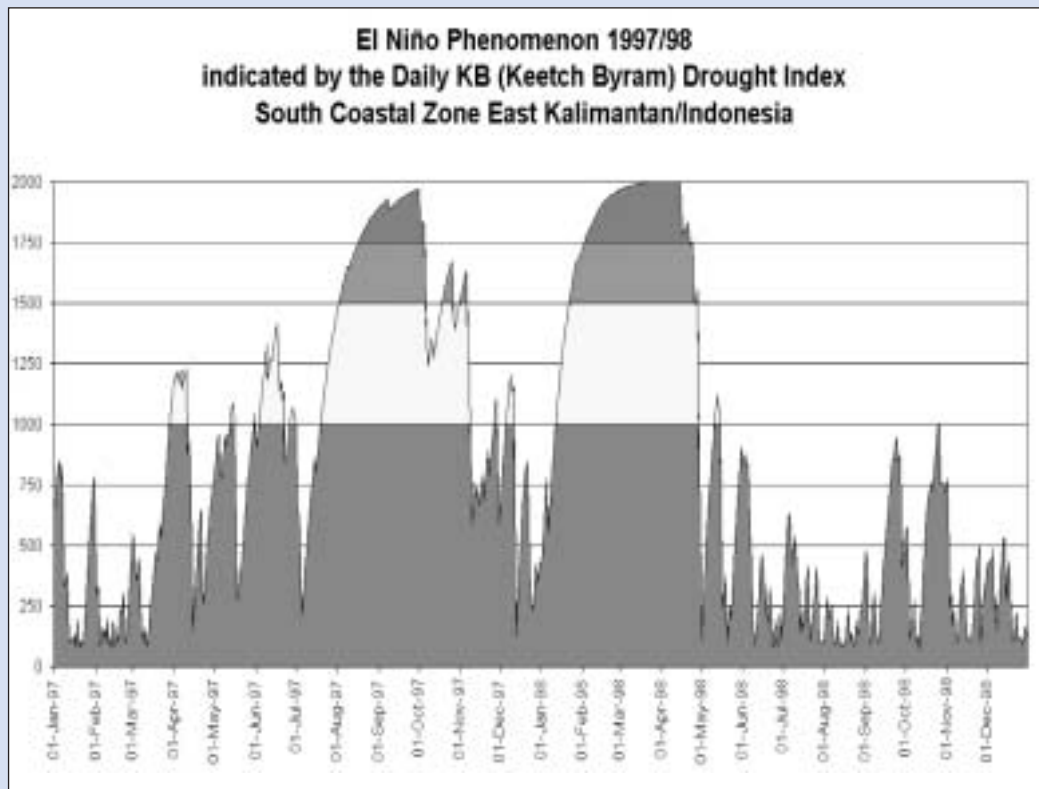
The results of all these efforts in the six pilot zones were early warning systems that work in the following way. Selected people living in the upper parts of the river regularly measure rainfall and water level. They transmit this information by radio to a central office in the closest municipality where the data collected are analysed. The centre itself is in communication with people in the flood-prone areas. At times of expected danger, the centre can thus alert the population exposed to risks and can prepare for their evacuation, if necessary.

In order to be effective, this system requires reliable communication and coordination processes among all actors and the population at risk. Responsibilities have also to be clearly assigned and commitment must be continuous. If these conditions are met, the early warning system helps to reduce substantially the losses and damages caused by floods and to motivate people to take further action aimed at achieving sustainable disaster risk reduction for the region.

The ongoing work to design an early warning system for the Lower Mekong floods undertaken by the *Mekong River Commission (MRC)* and its member countries (Cambodia, the Lao People's Democratic Republic, Thai-

Early warning of forest fire at local level

The Integrated Forest Fire Management (IFFM) project in Indonesia is a technical cooperation project supported by GTZ and the Global Fire Monitoring Centre (GFMC). The project approach relies on the involvement of local communities in fire prevention and preparedness (community-based fire management). IFFM has been working with a fire danger rating (FDR) system in East Kalimantan since 1995. The FDR is based on the Keetch-Byram Drought Index (KBDI) and is part of a fire information system (FIS) that manages spatial fire-related data and information in an integrated manner. The graph indicates the KBDI readings for the 1997-1998 El Niño years that show the development of drought and fire danger in the coastal zone of East Kalimantan. This drought index is easy to handle because it only requires on-site rainfall and temperature measurements. Since fire-weather patterns in the tropical rainforest region vary within short distances, it is advantageous for this system to be used by local entities such as local fire departments, forestry enterprises and communities.



Source:
GTZ/GFMC,
2001

land and Viet Nam) illustrates efforts to devise a strategy that is both technically efficient, socially useful and relevant to the recipient communities. The ongoing project is guided by research focusing on the complex social process triggered by warnings, which needs to be understood to design both the technical and social aspects of the warning system. MRC fully endorsed the value of the “social ownership” of the warning strategy when developing its Flood Mitigation and Management Plan in 2001. Thanks to the Commission and other parties involved, participatory approaches are progressively being introduced into the disaster management culture of the region. Individual countries should in principle apply a similar approach depending on their institutional

settings and political preparedness. Possible action plans to implement user-based flood warning and disaster mitigation were presented to the MRC secretariat, as well as to representatives of member countries on the occasion of the MRC Expert Meeting on Flood Forecasting and Early Warning Systems (Phnom Penh, Cambodia, 26 February-1 March 2002). The plans emphasize the need to understand vulnerability, risk culture and related trade-offs, as well as the social response to floods to provide useful warnings. National authorities were advised to conduct a proactive, preliminary assessment of the social relevance, relative usefulness and expected efficiency of their flood warning strategy in order to further improve it.

A number of activities focused on community-based flood mitigation and management are ongoing or have been completed in the Mekong Basin. New projects will capitalize on these initiatives, thereby strengthening networks, building mutual trust and developing professional practice and expertise.

Similar approaches have been developed elsewhere. The European Union's *OSIRIS project and Information Society Technologies Programme* assessed the potential added value of so-called "new information and communication technologies" for flood-related warning and information management. The project also studied conditions for effective operation of such tools, as well as social ownership. In 2000-2001 the *European Centre on Risk Prevention (CEPR)*, Niort, France, organized community-based workshops. A two-phased study was carried out to understand differences in risk perceptions and information demands amongst stakeholders, and to survey the social relevance and efficiency of existing or planned flood warning systems. In Hungary and Mozambique, the *United Nations Educational, Scientific and Cultural Organization (UNESCO)* carried out a study on flood-related information management systems and public participation at community-level in flood mitigation and control.

These examples confirm that early warning strategies should not be separated from broader development planning and poverty reduction goals. Practical and tangible objectives or immediate incentives are likely to trigger communities' commitment to user-based processes. Respectful understanding of existing social processes and capitalizing upon them are keys to successful schemes for public participation.

■ Support at the international and regional levels

The third requisite for the emergence, maintenance and improvement of effective early warning systems is the support provided by international and regional institutions and networks. The following principles provide a basis to guide the collaboration and coordination efforts required at the international and regional levels.

First of all, international and regional support provides incentives and motivation to strengthen and improve early warning capabilities, while at

the same time ensuring coordination of activities and facilitating the exchange of knowledge. There are many benefits to be found in the three-tiered support structure in which international/global efforts are mobilized to strengthen and build capacity at the regional level, which level does the same at the national level.

As seen in the examples given in this chapter, regional processes provide a framework for action at the national level; regional institutions provide advice and motivation to national institutions; these assist in fund-raising and are key interlocutors for governmental authorities thanks to their appreciation of national circumstances; finally, they assist countries to play their part in international activities.

International cooperation provides essential financial and support in kind to build national early warning capacities. Major networking initiatives that facilitate exchange of information and experience and linkage with international agendas are launched through international cooperative arrangements for the benefit of national institutions. Specific activities such as the development of uniform standards and concepts can only take place internationally with the cooperation of as many United Nations Member States as possible.

Recent activities undertaken at the international level include the Expert Meeting on Early Warning and Sustainable Development held in March 2002, under the auspices of the German Committee for Disaster Reduction (DKKV), within the framework of ISDR. The purpose of the meeting was to translate what is needed from the ongoing early warning process into concrete recommendations for action. The rationale of the initiative was to define modalities to implement the action plans and strategies resulting from the work carried out during the past decade and to take the opportunity of the upcoming WSSD to increase the visibility of the early warning process. Outputs of the meeting are intended to serve the WSSD preparatory process and beyond.

The meeting was instrumental in reiterating the contribution of early warning systems to the process of achieving sustainable development. Building on the elements of early warning and disaster reduction negotiated in the

Principles for Early Warning Systems at INTERNATIONAL and REGIONAL levels

1. In the interest of concerted international efforts to reduce the adverse effects of natural and similar disasters, *the technologically advanced countries have an obligation to encourage and support improved early warning practices in developing countries, small island developing States, economies in transition, and other disaster-prone countries with special circumstances.*
2. Primarily affected *countries equally have a primary responsibility to conduct a rigorous audit of the effectiveness, or consequential identification of needs, of their early warning capabilities.* The conduct of post-mortem assessments of regional and national warning system capabilities is particularly relevant following any disaster event.
3. *Specialized regional and global centres involved in the preparation and dissemination of warnings, such as the WMO Regional Specialized Meteorological Centres (RSMCs) provide important links to national early warning systems.* The application of their technical capabilities and the utility of their products should be carefully integrated with the needs of the countries being served, including any necessary clarification about the warning responsibilities between these centres and national agencies in the same region.
4. In the interest of protecting people from the risk of natural hazards, it is essential that *the formulation and presentation of warnings be based on the best available technical and scientific knowledge, and free of political distortion or manipulation.*
5. International bodies and regional organizations must work to *maintain the vital importance of timely exchange and unrestricted access of observational data and other warning information between countries, particularly when hazardous conditions affect neighbouring countries.*
6. *Timely, accurate and reliable warnings should be understood in the context of commonly accepted international standards, nomenclature, protocols and reporting procedures.* Established or internationally agreed means of communication should be employed for the international and regional dissemination of any warning information to specific authorities designated in each country.
7. *Collaboration and coordination is essential* between scientific institutions, early warning agencies, public authorities, the private sector, the media, and local community leaders to ensure that warnings are accurate, timely, meaningful and can result in appropriate action by an informed population.

WSSD preparatory process, the meeting identified specific needs and suggested a course of action to fulfil those needs. First and foremost need for better interlinkages to ensure dialogue among all stakeholders at all levels was identified, as well as the lack of vulnerability assessments at local and national levels. Capacity-building, technology development, indicators to evaluate the effectiveness of early warning systems as well as a thorough inventory/review of ongoing initiatives/programmes were listed among the specific needs.

The development of a global programme on early warning was suggested to fulfil the needs identified. The purpose of the programme would be to raise political commitment at national, regional and international levels towards the integration of early warning systems in disaster risk management strategies. Recognizing and drawing upon the valuable work already under way, especially by WMO, an important dimension of the programme would be the development of an early warning

platform/forum, under the auspices of the United Nations to facilitate dialogue between stakeholders and support exchange of experiences and information on early warning, at the international, regional, national and local levels. Hopefully the global programme on early warning and the international early warning platform/forum would trigger the establishment of national and subregional early warning platforms/forums to strengthen networking and capacities among the actors involved in the early warning chain. Such a programme would also be active in the areas of capacity-building and technical cooperation to reduce the technical/technological and scientific gaps between developed and developing countries.

The above activities would be elaborated within the ISDR framework and relevant strategies and structures through wide consultations, Working Group 2 and the ISDR secretariat being actively associated in this endeavour. Finally, a time frame to implement the above recommendations was developed.

ISDR Task Force Working Group on Early Warning

The aim of Working Group 2 on early warning created by the ISDR IATF is to better coordinate global practices in early warning and to make sure it is effectively utilized as an instrument in disaster reduction activities. The UNEP Division of Early Warning and Assessment leads this Working Group whose membership includes CDERA, the Food and Agriculture Organization of the United Nations (FAO), the German National Committee for Disaster Reduction, and the ADRC, GFMC, the Intergovernmental Authority on Development (IGAD), the SADC Drought Monitoring Centres, the South Pacific Applied Geoscience Commission (SOPAC), the United Nations Programme for Human Settlements (UN-HABITAT), the United Nations Convention to Combat Desertification (UNCCD), UNDP, UNESCO and WMO. The group builds on previous activities undertaken in the field and coordinates with those of the different IATF working groups in the areas of data and information management, to support assessments of risk and vulnerability to natural hazards and early warning and vice versa. The group seeks to involve as many parties as possible from national, regional and international organizations into its discussions, on an ad hoc basis, to ensure its intersectoral and multidisciplinary dimension.

Key words characterizing the six objectives of the Group are coordination, collaboration, harmonization, dissemination of information and networking to create and share knowledge. The work of the group will focus on inventorying capacities for early warning and vulnerability assessments, as well as related scientific and technical issues, learning lessons and identifying shortcomings, developing effectiveness indicators and communicating early warning information. The group will

At the regional level, the growing economic importance of climatic variability has prompted WMO and other technical institutions to reach beyond scientific research and to extend available information to establish early warning systems and to strengthen local risk reduction practices. An excellent example in this area is the series of Regional Climate Outlook Forums (RCOFs) organized by *USAID*, the *United States National Oceanic and Atmospheric Administration (US/NOAA)* and WMO. These seasonal, multidisciplinary technical meetings have brought together meteorologists, climate

forecasters and disaster managers from neighbouring countries to review advance climate forecast indicators jointly and then to consider the potential implications in their respective countries. The weather forecast data are likewise discussed with respect to other social and economic dimensions of governmental interest, in an effort to develop routine opportunities by which climatic and meteorological considerations are integrated into disaster management, agricultural, public health, energy, commercial and similar interests shared by all of the participating countries.

A review to assess the accomplishments and shortcomings of RCOFs and recast their future was carried out in 2000. Conclusions are consistent with the needs identified at the Bonn meeting, i.e. improved interlinkages among all stakeholders involved in the early warning process. As stated in "Coping with the Climate: A Way Forward", there is a need to clarify and reinforce the current three-tiered support structure. There is also a need to focus and build capacity in key areas, including the development of improved, user-tailored forecast products in partnership with appropriate intermediaries, broader outreach through the media, verification of forecast products and evaluation of forecast costs and benefits. Development and use of forecasts will be enhanced by "more systematic organization of the roles and responsibilities of forum partners including users, researchers, and operational organizations" and by the "partnerships ... needed at all levels of the process". Governments, policy makers, development experts, scientists and other interested parties are invited to engage in a process of dialogue and programme development needed for the management of climatic impacts.

Technical identification and monitoring of hazards

Scientific knowledge and monitoring capabilities are needed to identify and forecast short to long-term hazards. The first segment of the early warning chain is the forecast and prediction of hazards, which along with vulnerability and risk information, will allow the formulation of warning messages for intermediaries. Until now, early warning has taken place along the lines of singular events and hazards or

organization-specific requirements. However the challenges that humanity will face in the twenty-first century require a systematic and comprehensive approach encompassing both environmental and climatic processes—over a longer period of time as well as during periods of quiescence (e.g. between El Niño episodes, in between fire weather, smoke and haze seasons, during hurricane and typhoon off-seasons, etc.). There is then a much greater need for institutionalized standard nomenclature, procedures, extended organizational relationships and common approaches to information management—which will be eased by advances in omnidirectional communication facilities and information technologies. Recommendations of the Bonn meeting described above and the action programme to be adopted at WSSD implicitly provide a starting point to address these concerns. As stated in the conclusions of the IDNDR Programme Forum in 1999, there is a crucial need to implement an early warning concept of the second generation that must be interdisciplinary and intersectoral comprising sociological, economical, political, organizational and scientific wisdom.

It is difficult to pay tribute to the number and variety of “warning centres”, dispersed by type of hazard, location, organization, mandates, etc. Some examples have been selected and are briefly described in this subsection. Other examples are given in chapter 4.1 dealing with information management and communication.

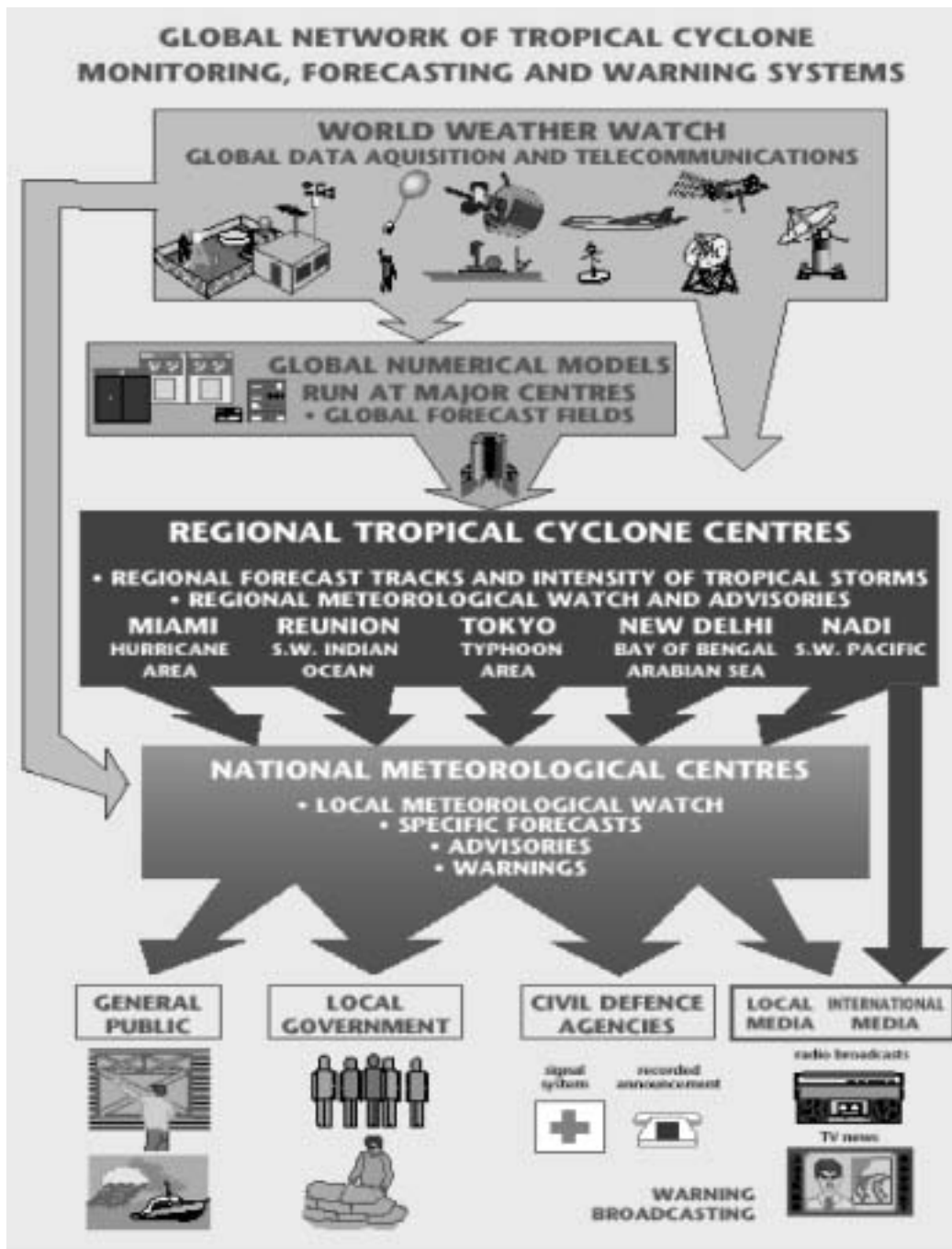
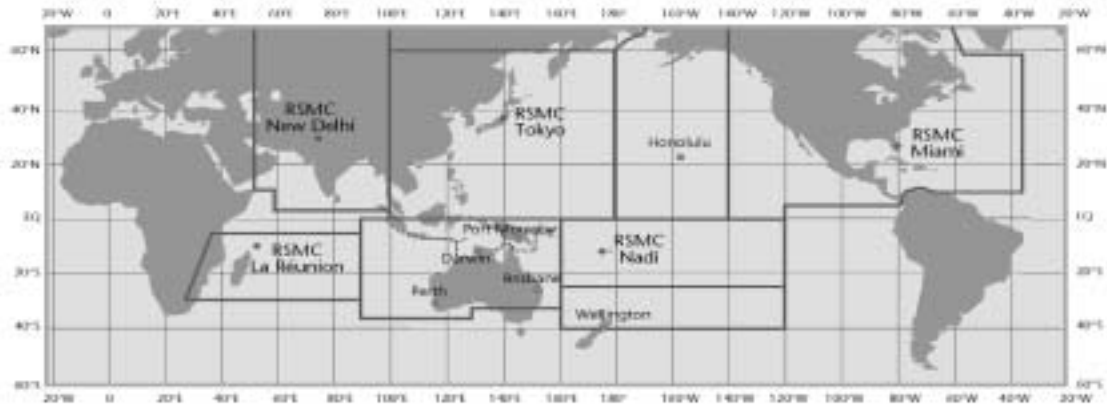
As almost three-quarters of all natural disasters are related to weather, water or climate, WMO plays an important role in structuring the systematic analysis and reporting on hazards. It both works through, and provides, technical support to all National Meteorological and Hydrological Services (NMHSs) and many regional specialized meteorological centres worldwide. Without these institutions, early warning capabilities would almost be non-existent.

The following WMO programmes are particularly important in contributing to global capabilities in the detection, forecasting and early warning of hazards, as well as in providing effective means and procedures to minimize their adverse consequences through the application of science and technology for greater public understanding:

- **The World Weather Watch (WWW)** programme enables the exchange of real-time data, forecasts, warnings and advisories for the public and the international community;
- **The Tropical Cyclone Programme (TCP)** works to develop professional abilities and promotes nationally and regionally coordinated systems to ensure effective preparedness measures against tropical cyclones and associated phenomena;
- **The World Climate Programme (WCP)** provides assistance through its Climate Information and Prediction Services to countries for the application of climate information and knowledge in the prediction and early warning of climate-related natural disasters;
- **The World Weather Research Programme (WWRP)** develops and promotes cost-effective and improved techniques for the forecast of high-impact weather like tropical cyclones, sand and dust storms, and heavy rainfall that can provoke severe flooding;
- **The Hydrology and Water Resources Programme** assists national hydrological serv-

WMO technical cooperation projects contribute to the improvement of early warning systems in developing countries. For example, one recently completed project supported early warning systems for the national meteorological services of Burkina Faso, Mali and Niger. Another project is looking into the feasibility of establishing a regional system, which will produce and utilize early warning of impending danger and related social and economic consequences based on the actual predictions of *El Niño-Southern Oscillation (ENSO)* and thus ameliorate the socio-economic impacts of ENSO by improved early warning mechanisms. Feasibility will be analysed from the technical, economical, social, environmental, legal and institutional points of view.

- ices in assessing the risks, and issuing forecasts, of water-related hazards, with a focus on major floods and droughts; and
- **Regional Specialized Meteorological Centres (RSMCs)** are designated worldwide by WMO to provide weather forecasts and advisories on tropical cyclones or other specialized risks associated with the atmosphere or having global implications, like volcanic plumes, fire haze, or environmental emergencies including nuclear facility accidents or other local and large-scale pollution emergencies.



The success of the WMO programmes illustrates the economic and social benefits that are derived from an accurate global weather forecasting system. Studies show that the benefits of weather forecasting do not stop at early warning of natural disasters. However, meteorological and hydrological services are still undervalued in most countries even though they constitute a building element of any national disaster reduction strategy given their importance in early warning systems. Moreover, observations of weather phenomena go beyond the immediate and seasonal forecasts determining daily human activity. Long-range studies of the stratosphere are crucial in understanding the phenomenon of global change, including El Niño, climate change or the depletion of the ozone layer. WMO scientific analyses and warnings are instrumental in addressing these issues and supporting multi-lateral environmental agreements.

An *International Research Centre for the El Niño Phenomenon (IRCEN, CIIFEN in Spanish)* is being established in Guayaquil, Ecuador, under the auspices of the Government of Ecuador, ISDR and WMO. The Centre will be a means to conduct a regional project that will address, inter alia, early warning systems for disaster loss reduction. It is conceived as a centre with global connections to other centres, but with a special focus on the Eastern Equatorial Pacific and the western countries of South America. Socio-economic benefits will be derived from seasonal forecasts and El Niño/La Niña warnings and advisories, which will be converted into information products designed for disaster loss reduction purposes and key socio-economic sectors, public health, agriculture, fisheries, water management, energy production and use. The centre should be starting its operations in September 2002.

Glacial Lake Outburst Flood (GLOF)

UNEP through its *Environment Assessment Programme for Asia and the Pacific (EAPAP)*, at the Asian Institute of Technology, Bangkok, is contributing to the establishment of an operational early warning system to monitor hazards in the Hindu Kush Himalayan region. Through a project implemented in collaboration with the *International Centre for Integrated Mountain Development (ICIMOD)*, Nepal recently produced inventories of glaciers and glacial lakes in Bhutan and Nepal, specifying the potential risk lakes. Outputs of the project also included recommendations for the establishment of a system for monitoring potential risk lakes using remote sensing, GIS and strengthening of national capabilities to implement an early warning system for GLOF hazards. Training of local experts was also provided.

Implementation of an early warning system in Nepal

Following panic created by the media in the summer of 1997 in the Rolwaling and Tama Koshi Valleys, His Majesty's Government of Nepal implemented an early warning system at the end of June 1997 to provide timely warning to the people. An army and two police posts were established at appropriate locations and provided with high frequency (HF) radio transceivers, one post having a back-up set. Regular radio contacts were maintained with headquarters in Kathmandu. In addition, the posts were provided with satellite telephones. The disaster prevention cell at the Home Ministry was informed twice a day. In the event of a GLOF, Radio Nepal, the national broadcaster, would broadcast a warning. Radio Nepal can be received in most places along the valleys that are at risk.

The GLOF early warning system

The first flood warning system in Nepal was installed in May 1998 to warn the people living downstream from Tsho Rolpa Glacial Lake, in the potential GLOF affected areas along the Rolwaling and Tama Kosi Valleys as well as at the Khimti Hydroelectric Project. The Department of Hydrology and Meteorology implemented the project financed by the World Bank. The operation of the warning system has been satisfactory. The GLOF warning system can be essentially divided into two general components: the GLOF sensing system, which detects the occurrence of a GLOF and initiates the warning process, and the downstream warning system, which conveys

GFMC provides a web portal with the global, regional and national systems that are available for real-time or nearly real-time early warning of wildland fire. Most systems are based on weather forecasts at short to extended time ranges and global to regional space scales. The global system is generated by the *Experimental Climate Prediction Centre (ECPC)*. Regional systems are provided by the Association of South-East Asian Nations (ASEAN) *Fire Weather Information System* (generated by Forestry Canada), the *Eurasian Experimental Fire Weather Information System* (Forestry Canada and GFMC) and the *European Natural Hazards Project Forest Fire Risk* (European Union). Other systems are satellite-based indices, e.g. the Normalized Difference Vegetation Index (NDVI) and thermal data from the NOAA Advanced Very High Resolution Radiometer (AVHRR) sensors. Area, intensity and duration of vegetation stress, fire potential and danger can be estimated from maps that are updated regu-

larly. Together with real-time satellite data on active fires the GFMC information system provides a range of information tools for early warning of critical fire situations.

The *Pacific Tsunami Warning System (PTWS)* of the *International Oceanographic Commission (IOC)* of UNESCO provides timely and effective tsunami warning, watch and information bulletins to the populations of the Pacific. It is operated through the *Pacific Tsunami Warning Centre (PTWC)* with the support of national and regional tsunami warning centres. IOC also maintains an *International Tsunami Information Centre (ITIC)*, which acts as a source of information for national and regional tsunami warning authorities.

Alongside these programmes, the *Three Global Observing Systems (G3OS)*, namely the *Global Climate Observing System (GCOS)*, the *Global Terrestrial Observing System (GTOS)* and the *Global Ocean Observing System (GOOS)*, in which United Nations agencies, the *International Council of Scientific Unions (ICSU)* and satellite agencies work together, make important contributions to the warning process. G3OS activities are harmonized through the *Integrated Global Observing Strategy (IGOS)*, to which the United Nations system-wide Earthwatch is also providing support especially as far as environmental observation and assessment are concerned. Environmental data need to be integrated into early warning strategies and Earthwatch provides a useful platform for information and knowledge exchange.

With continuing globalization in travel and trade, global epidemic surveillance is essential to ensure international public health security. International efforts to contain health-related threats are coordinated by WHO. WHO has established a number of international networks for specific disease threats and has developed several electronic databases including: FluNet, a geographical information system to monitor influenza activity and the *Global Public Health Intelligence Network (GPHIN)*, a web-based system developed in collaboration with Health Canada which scans the web for outbreak-related information. The early warning and response network of Southern Sudan (see box) also

Early Warning and Response Network (EWARN), Southern Sudan

EWARN was launched in 1999 by WHO in collaboration with several international agencies, NGOs and local communities to strengthen outbreak detection and response.

Objectives of EWARN:

- Early detection, alert and prompt investigation of suspected outbreaks;
- Establishment and strengthening of outbreak preparedness and rapid response;
- Provision of regular feedback and technical guidance to all involved;
- Building local capacity for early detection, prompt investigation and rapid response.

Currently, EWARN partners handle alerts that would previously have called for mobilization of international teams.

In 2000 a relapsing fever outbreak was contained within two weeks of reported onset, with 154 cases and eight deaths. Partnership has improved alerting, reporting and response in the event of suspected outbreaks and saved time, money and lives. The development of an early warning and response network in Southern Sudan which has built on the experiences and resources of existing NGOs, has provided a model of success in using scarce resources to build capacity and make a difference within a multidisease or integrated disease surveillance and response framework.

Drought early warning systems

Possible achievements through concerted and systematic approaches undertaken internationally, regionally and nationally are evidenced by the accomplishments in drought early warning systems established in the wake of the world food crisis in the early 1970s.

The FAO Global Information and Early Warning System on Food and Agriculture (GIEWS) provides a framework for institutional links and information-sharing agreements among United Nations organizations, governments, NGOs and trade, research and media organizations, while supporting national and regional initiatives. It monitors food supply and demand conditions for all countries in the world on a continued basis and provides timely warnings of any imminent food shortages, droughts and hunger at individual country or sub-regional level.

The USAID Famine Early Warning System (FEWS) Net provides a full range of products and services strengthening the abilities of African countries and regional organizations to manage threats of food security through the provision of timely and analytical early warning and vulnerability information.

Article 10 of UNCCD encourages parties to “enhance national climatological, meteorological and hydrological capabilities and the means to provide for drought early warning”. UNCCD encourages parties to ensure that the collection, analysis and exchange of data and information on drought and land degradation addresses the needs of local communities and that these are involved in these activities (article 16). Parties to UNCCD have recognized the importance of building on existing operational early warning systems within the framework of national action programmes. The UNCCD Committee on Science and Technology established two ad hoc panels of experts to examine the issue of early warning systems in the light of the approach adopted by ISDR. The panels concluded that early warning for drought prediction and assessment, and monitoring and assessment for desertification are fundamentally interrelated, yet operationally different activities. The panels recommended that operational drought warning systems should incorporate desertification monitoring into their activities and integrate systems to address both drought and desertification, rather than establishing separate systems. Traditional knowledge should also be integrated into monitoring and assessment activities.

The IGAD policy on food security and environment addresses requirements of early warning systems such as remote sensing services. *Drought Monitoring Centres for Eastern and Southern Africa* primarily focusing on drought have extended their products and services to cover weather and climatic patterns, as well as impact assessments.

The new SADC Food Security Programme has widened its scope to encompass economic development, trade, investment and poverty (see also chapter 3.2). A regional coordination and cooperation programme supports cooperation on all food security, agricultural and natural resources development issues. A regional information system for food security supports the generation and exchange of information relating to all aspects of food security, ranging from information about policies through socio-economic data of economies to data concerning the nutrition of households for decision-making purposes across all the facets of the food, agriculture and natural resources sector. Components of the system include: the *Regional Early Warning System for Food Security (REWS)*; the *Regional Remote Sensing Unit (RRSU)*; and the *Regional Environmental Information System (REIS)*.

The Sahelian *Regional Training Centre for Agrometeorology and Operational Hydrology and their Applications (AGRHYMET)* of the *Permanent Inter-State Committee for Drought Control in the Sahel (CILSS)* is now also dealing with natural resources management and the impacts of climate change.

Early warning of volcanic eruptions in Japan

The *Japanese Coordination Committee for the Prediction of Volcanic Eruptions* dedicates its efforts to the mitigation of damages from volcanoes. In this regard, early warning of eruptions is essential. Therefore, the *Japan Meteorological Agency (JMA)*, universities and other research institutes are constantly monitoring and conducting research on volcanoes using up-to-date technologies. JMA and university institutions regularly observe the most active volcanoes on a real-time basis by using seismographs and cameras. Usu is one of the intensively observed volcanoes. In March 2000, the Committee reported the possibility of an eruption. In response, the relevant administrative organizations such as the National Land Agency, JMA, the Ministries of Construction, Home Affairs and Transport, and the national police dispatched officials to the site and organized a local liaison meeting, followed by the setting up of a local headquarters for major disaster countermeasures to share information and decide on appropriate action. Local government officials, public corporations/companies and relief services were dispatched on site. Thus a response system both at the national and local levels was in place before the eruption. Advisory evacuation bulletins were issued to local residents using local community networks and mass media. The agencies and ministries concerned arranged shelter, transportation and security. Evacuation orders then followed, whereby 10,000 people were evacuated; no death or injury was reported. The absence of human casualties can be attributed to the coordinated efforts of the organizations involved in disaster management. In this regard, accurate prediction of the eruption through constant observation with the latest technologies was a key factor, allowing quick governmental response. Strong collaboration between each ministry and organization allowed quick evacuation and provision of shelters. Moreover, partnerships with other organizations such as the media secured efficient dissemination of warnings and evacuation orders.

Source: ADRC, 2001

provides a concrete example of health-related early detection, alert and investigation of disease outbreaks.

At the national level, the Nicaraguan Government has given natural hazard prevention an important role in its politics. Scientific investigations, mapping activities and the establishment of early warning systems are carried out by INETER. These efforts and cooperation with the Civil Defence of Nicaragua and other institutions should lead to successful early warnings.

Multidisciplinary, intersectoral and multi-agency communications requirements

Communication-related issues in the context of early warning systems have two aspects; the hardware aspect relates to the maintenance of lifelines, i.e. the necessity to build or strengthen robust hazard-resistant communication systems; the software aspect relates to the maintenance of relationships, i.e. the need to establish and maintain effective links and working relationships among the actors involved in the early warning chain.

As stated earlier, considerable scientific, technical, communication and managerial efforts have been achieved to improve early warning systems for a range of natural hazards. Systems are more accurate than ever and can deliver information more quickly than ever. However, most advanced technologies for

observation, analysis and transmission are not equally available and affordable throughout the world. Present and anticipated activities within the ISDR framework and bilateral/regional technical cooperation programmes offer concrete vehicles to assist developing countries in improving their forecast, prediction and communication systems. Moreover, it is recognized that occurrence of a hazard and ensuing relief aid, usually target the more “technical in nature” needs, such as hazard-resistant forms of communication or sophisticated means of data collection and processing, to mention but two.

The necessity to build or strengthen key lifeline resources, such as electrical supply or telephone networks, to robust hazard-resistant standards is well documented and obvious. Solutions exist and are well

Experience shows that one of the most effective measures for reducing damage and consequences of natural disasters is a well-functioning coordination of actions among a number of governmental institutions involved in this activity. In the framework of the State Emergency Commission of **Ukraine**, special procedures for natural disaster preparedness and mitigation have been established by the Government for national agencies. These specify basic principles and directives, define roles and responsibilities of different departments and institutions for action at the national, subregional and local levels.

The role of the mass media in early warning systems

An effective early warning system is one that reaches people using means with which they are conversant. Mass media can serve to warn the public effectively, especially about slow-onset hazards. Television and radio have potentially important roles in making and disseminating public information and educational programmes that can help improve the population's knowledge and behaviour in the face of hazards and risks. However low capacity to make their own programmes reduces the extent to which national media and broadcast services can fulfil a more important role in hazard education and warning. An additional shortcoming is the lack of interaction between professional originators of warnings and professional media presenters and programmers. If both sides work together, the impact of broadcasts on warning response is significantly enhanced. In **Mauritius**, a low-cost media weather presentation system allows weather professionals to prepare, construct and record their own weather presentations on video for broadcast. Selected weather professionals are trained in presentation and video recording, as their authority is higher than professional presenters with some meteorological training.

Source: UK Flagship Programme, 1998.

known; recent developments in information technology will go a step further in protecting key resources from damages caused by disasters. Back-up communication systems such as battery-powered radio and telephone links need to be part of effective warning systems. In **Mauritius**, the back-up system would still operate even if a cyclone were to destroy or interrupt the power supply system.

At the intersection of technology and communication issues, capitalizing on the extensive penetration of mobile phones even among the poorest of the poor and into village life, street vendors and coastal fishermen, constitutes a potentially valuable means for "leapfrog technology" to be used in delivering warnings. It will require a consistent process, based on collaboration between public services, communications technology and a highly competitive commercial field, to work out uniform standards, inter alia.

Improvements in the hardware side of early warning have unfortunately not meant that communities have been made safe from disasters. This will be achieved by devoting more attention to the software side of early warning, i.e. developing improved or alternative methods of communication to address the inappropriate linkages between technical originators, intermediaries, disseminators and the receivers of warnings. To be truly effective, human and institutional inadequacies of communication links need to be addressed. Communication throughout the early warning chain must be an integrated multiple-way process, through which originators, intermediaries, disseminators and users are in constant touch with one another in order to make the system responsive to people's needs, priorities and decisions or in other words, translate predictions into

response actions. This implies recognizing early warning as a socio-organizational process and finding suitable means of communication to establish strong partnerships between different social groups and organizational systems, including the media and private/commercial communications channels. Institutionalized intersectoral, multi-agency communication capabilities need to be developed outside emergency situations so as to be able to function and generate timely response when disasters strike. Such efforts should start with an assessment of the existing information systems and organizations in place, as well as of their communication channels. Mutual trust and respect has to grow from friendship and regular joint working between actors in a warning system. It is also vital to define roles and responsibilities clearly, preferably by law within an effective operational system of disaster management. In the **Philippines**, regular training takes place where the different actors in a typhoon warning system meet to practise management of the warning—from origination to protective action on the ground.

Proper information and data management and transfer from the international to the local level will also help countries reduce the resource burden generated by scientific, technological and technical sophistication.

The basic aim of the recommendations from the Bonn meeting described above, was to create linkages to ensure dialogue among all stakeholders involved in early warning through early warning platforms. They also addressed most of the concerns described in this subsection.

Institutional services that can react to warnings

Warning in itself has no value, what is fundamental is how people react to it. The ultimate indicator of a warning system's effectiveness is the warning recipient's response to the warning. The mere existence of an efficient early warning system should not lead to a false sense of security.

In **Kenya**, the *Early Warning System (EWS)* model pioneered by the *Turkana Drought Contingency Planning Unit (TDCPU)*, which has now been scaled up to cover 10 districts in the north of the country, provides an interesting example of how early warning data can be translated and communicated clearly to decision makers. Although monitoring at least 18 indicators, covering environment, the rural economy and human welfare, EWS delivers a simple message to decision makers. By using a predefined sequence of warning stages, from "normal" to "alert" to "alarm" to "emergency", it presents an easily understood summary analysis, directly linked to response interventions.

Early warning is widely acknowledged as being much more than a technological issue related to hazard monitoring, forecasting and telecommunications and a scientific issue related to climatology, volcanology and seismology. It is expected to provide clear, consistent, critical and user-friendly information to emergency management officials and the public in due time to ensure that appropriate action can be taken to minimize loss of life and property. Therefore, the last segment of the early warning chain, namely the reaction to warning messages, deserves more attention in the design and operation of early warning systems. Known, structured, practised and sustained contingency action plans are required to elicit proper response after clear and consistent messages are issued, especially when the time to act becomes shorter. In this regard the importance of regular simulation exercises is critical to improve both the efficiency of the response actions and receive the necessary feedback to adjust the overall design of the early warning system. After the disastrous Oder flood event in 1997 it was recognized that there was a necessity for combined exercises for emergency situations and improved coordination of countermeasures between respective government authorities on the German and Polish sides of

the river. It also pointed to the need for some early warning systems to be transboundary in nature.

There is one example of disaster management contingency planning based upon a well-understood early warning system and accomplished measures of disaster preparedness that could provide wider beneficial experience. A systematic and annually reviewed process of contingency planning for disaster preparedness and response has been in force in **Mauritius** since the 1960s. It is derived from the primary forecasting and early warning authority of the National Meteorological Service, and is coordinated across all operational sectors of government, under the overall authority of the Prime Minister's Office. This programme has given particular attention to maintaining the relevance of its operational plans throughout changing conditions of growth and development in the country, even though tropical cyclones directly impact the society only every eight to ten years. The public and official acceptance of early warning and disaster preparedness as integral elements of government responsibility and the resulting informed public behaviour displayed across generations must both be considered as factors of the strategy's success. The National Meteorological Service has been central to the early warning process and has been a motivation for the preparedness strategy since its inception. It has further demonstrated the leadership that mete-

Warrick et al. (1981) cited the case of the ash fall warning that was issued by the Washington State Department of Emergency Services in advance of the eruption of Mount St. Helens. Although issued by an authoritative source, this message was not passed on to the community at risk by intermediate agents because it lacked a sense of urgency, was not specific about the areas likely to be affected by ash fall and contained no guidance about precautionary actions which people were expected to take. It is now believed that effective warning messages should contain a moderate sense of urgency, estimate the time before impact and the scale of the event and provide specific instructions for action, including the need to stay clear of the hazard zone

Source: Gruntfest 1987

orological services can provide by reaching out to include other partners and professional sectors through disaster preparedness initiatives. By appreciating the threat of future potential natural disasters, the National Meteorological Service and the Disaster Management Unit continue to work closely with other government, commercial and public interests on preparedness and mitigation initiatives to address the possible consequences of climate change on all the social and economic aspects of the country.

Unusual for early warning systems, the Director of the Mauritius Meteorological Service is empowered by the political authority to issue necessary warnings himself, without prior or additional recourse or approval by any other public authority. In the course of a developing emergency, close communication is manifestly maintained with the political authorities. This is, however, a clever contingency if communication is impossible; it also clearly situates the responsibility on the professional shoulders of the Meteorological Service.

The interaction between the prediction and response elements of the warning chain is important. For example, the **Russian Federation** has institutionalized interaction between disaster prediction and mitigation in its national "Safety" programme, responsible for risk response activities in emergency situations. The framework for interaction extends to all the member countries of the Commonwealth of Independent States through the Inter-State Council on Emergencies. A joint programme develops and adopts, inter alia, systems and technical means for prediction, warning and quick response measures.

However, clear procedures for verification that messages are not only received and understood, but also acted upon, are often overlooked. In **Hong Kong**, for example, the typhoon warning system requires that when meteorologists issue a warning message to the police and fire services, recipients should confirm that the warning has been received and will be acted upon.

In some cases, slow or no response to timely early warning information received can be rooted to a lack of trust in the reliability of the system; to contradictory information or to the fact that messages are not tailored to potential beneficiaries or do not include advice on viable courses of action to reduce risk. The socio-economic, cultural, or else political reasons not to act once warnings are received, need to be overcome by making provisions for follow-up response capacities.

This is illustrated by the comparative study conducted by the *Philippine Institute of Volcanology and Seismology (PHIVOLCS)* of the Mayon volcano and Taal Volcano Island in the Philippines. The study showed that on Mayon volcano, inhabitants at risk complied with evacuation orders received through the radio only after having sought confirmation from the barangay (village) or municipal leader. In comparison, on Taal Volcano Island, most of the inhabitants were responsive to evacuation orders received from community leaders and by broadcasts. The difference in attitude was explained by reporting habits/styles of popular local radio announcers and consistency of the radio announcers' warning with folk-observed precursors to eruptions (Jean C. Tayag, 1998).

Future challenges and priorities

What should the early warning process accomplish in the coming years? From the issues discussed in this chapter, the following areas for action stand out:

- Human-based and communication requirements;
- Conceptualization of early warning;
- Interpretation of scientific predictions based on vulnerability and risk assessments and their translation into effective actions;
- Public participation;
- Coordination of national, regional and international early warning activities.

The establishment of a global early warning programme and the development of an international early warning platform/forum, as suggested at the Bonn meeting on early warning and sustainable development (March 2002), should provide a useful framework to respond to these challenges. If as envisaged the global programme on early warning and the international early warning platform/forum trigger the establishment of national and subregional early warning platforms/forums to strengthen networking and capacities among the actors involved in the early warning chain, many of the above needs could be solved.

● Human-based and communication requirements

This chapter made clear that more than a process of technological paraphernalia, the early warning process should become a clever communication system. The most pressing need is to address the human-based and communication systems-related weaknesses. This conclusion is not a new one; a major output from the IDNDR early warning systems Working Group was that the difficulties are decidedly NOT technological ones, but rather conceptual, systemic, and human or institutionally-based communication ones. The same fact is reflected in the recommendations of the Bonn meeting, which calls for better interlinkages to ensure dialogue among all stakeholders at the international, regional, national and local levels, to, among other things, integrate activities, interests and expertise of the various

groups involved in the early warning process, organize information and technology exchange, train users to find and utilize appropriate early warning products, strengthen institutions at all levels and build capacities. Institutionalized and regularly tested communication channels clearly spelling out the functions and roles of the various actors along the warning chain will avoid contradictions and duplication and ensure the ultimate success of getting the warning message down to populations at risk wherever they live. Greater coordination between services involved in the provision of data and information will provide a comprehensive picture of conditions and outlooks necessary to inform decision-making and response actions.

● Conceptualization of early warning

The initiative to hold a meeting on early warning and sustainable development was timely in addressing one other challenge, which relates to the fact that conceptualization and implementation of early warning still take place along the “old rapid onset hazard/event or organizational specific” lines. This is counterproductive to an overall, and more systematic, comprehensive approach to the global needs of the twenty-first century. Early warning being a pillar of disaster reduction strategies has to find its way in sustainable development policies. This means that early warning must now necessarily encompass both environmental and climatic processes—over a longer period of time as well as during periods of quiescence (e.g. between El Niño episodes, in between fire weather, smoke and haze seasons, during hurricane and typhoon off-seasons, etc.) rather than being singular event-based concepts or scenarios. There is then a much greater need for institutionalized standard nomenclature, procedures and extended organizational relationships, which should benefit from advances in communications facilities and information technologies. Convergence and coherence in early warning activities in the context of sustainable development should be promoted. This will involve the ability of early warning systems to deliver information about vulnerability patterns in addition to hazards forecasting. Systems such as GIEWS and FEWS that provide vulnerability information related to food security are needed in the areas described in chapter 2.

Criteria to measure the effectiveness of early warning systems need to be elaborated to increase their credibility and improve their efficiency. In this regard, special attention should be given to the accuracy, timeliness and coverage of warnings, including number of recipients and validation process, calculation of avoided deaths and economic losses, failure to identify risk and take response measures, rating of recipients' satisfaction, including awareness of the system in place, warning time, conflicting information and inappropriateness or inconsistency of it.

- **Interpretation of scientific predictions based on vulnerability and risk assessments and their translation into effective actions**

Unrestricted and affordable access to all relevant information on early warning for all users is necessary but not sufficient. Improvement of the interface between issuers and intermediaries for a better interpretation of scientific predictions and their translation into positive administrative actions is a key factor of the early warning chain. This issue involves several facets. First of all, if as noted, advances in forecasting and monitoring are remarkable, the accompanying vulnerability and risk information is often missing. Major efforts should be undertaken in the coming years to assess vulnerabilities, generate risk scenarios and vulnerability maps, based on standardized methodologies. Then more attention should be devoted to developing user-friendly products for decision makers and communities at risk. This will require a better understanding of user needs and preferences on how the information should be presented and how to apply it in the decision-making process. This last point will need treatment of the uncertainty factor in predictions and its consequence for decision-making processes.

- **Public participation**

The user-oriented requirements spelled out above will be met through structured and focused participation of the public in the

design and dissemination of warning messages. People need to know the types of risks they are facing, then be aware of the alert systems in place in case the risk becomes a reality, then to understand the warning messages they will receive in case of crisis and finally the reaction expected from them. Public participation is the key to trustworthy and credible early warning systems. Therefore integrated information systems ensuring community participation in national early warning strategies need to be developed. These systems will have built-in capacities to record, test and incorporate traditional and local knowledge and coping strategies in early warning systems, including from one generation to the other. This feature is important for infrequent events. Public participation is also essential to regularly test systems in place and carry out after-event feedback analysis to improve them.

- **Coordination of national, regional and international early warning activities**


The need to strengthen the international framework for improving early warning systems through an effective international mechanism, including for the transfer of technology to developing countries is not a new one either. The recommendation from the Bonn meeting to establish a global early warning programme and develop an international early warning platform/forum responds to this need. Coordination and cooperation, exchange of information, experience and technologies, interface between national, regional and international activities are necessary driving elements to avoid duplication and move the early warning process forward. The early warning process will benefit from resources and information/knowledge exchange through enhanced contacts with institutions in charge of multilateral environmental agreements, especially UNCCD and the United Nations Framework Convention on Climate Change (UNFCCC). Such contacts will also improve interaction between the early warning process and the international agenda for sustainable development.



Main challenges for drought early warning systems illustrating the range of issues faced in the early warning process

- **Data sharing:** Meteorological and hydrological data are often not widely shared between government agencies. This restricts early assessment of drought and other climate conditions and retards its use in drought preparedness, mitigation and response. In some countries, the high cost of data acquisition from meteorological services restricts the flow of information for timely assessments and for use in research. Memorandums of Understanding (MOUs) between government agencies would facilitate data sharing and use and could bring tremendous societal benefits;
- **Early warning systems products:** Data and information products produced by early warning systems are not often user-friendly. Products are often too complicated and do not provide the type of information needed by users for making decisions. Users are seldom trained on how to apply this information in the decision-making process or consulted prior to product development. Products are often not evaluated for their utility in decision-making. User needs should be assessed and products evaluated through permanent feedback mechanisms;
- **Monitoring tools:** In the case of droughts, triggers for specific mitigation and response actions are often unreliable because of inadequacy of detection tools and inadequate linkages between indices and impacts. Integrated assessment products are preferred but few attempts have been made to integrate meteorological and hydrological information into a single product for purposes of detecting and tracking drought conditions and development. It is critical that an integrated approach to climate monitoring be employed to obtain a comprehensive assessment of the status of climate and water supply;
- **Impact assessment methodology:** One of the missing links in early warning systems is the connection between climate/drought indices and impacts. The lack of effective impact and reliable assessment methodologies has hindered the activation of mitigation and response programmes and reliable assessments of drought-related impacts;
- **Delivery systems:** Data and information on emerging drought conditions, seasonal forecasts and other products are not often delivered to users in a timely manner. This characteristic significantly limits the usefulness of these products for most users. It is critical that delivery systems be improved and be location appropriate. For example, the Internet provides the most cost-effective information delivery in many settings but is inappropriate in most developing countries. Electronic and print media, as well as local extension networks, need to be used more fully as part of a comprehensive delivery system to diverse user groups.

Source: WMO, Early Warning Systems for Drought Preparedness and Drought Management.



Chapter 6

Related international commitments and the UN role in disaster risk reduction

- 6.1 Selected international development agendas and commitments
- 6.2 UN agencies and scope of activities



Photo: G. Berz, Munich Re

6.1. Selected international development agendas and commitments

The international community has adopted several significant declarations, agendas and conventions during the last decades, on, among other things, environment, fresh water management, climate change and desertification, social development, habitat and food security, which all contain commitments related to disaster reduction. These are often referred to in the text of this review.

The following section will provide a short overview of some of the most relevant ones, in particular those related to sustainable development, which is built around three pillars: social and economic development, and environmental protection. These are all relevant elements for disaster risk reduction and need to be linked to the efforts to implement the objectives of the International Strategy for Disaster Reduction. The full implementation of the global visions expressed below are yet to be realized.

The following mainstream agreements or subjects are touched upon in this chapter:

- Millennium development goals
- Sustainable development agenda
- Climate change
- Desertification and drought
- Wetlands
- Freshwater agenda
- Gender agenda
- Habitat agenda
- Small island developing states
- Least developed countries

An overview of how the different parts of the UN system relate to risk reduction is described in section 6.2. of this chapter.

The Millennium Development Goals

The UN Millennium Summit gathered in New York in September 2000. A total of 189 world leaders met and adopted the UN Millennium Declaration (A/RES/55/2).

Targets, known as *the Millennium Development Goals* were established, setting a new milestone and providing guiding principles for the international community, national governments and, in particular, the United Nations. Many of them touch on areas which are closely linked to vulnerability to natural hazards, such as eradicating extreme poverty and hunger, achieving universal primary education, promoting gender equality, ensuring environmental stability and partnerships for development. For example, the goal of improving the lives of thousands of slum dwellers around the world living in high-risk areas by 2020,

"We recognise that, in addition to our separate responsibilities to our individual societies, we have a collective responsibility to uphold the principles of human dignity, equality and equity at the global level. As leaders, we have a duty therefore to all the world's people, especially the most vulnerable and, in particular, the children of the world, to whom the future belongs."
Millennium Declaration

involves poverty eradication, proper land use planning and the improved understanding of vulnerability to disasters in densely populated areas.

Under "Protecting our common environment" the declaration resolves "to adopt in all our environmental action a new ethic of conservation and stewardship and, as first steps, resolves...to intensify cooperation to reduce the number and effects of natural and man-made disasters."



Strategies linked to ISDR for moving ahead on this goal as described in the "Road map towards the implementation of the United Nations Millennium Declaration" (Secretary-General Report to GA A/56/326) include:

- developing early warning systems, vulnerability mapping, technological transfer and training;
- supporting interdisciplinary and intersectoral partnerships, improved scientific research on the causes of natural disasters and better international cooperation to reduce the impact of climate variables, such as El Niño and La Niña;
- encouraging governments to address the problems created by megacities, the location of settlements in high-risk areas and other manmade determinants of disasters;
- encouraging governments to incorporate disaster risk reduction into national planning processes, including building codes.

The Sustainable Development Agenda

The World Summit on Sustainable Development (WSSD) is being held in Johannesburg, South Africa, in August 2002, 10 years after the *UN Conference on Environment and Development (UNCED)*. *UNCED*, also known as the *Earth Summit*, took place in June 1992, in Rio de Janeiro, Brazil.

The main outputs of that summit were the *Rio Declaration on Environment and Development and Agenda 21* - a 40 chapter program of action. *UNCED* also led to agreement on two legally binding conventions on *Biological Diversity (CBD)* and *Climate Change*

(*UNFCCC*). It also produced a Statement of Forest Principles. It started the process of developing a *Convention to Combat Desertification (UNCCD)* in those countries experiencing serious drought and/or desertification, in particular in Africa, adopted in 1994. The Earth Summit gave rise to a number of positive responses including the emergence of thousands of local Agenda 21 initiatives and an enhanced political profile of environmental issues. It led to the formation of the *Commission for Sustainable Development (CSD)* and many countries set up strategies for sustainable development. But in only a few cases did these include concerns for risk and disaster reduction.

The journey toward sustainable development is far from being achieved. This is one conclusion reached during the preparatory process to review the implementation of Agenda 21, in preparation for the WSSD. In the last thirty years a whole series of summits, meetings and agreements have brought us to the wide ranging interpretation of sustainable development that we see today.

For a long time, environment was seen as antagonistic to development. However, in 1972 a major step was made towards the recognition of the need to address environmental problems if better living conditions were to be attained. In 1992, although experience had been gained and environmental policy was becoming routine practice worldwide, resistance against the environmental agenda was still high. Thanks to the high political profile of climate change and biodiversity, the environment agenda was boosted. In 2002, the essential need for environmental strategies to achieve sustainable development is no longer questioned, even if in terms of implementation the situation is still far from ideal.

Disaster reduction and sustainable development

The First World Conference on Natural Disaster Reduction convened in Yokohama, Japan, in May 1994, represented a turning point for promoting disaster reduction. It led to the adoption of the Yokohama Plan of Action and changed focus of the work in the second half of IDNDR. The new approach included more focus on risk and vulnerability reduction and renewed effort to incorporate disaster reduction concerns into sustainable development. Increased emphasis was given to social sciences and a focus on public policy and promotion of community involvement to reduce risk to disaster in all stages. A ten-year review of the implementation of the Yokohama strategy will take place in 2004."

Disaster reduction was not dealt with as such during the Rio conference's agenda, even though it was included in the discussion on human settlements, mountain development, fresh water management and land degradation. During the IDNDR, the connection between disaster reduction and sustainable development, including its social, economic and environmental dimensions has been clarified to a greater extent. The awareness of these issues and the nature of the cross-sectoral relationships evolved as an increasing array of United Nations Multilateral Environmental Conventions on climate change, desertification and biodiversity, signed between 1992 and 1994.

These joined the long standing *Ramsar Convention on Wetland Preservation (1971)* to emphasize the importance of natural resource management and the dynamic growth of risk factors that contribute to natural disasters.

sustainable development as development which "meets the needs of present generations without compromising the ability of future generations to meet their own needs."

History of the Earth Summit

The concept of sustainable development dates back a long way but it was at the *UN Conference on Human Environment (Stockholm, 1972)* when the international community met for the first time to consider the global environment and highlighted the need to support people in this process. The Conference indicated that industrialised environmental problems, such as habitat degradation, toxicity and acid rain, were not necessarily relevant issues for all countries and communities. However, it was the existing environmental problems that dominated the meeting and led to wider public environmental awareness.

Sustainable development meets the needs of the present generations without compromising the ability of future ones to meet their own needs....

However, the description of sustainable development in Agenda 21 called for a total shift in the status quo of prevalent value systems and institutional processes. Such global change could never have occurred over night. When progress was assessed after five years - Rio+5 in New York, 1997 - many gaps in implementation were identified, particularly with regard to social equity and poverty. Falling levels of official development assistance (ODA) and growing international debt contributed to this. It also showed failures to improve technology transfer, capacity building for participation and development, institutional coordination, and to reduce excessive levels of production and consumption.

In the 1980s, the UN set up the *World Commission on Environment and Development*, also called the *Brundtland Commission*. They produced *Our Common Future*, otherwise known as the *Brundtland Report*, which framed much of what would become Agenda 21 and the 27 principles of the Rio Declaration on Environment and Development. It defined

The review meeting called for the ratification and implementation of the growing number of international agreements and conventions which refer to environment and development. The same concerns regarding implementation have been raised in the Rio+10 preparatory

The four broad areas of action of Agenda 21

Elements	Issues
Social and economic dimensions to development	Poverty, production and consumption, health, human settlement, integrated decision-making
Conservation and management of natural resources	Atmosphere, oceans and seas, land, forests, mountains, biological diversity, ecosystems, biotechnology, freshwater resources, toxic chemicals, hazardous radioactive and solid waste
Strengthening role of major groups	Youth, women, indigenous people, NGOs, local authorities, trade unions, businesses, scientific and technical communities, farmers
Means of implementation	Finance, technology transfer, information, public awareness, capacity building, education, legal instruments, institutional frameworks

process, leading to the WSSD. During this process, natural disaster has been identified as a serious constraint to sustainable development and has been included as an action point in the draft programme of implementation.

More information can be found on
www.earthsummit2002.org

● Expected results of WSSD

- Political declaration on increased commitment for action.
- Programme of implementation building on Agenda 21 and the Rio Principles.

- Partnerships (global, regional or sub-regional) to implement specific parts of the plan of implementation.

Disaster is emerging as one of the new subjects in the draft plan of implementation and will hopefully be recognised as a prerequisite for sustainable development. The subject is dealt with under the issue of protecting and managing the natural resource base of economic and social development, and also touched upon under poverty eradication for adequate and secure housing for the poor and under means of implementation. The sections on small island developing states, as well as the one for Africa, include special concerns and action points related to increased capacities to cope with disasters.



Elements discussed for the programme of implementation of Johannesburg:

"An integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the 21st century." Actions, which are required at all levels, mentioned in the draft after the last preparatory committee held in Bali, call for a strengthened role of the International Strategy for Disaster Reduction (ISDR), and include:

- The need to strengthen or establish effective regional, subregional and national strategies and scientific and technical institutional support for disaster management, including joint observation and research.
- Wetland and watershed protection and restoration to reduce floods, improved land-use planning, improving and applying techniques for assessing the potential adverse effects of climate.
- Dissemination and use of traditional and indigenous knowledge to mitigate the impact of disasters.
- Promoting community-based disaster management planning by local authorities, including through training activities and raising public awareness.
- Supporting the ongoing voluntary contribution of, as appropriate, NGOs, the scientific community, and other partners in the management of natural disasters according to agreed, relevant guidelines.
- Development and strengthening of early warning systems and information networks in disaster management.
- Strengthening capacity at all levels to collect and disseminate scientific and technical information, especially El Niño and La Niña, through assistance to institutions devoted to addressing such events.



Steps to Earth Summit 2002

UN Sustainable Development Process	Key Events
1972 UN Conference on Human Environment (Stockholm) UNEP established	1982 UNEP's first high level meeting
1980 World Conservation Strategy (IUCN)	1991 Children's Summit, New York
1983 World Commission on Environment and Development (the Brundtland Commission) set up	1992 Framework Convention on Climate Change (FCCC) and Convention on Biological Diversity (CBD) agreed
1989 Brundtland Report Our Common Future	1993 Human Rights Summit, Vienna
1989 Launch of the International Decade for Natural Disaster Reduction (IDNDR)	1994 World Conference on Natural Disaster Reduction "For a Safer World", Yokohama Conference on Small Island Developing States, Barbados
1992 UN Conference on Environment and Development (the Earth Summit), in Rio de Janeiro. UN Commission on Sustainable Development (CSD) established.	1995 Social Summit Copenhagen Women's Summit, Beijing World Trade Organization (WTO) established
1997 Rio+5 Summit review (critical because of slow implementation)	1996 Human Settlements, Summit Istanbul Food Summit, Rome
1999 End of IDNDR	1997 Kyoto Protocol on Climate Change adopted
2000 Launch of the International Strategy for Disaster Reduction (ISDR)	1998 Convention on Prior Informed Consent adopted
WSSD (Rio+10) process:	1999 IDNDR Programme Forum, Geneva
2001 Defining modalities of process. National, sub regional and regional preparatory meetings	2000 Millennium Summit, New York World Youth Forum, Dakar Biosafety Protocol adopted
2002 Global Prep Comm. 2 (Jan., New York) Substantive review of implementation of Agenda 21 Global Prep Comm. 3 (March, New York) Review and finalize elements for programme of action Global Prep Comm. 4 (May, Bali) Identification of priority issues, programme of	2001 UNEP 21st Governing Council, Cartagena UN Third Conference on Least Developed Countries, Brussels International Conference on Freshwater, Bonn WTO negotiations, including GATTs and agriculture
2002 Financing for Development, Mexico	
World Food Summit, Italy	

2002: World Summit on Sustainable Development defining national, regional and global commitments in Johannesburg, South Africa, 26 August-4 September 2002

Adapted from www.earthsummit2002.org/Es2002.pdf



United Nations Framework Convention on Climate Change (UNFCCC)

The climate change convention was opened for signature at the *UN Conference on Environment and Development in 1992*. Its ultimate goal is the "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic system". The Kyoto Protocol was adopted in 1997, and completed three years of negotiations relating to its operational details in November 2001. It contains legally binding commitments for developed country parties. Most OECD countries agreed to decrease their anthropogenic greenhouse gas emissions by at least 5 per cent below 1990 levels in the first commitment period from 2008-2012. Many countries with high emission rates have not yet ratified the Kyoto Protocol, the most evident being the United States. The Protocol is not yet in force.

Time is ripe for forging the links between climate change adaptation and disaster reduction.

Since the convention's entry into force, parties have met annually in the *Conference of the Parties (COP)* to monitor its implementation and continue talks on how best to tackle climate change. The decisions taken by the COP at annual sessions now make up a detailed rule book for the effective implementation of the convention. *The landmark Marrakesh Accords* adopted at the seventh session of the COP in Marrakesh, in October/November 2001, were especially important in elaborating the convention's rules on issues of particular concern to developing countries.

Industrialised countries, who have historically contributed most to climate change, are requested by the convention to submit regular reports, known as national communications, detailing their climate change policies and measures. These countries are termed Annex 1 Parties of which there are currently 41.

All remaining countries, mostly developing countries, make up the group of non-Annex I Parties, currently numbering 145. These countries are invited to provide national communications in more general terms on

their actions to address climate change and measures taken to adapt to its effect, as well as on their needs to implement the convention. Much of the information requested from Parties to the Convention will be of use for disaster reduction strategies (for example, information on policy frameworks for implementing adaptation measures and response strategies in the context of disaster preparedness, with a view to integrating climate change impact information into national planning processes).

Specific needs and concerns with regard to financial assistance and technology transfer, along with support for capacity building of particularly vulnerable developing countries are taken into account under the climate regime. Some developing countries, such as low-lying island nations or those with areas prone to natural disasters, face high risks from the adverse effects of climate change itself, while others, such as oil exporting states, feel more threatened by the potential economic repercussions of response measures.

The protocol requests Parties to minimize the adverse effects of their climate change policies and measures, including social, environmental and economic impacts on other Parties.

Climate change legislation and financial means at the disposal of the poorest countries pursuant to the provisions of the UNFCCC will bring additional benefits to cope with climate-related disasters, which constitute two-thirds of all disasters.

The 2001 Marrakesh Accords took some important steps forward on vulnerability and adaptation, especially decisions on the adverse effects of climate change including response to climate related hazards. Two new convention funds, to be managed by the GEF, were also established, plus one operating under the Kyoto Protocol.

The scope of activities eligible for funding under the convention was extended, notably in the area of adaptation to climate change and capacity building. These include the integration of climate change considerations in sustainable development planning, systematic observation and monitoring networks and early warning for extreme weather events and disease outbreaks.

The *Clean Development Mechanism (CDM)* established under the Protocol also represents a potential for financing projects providing disaster reduction services. This mechanism is meant to ease emission target compliance for developed countries through the financing of energy projects in developing countries. In the

first commitment period reforestation projects will also be eligible. The door has been left open to add land use projects for the second commitment period.

More information can be found on www.unfccc.int

The Intergovernmental Panel on Climate Change

The IPCC, established by UNEP and WMO in 1988, provides important scientific input to the climate change process. The current structure of the IPCC consists of three working groups: working group I addresses the science of climate change; working group II deals with impacts, vulnerability and adaptation; and working group III with mitigation of greenhouse gases. In addition to the three working groups, the IPCC also includes a Task Force on National Greenhouse Gas inventories.

The IPCC is best known for its comprehensive assessment reports, incorporating findings from all three working groups, which are recognised as the most credible source of information on climate change. The latest, Third Assessment Report released in 2001, stated that "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities and human interference will continue to change atmospheric composition throughout the 21st century".

The IPCC has projected the following alarming chain reaction of events by 2100:

- Largest greenhouse gas emissions would increase from today's level of about 365 ppmv (parts per million by volume) to between 550 and 1000 ppmv.
- Global mean surface temperatures will increase by about 1.5 to six degrees Celsius.
- Incidence of some extreme events will increase including the frequency and magnitude of the El Niño Southern Oscillation (ENSO) phenomenon.

These projections directly affect the very existence of some low-lying states and are likely to have a profound impact on the planet in terms of the likelihood of large-scale disasters.

The IPCC states that there is little evidence that efficient and effective adaptations to climate change risks will be undertaken autonomously. It says that in most developing countries local governments are weak and ineffective at environmental management and have little capacity to integrate disaster preparedness into current tasks and responsibilities.

More information can be found on www.ipcc.ch, see also Chapter 2

Combat desertification and drought

The international community has long recognised that desertification is a major economic, social, and environmental problem of concern to many countries. In 1977, the *United Nations Conference on Desertification (UNCCD)* adopted a *Plan of Action to Combat Desertification (PACD)*. Unfortunately, despite this and other efforts, the *United Nations Environment Programme (UNEP)* concluded in 1991 that the problem of land degradation in arid, semi-arid, and dry sub-humid areas had intensified, although there were "local examples of success".

As a result, the question of how to tackle desertification was still a major concern for the 1992 Rio Earth Summit. The Conference supported

a new, integrated approach to the problem emphasizing action to promote sustainable development at the community level. The Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (UNCCD) was adopted in 1994 and entered into force in 1996. Over 179 countries are now Parties to the convention.

The Conference of the Parties (COP), the convention's supreme body, will hold its sixth session in October, 2003. A permanent secretariat is based in Bonn. *The Committee on Science and Technology (CST)* is multidisciplinary and open to the participation of all Parties. Composed of government representatives, the CST advises the COP on scientific and technological matters relevant to desertification and drought.

UNCCD and desertification/land degradation

Desertification does not refer to the expansion of existing deserts. It occurs because dry land ecosystems, which cover over one third of the world's land area, are extremely vulnerable to over-exploitation and inappropriate land use. Poverty, political instability, deforestation, overgrazing, and bad irrigation practices can all undermine the land's productivity. Over 250 million people are directly affected by desertification. In addition, some one billion people in over one hundred countries are at risk. These people include many of the world's poorest, most marginalized, and politically weak citizens.

Combating desertification is essential to ensuring the long-term productivity of inhabited Rylands. Unfortunately, past efforts have too often failed and the problem of land degradation continues to worsen. This is because the causes of desertification are many and complex, ranging from international trade patterns to unsustainable land management practices.

UNCCD and drought

Drought has received less attention than land degradation in most of the national action programs, possibly due to the lack of capacity in many developing countries to address drought-related issues, and because it is relatively easier to implement concrete measures for combating land degradation. Drought strategies are basically dealt with in terms of adaptation, rather than mitigation.

See more at www.unccd.org (United Nations Secretariat of the Convention to Combat Desertification)

National Action Programme: Countries affected by desertification are implementing the convention by developing and carrying out national, sub-regional, and regional action programme.

Drawing on past lessons, the Convention states that these programmes:

- must adopt a democratic, bottom-up approach
- should emphasize popular participation designed to allow local people to help themselves to reverse land degradation
- must make politically sensitive changes, such as decentralizing authority, improving land-tenure systems, and empowering women, farmers, and pastoralists
- should permit NGOs to play a strong role
- must be fully integrated into other national policies for sustainable development
- should be flexible and modified as circumstances change

Ramsar Convention - wetlands

The Convention was adopted in 1971 in Iran, in the city of Ramsar. It came into force in 1975 and 131 countries already join the Convention and some other are in the process. Ramsar is the only global environmental treaty dealing with a specific ecosystem and the mission of the Convention is "the conservation and wise use of Wetlands by national action and international cooperation as a means to achieving sustainable development throughout

The Ramsar Convention on Wetland Preservation and disaster reduction

Among the many values and functions of wetlands some of the most important involve flood reduction, coastal protection, mitigation of climate change and desertification effects. These considerations are at the heart of the Convention's guidance on management planning for wetlands. In addition to the revised management planning guidelines currently under development for adoption by the Conference of the Parties, additional guidance is also being developed on integrated coastal zone management which stresses these values very strongly.

Ramsar, the *World Wide Fund for Nature (WWF)*, and the Niger Basin Authority are presently working on a project financed by the *Global Environment Facility (GEF)* to designate wetlands throughout the Niger River Basin as Ramsar sites and develop management plans for them which will help to mitigate the effects of seasonal climate variations. A similar initiative also financed by GEF is currently underway with Ramsar, WWF, and the Lake Chad Basin Commission to bring the entire basin under a cooperative management plan following Ramsar guidelines.

Similarly, Ramsar staff is working with local officials and NGOs on a number of projects in Europe to develop sound management regimes for transboundary wetlands such as the Neretva River delta, the trilateral Prespa Park, the Danube Delta and the Dyje Morava floodplain. Although the main purpose of these activities is sustainable use of resources, all have a component that is relevant to disaster prevention.

*Source: Ramsar Secretariat, and G. Bergkamp, B.Orlando, IUCN
RAMSAR secretariat and G. Bergkamp, B.t Orlando, IUCN, 1999*

the world." Some of the main activities of the Convention are the development of National Wetlands Policy and inventories of Wetlands. The Convention deals with all wetlands issues from surface water to groundwater (salty, freshwater, etc). Wetlands and flood control was mentioned in the initial Convention. Nevertheless this has not been a priority until very recently. For the Strategic Work Plan 2003-2008, this topic is included.

The Ramsar Convention Bodies are the Conference of the Contracting Parties, the Standing Committee (regional representatives of Ramsar's six regions), the Scientific and Technical Review Panel and the Ramsar Bureau (Secretariat), in Gland, Switzerland.

Main partners for the implementation of policies are the non-governmental organizations *IUCN-World Conservation Union, Wetlands International, World Wide Fund for Nature (WWF)* and *Birdlife International*.

The Ramsar Convention shares headquarters with IUCN, and has a joint Work Plan with the *Convention on Biological Diversity* and a Memorandum of Cooperation with UNCCD,

Convention on Migratory Species and World Heritage Programme of UNESCO

For more information see www.ramsar.org

The Fresh water agenda

Some 1.3 billion people worldwide lack access to safe drinking water and close to 2.5 billion are not provided with adequate sanitation. Water is becoming scarce due to increasing demands for food production and growing populations. Pollution is also on the increase, threatening water supplies.

There are two intrinsic links between disasters risk reduction and the water agenda. The impact resulting from climate change on the natural surface and ground water systems is increasingly having an adverse affect on social and economic development patterns. Freshwater infrastructures are vulnerable to natural hazards, such as floods, earthquakes, landslides and volcanic eruptions.

There are many political documents that mention risk and water related hazards, forming the so-called fresh water agenda. Prior to

the Rio Earth Summit, the *UN International Conference on Water and the Environment* (ICWE) was held in January 1992. The Dublin Statement (www.wmo.ch/web/homs/documents/english/icwedece.html) on Water and Sustainable Development establishes four guiding principles, as well as an agenda for action, which have guided academic and political discussions ever since.

One of the recommendations relates to the

World Water Assessment Programme

The *World Water Assessment Programme/World Water Development Report (WWAP/WWDR)*, is administered by UNESCO, and is a UN-wide effort, set up upon the request of governments, to pool UN resources regarding world water management. WWAP will assist developing countries to strengthen their capacity to assess their own water situation. The WWDR will target all those involved in the formulation and implementation of water-related policies and investments.

More information is available at:
www.unesco.org/water/wwap

protection against natural disasters, and calls for proactive measures to reverse the current trends. In particular, the Dublin Statement identifies climate change and sea level rise as factors that would exacerbate disaster risk, "threatening the apparent security of existing water resources". Chapter 18 of Agenda 21 covered the "protection of the quality and supply of freshwater resources: application of integrated approaches to the development management and use of water resources" with ample reference to disasters and hydrological extreme events.

More recently, in March 2000, the *Second World Water Forum*, launched the *World Water Vision* and a Ministerial Declaration on Water Security in the 21st Century was developed. The declaration identifies seven challenges for the global community, including the "management of risk - to provide security from floods, droughts, pollution and other water related hazards."

A vast body of knowledge exists on water management, and flood and drought management in particular. An increasing focus in local, national and international programs is on best ways to

implement these commonly agreed principles. For example, the WMO, has set out to promote flood management activities in the context of *Integrated Water Resources Management* (IWRM).

The reduction of vulnerability to floods and droughts will have to be included in the many facets of the freshwater agenda. These include the integration of all stakeholders in river basin management, the institutional framework to effectively manage water demand and international trade arrangements, which respect national water regulations. Such water management processes need to go hand in hand with an increased delegation of responsibility and means to local authorities.

At a global level, the upcoming WSSD, the United Nations International Freshwater Year 2003, as well as the third World Water Forum, to be held in March 2003, will provide opportunities to further develop these concepts.

Research in support of Integrated Water Resource Management and Comprehensive Disaster Risk Management .

WADI (*Water-related Disasters*) is a recent research initiative of the *Potsdam Institute for Climate Impact Research (PIK)* that responds directly to humankind's increasing vulnerability to water-related disasters. It provides a scientific basis for adaptation and mitigation options for sustainable transition programs that are developed in conjunction with the various stakeholders.

See more at: www.pink-potsdam.de

The gender agenda

Fourth World Conference on Women and follow-up

The Beijing Platform for Action, adopted at the Fourth World Conference on Women (1995) recognised that many women are particularly affected by environmental disasters, disease and violence. It requested governments to "promote knowledge of and sponsor research on the role of women, particularly rural and indigenous women, in food gathering

and production, soil conservation, irrigation, watershed management, sanitation, coastal zone and marine resource management, integrated pest management, land-use planning, forest conservation and community forestry, fisheries, natural disaster prevention, and new and renewable sources of energy, focusing particularly on indigenous women's knowledge and experience."

Five years later, the review and appraisal of the implementation of the Beijing Platform for Action (2000) identified natural disasters and epidemics as emerging issues, which deserved greater attention. It was noted that the social and economic impact of natural disasters and epidemics remained relatively invisible as a policy issue, in particular their impact on the status of women and the achievement of gender equality. In their responses to a questionnaire, several states in Africa and Asia cited the feminization of poverty, often aggravated by natural disasters and crop failure, as an obstacle to improving gender equality.

The twenty-third special session of the General Assembly entitled "Women 2000: gender equality, development and peace for the twenty-first century" acknowledged an increase in casualties and damage caused by natural disasters and raised awareness of the inefficiencies and inadequacies of existing approaches and intervention methods in responding to such emergency situations, from a gender perspective.

It suggested that a gender perspective be incorporated into disaster prevention, mitigation and recovery strategies. The special session also recommended that the UN system and international organizations should assist governments in developing gender-sensitive strategies for the delivery of assistance and responses to humanitarian crises resulting from natural disasters.

● **Convention on the Elimination of Discrimination against Women**

Several articles of the Convention on the Elimination of Discrimination against Women explore the violations of women's human rights in the case of natural disasters. A number of general recommendations, adopted by the Committee on the Elimination of Discrimination Against Women, also offer interpretation of articles of the convention as they relate to disasters and environment.

Gender mainstreaming: This is the process of bringing a gender perspective into the mainstream activities of governments at all levels, as a means of promoting the role of women in the field of development, integrating women's values into development work. Gender mainstreaming builds on the knowledge and lessons-learned from previous experiences with gender equality policies.

Gender analysis: Gender analysis involves the collection and use of sex-disaggregated data that reveal the roles and responsibilities of men and women, to be fed into the policy process for enabling assessments of how existing and future policies and programmes potentially affect men and women differently. Gender analysis needs to be both quantitative and qualitative.

The committee has urged certain states to pay greater attention to environment and natural disasters. In the case of Nicaragua, it suggested that aspects of natural disasters impeded women's full enjoyment of their rights. When it considered the report of Kazakhstan, the committee expressed concern about the degree of environmental degradation in the country and its extremely negative impact on the health of the whole population, in particular on women and children.

The committee also expressed its concern about the degree of environmental degradation in Uzbekistan and its negative impact on the health of the whole population, in particular women and children.

In the case of Belarus, the committee noted the government's attempts to deal with the health impact of the Chernobyl disaster and addressed this issue as a principal area of concern.

● **Commission on the Status of Women**

The UN Commission on the Status of Women, in its programme of work for 2002-2006, will consider the "environmental management and mitigation of natural disasters: a gender perspective". In preparation for this topic, an expert group was organized by the *United Nations Division for the Advancement of Women (DAW)* in collaboration with the ISDR Secretariat.

The expert group meeting discussed the link between gender and environmental manage-

ment, natural disaster reduction and risk management. It adopted a number of recommendations some of which were later adopted by the commission.

Experts recommended, in particular, to systematically include hazard proneness and gender-based vulnerabilities in environmental impact assessments. They also reiterated the importance of women's participation in decision-making in public administration and in governmental structures at all levels.

Experts also highlighted the necessity to introduce a gender perspective into the ongoing research on the relationship between climate, natural hazards, disaster and related environmental vulnerability. They stressed the need to use gender-sensitive indices and indicators and further pointed out the need to develop instruments for including gender analysis in local disaster risk management.

The Commission on the Status of Women in 2002 also called for the integration of gender perspectives in the implementation of all policy documents and treaties related to sustainable development and in the review of the implementation of the Yokohama Strategy for a Safer World.

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The Habitat agenda

More vulnerable cities...

As more and more people move to cities, the pressure on the land increases. Often, the poorest end up in badly-built housing in high density areas on marginal land such as exposed coastal areas, river deltas and steep slopes. These are the same areas likely to have the poorest supply of water, the most rudimentary sewage disposal, and where government is least likely to enforce safety standards. These are the places where, in the event of a disaster, the rescuers will find it hardest to get to.

The Habitat agenda was defined during the Second United Nations Conference on Human Settlements in Istanbul, 1996. It includes a series of commitments and guiding principles for sustainable cities. Most disasters are caused by vulnerabilities created by human action such as uncontrolled or inadequately planned human settlements, lack of basis infrastructure and the occupation of disaster prone areas. The most efficient and effective disaster preparedness systems are usually provided at the neighborhood level through volunteer contributions and local authority actions. Specific actions are required at the appropriate levels of central government and local governments in close coordination with the private sector and all community groups.

UN HABITAT takes actions in improving disaster management in human settlements by working with partners that include local governments, insurance companies, NGOs and the academic, health and scientific community. The goal is to adopt appropriate norms for land use, building and planning standard.

Chapter III - CommitmentsSustainable human settlements

"We commit ourselves to the goal of sustainable human settlements in an urbanizing world by developing societies that will make efficient use of resources within the carrying capacity of ecosystems and take into account the precautionary principle approach, and by providing all people, in particular those belonging to vulnerable and disadvantaged groups, with equal opportunities for a healthy, safe and productive life in harmony with nature and their cultural heritage and spiritual and cultural values" "Preventing man-made disasters, including major technological disasters, by ensuring adequate regulatory and other measures to avoid their occurrence, and reducing the impacts of natural disasters and other emergencies on human settlements, inter alia, through appropriate planning mechanisms and resources for rapid, people-centred responses that promote a smooth transition from relief, through rehabilitation, to reconstruction and development, taking into account cultural and sustainable dimensions; and rebuilding disaster-affected settlements in a manner that reduces future disaster-related risks and makes the rebuilt settlements accessible to all" *Extract from the Habitat Agenda, Istanbul 1996.*

In the five-year follow up review of the Habitat Agenda in 2001, renewed commitment to engage in disaster preparedness and risk reduction was stated.

Kobe - a city adapting and recovering

The Habitat-agenda aims to build capacities for sustainable human settlements issues. A window of opportunity for change is after a disaster. In the case of Kobe, Japan, disaster and risk reduction acquired a new meaning after 1995.

The Kobe earthquake, with a magnitude of 7.2 in the Richter scale, hit the city and its surrounding areas on 17 January 1995 at 5:46. There were over 6,400 casualties and more than 200,000 people (Hyogo Prefecture Government) were forced to find temporary shelter due to the destruction of buildings and infrastructure.



Public facilities such as offices, schools and hospitals were damaged extensively, paralysing services for several days. Utilities were also interrupted - electricity was unavailable in 25 per cent of the city and telephone, gas and water was disrupted in the entire city. Many severe fires broke out, resulting in more than 800,000 square metres of burnt land. The economic damage to the city was estimated at 7 trillion Japanese yen (approx. US\$60 billion).

The earthquake showed the need for a multidisciplinary approach of disaster management with appropriate incorporation of the socio-economic context. A massive reconstruction plan was undertaken following the earthquake both at the city and provincial levels. The basic ideas of the reconstruction plan were:

- balance between the urban conveniences and safety precautions
- raising awareness of both benefits and hazards of nature
- more emphasis on human interaction

Key issues for creating community safety were incorporated in the reconstruction planning and emphasised the following:

- Security. Creation of a community where people can live and work with a sense of safety.
- Vitality. Creation of a community and built environment full of creativity.
- Appeal. Creation of a community consistent with its unique nature and appeal.
- Cooperation. Creation of a community that will work together in mutual trust.

The goal of the reconstruction plan was to create a safer city while respecting the necessity to live a normal, everyday life. Many evaluations were conducted during Kobe's reconstruction period. Following are some of the findings found useful in improving earthquake countermeasures:

- Promoting integrated risk management
- Enhancing community involvement in the formulation of earthquake countermeasures and developing cooperation between administrative organizations and residents
- Continued efforts toward the creation of safe and disaster resistant towns
- Passing results to future generations and establishing a framework for international cooperation concerning earthquake countermeasures.

Source: Kenji Okazaki, 2001

Small island developing states and disaster reduction

All together there are 43 small island developing states and territories (SIDS) in the Caribbean, Pacific and Indian Ocean regions. Their special circumstances are increasingly gaining global attention. For example, the Rio Declaration and Agenda 21 recognised the special needs of SIDS. Subsequently, the *Barbados Programme of Action for the Sustainable Development of Small Island Developing States* was adopted in 1994. It includes the call to develop a vulnerability index, as well as the need to focus on disaster prevention and preparedness. At the 2000 UN Millennium Summit, world leaders resolved to "address the vulnerabilities faced by SIDS rapidly and in full by 2015."

The *Alliance of Small Island States (AOSIS)* is pursuing the interests of SIDS collectively, even though not all SIDS are members of the Alliance. As a follow up to the *Barbados Programme of Action*, an internet network, supported by UN/DESA, has been established to ensure easy access of information (www.sidsnet.org). UNESCO is also supporting an initiative, *Small Islands Voice*. (www.smallislandsvoice.org)

Owing to the small size, remoteness and fragility of island ecosystems, SIDS are especially vulnerable to hazards and the impact of a changing climate. They must also deal with the visible sea level rise, careful management of coastal and marine resources, scarce fresh water resources - in contrast to susceptibility to flood- and waste management. Environmental disasters such as oil spills could also severely damage SIDS.

Caribbean islands- vulnerability to hazards

Similar to the Pacific small island developing states are the Caribbean islands. Idyllic though they may seem, the islands have not escaped global trends of increasing urbanization and occupation of marginal lands resulting in higher levels of vulnerability and exposure to more risk. The economies of most islands are underpinned by tourism, the very nature of which exposes the industry's infrastructure and investments to coastal flooding from storm surges and tsunamis. Exploitation of natural resources for tourism or the mining industry and development of coastal areas all increase vulnerability. Pollution destroys coral reefs and seagrass beds important to reducing impact of storm surges. Destruction of mangrove stands for coastal development or charcoal production also increases coastal vulnerability.

Past events in banana-based economies have reduced GDP by up to 40% as in the case of St. Lucia and Tropical Storm Debby.

Least developed countries

Least developed countries (LDCs) are the poorest countries in the world, officially designated as such by the UN General Assembly. More than 600 million people live in the 49 LDCs, half of which are very disaster prone, and 32 of which are located in Africa. In 1981, when the concept of an LDC was articulated, there were only 30 such countries.

The criteria for being an LDC are the following:

- A low gross domestic product.
- A low level of economic diversification.
- Weak human resources, measured by life expectancy, calorie intake, primary and secondary school enrolment and adult literacy.

Three UN conferences have been dedicated to LDCs. All of them have recognised the disproportionately high social and economic costs of disasters. The programme of action stemming from the first two conferences focussed in this area on the need to improve disaster response capacity, with some references to early warning capacities. However, during the third conference, held in 2001, the focus had shifted to reducing vulnerability and developing disaster mitigation programmes.

The programme of action for the least developed countries for the decade 2001-2010 aims to forge strong partnerships between north and south to significantly improve the human and economic conditions in the poorest countries of the world. The programme of action also includes a commitment for reducing vulnerability and protecting the environment. It suggests actions to strengthen institutions and increase ownership for local stakeholders in formulating a sustainable development policy.

It encourages both LDCs and development partners to involve the private sector in the areas of disaster mitigation and disaster preparedness. It also encourages the involvement of local communities and NGOs in disaster mitigation, early warning systems and relief efforts. A reference is made to the donor community to give priority attention to the LDCs for implementing the programme set out within the International Strategy for Disaster Reduction at national level.

A special Trust Fund within the ONU is open for contribution to support this action plan. Administered by UNDRO.

6.2 UN agencies and scope of activities

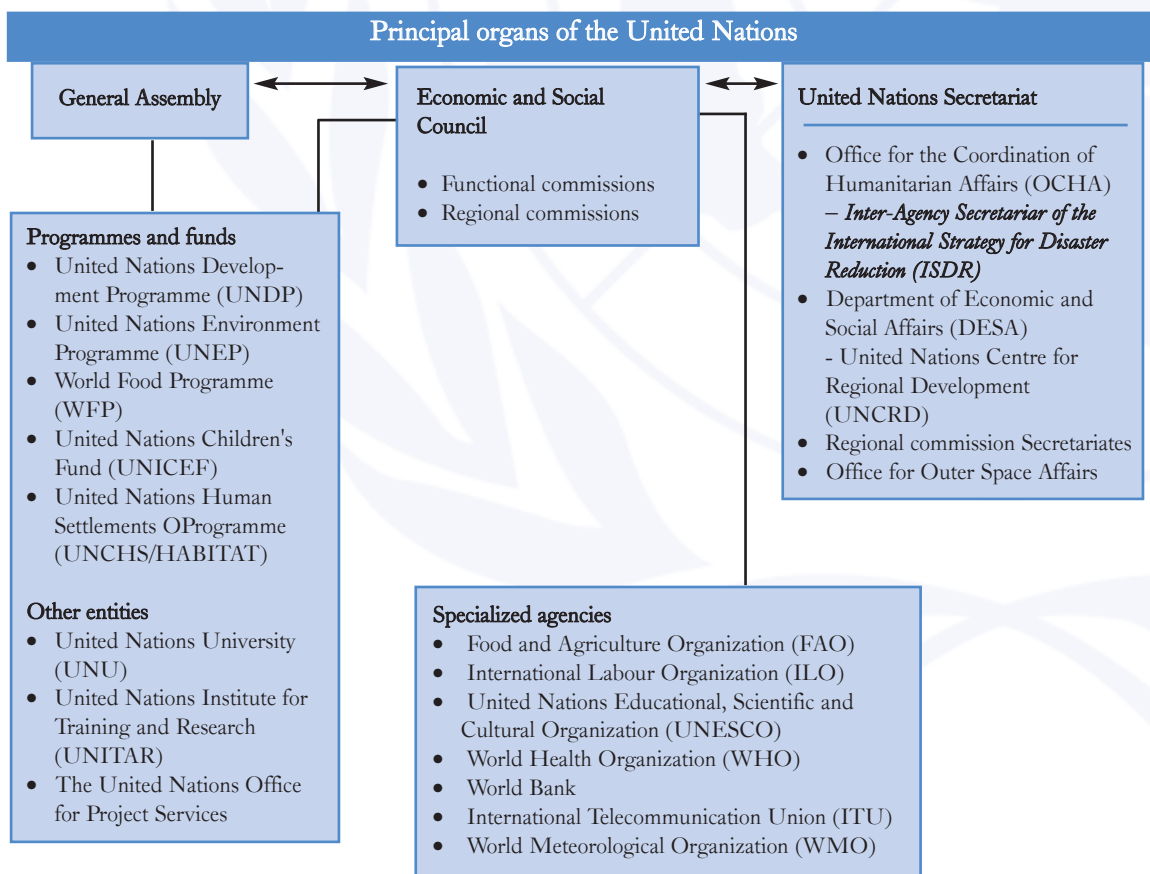
Introduction

The United Nations system is a mosaic that reflects the complexity of activities to be conducted in order to fulfil the objectives and principles of the Charter of the United Nations. It is composed of principal organs, specialized agencies and other autonomous organizations carrying out specific mandates. Reducing vulnerability and risk to natural or man-made hazards is addressed by many entities of the United Nations system within the framework of their respective field of activities. By establishing the **International Strategy for Disaster Reduction (ISDR)** as the successor arrangement to the International Decade for Natural Disaster Reduction (IDNDR, 1990-2000), the international community recognized the need for a consolidated and coordinated approach to disaster and risk reduction by concerned entities within and outside the United Nations system.

The purpose of this section is to give an indication of how the parts of the United Nations system function when it comes to disaster and risk reduction. It is a general overview, which does not include disaster relief or emergency management activities. This brief assessment of the key players within the United Nations system and their action in disaster reduction seeks to demonstrate the potential for increased coherence in this field and facilitate a targeted approach to the system by Governments and other entities.

Graphic overview of the United Nations system in relation to disaster reduction

Only United Nations entities relevant to disaster reduction are mentioned. This overview is not intended to illustrate a comprehensive explanation of the complete United Nations system or hierarchy.



Principal organs of the United Nations System concerned with disaster and risk reduction

General Assembly

The General Assembly is the main deliberative organ of the United Nations and is composed of representatives of all Member States. While the decisions of the Assembly expressed in resolutions have no legally binding force for Governments, they carry the weight of world opinion as well as the moral authority of the world community. Decisions of the Assembly are based on documentation produced at its request on reports from United Nations organs (i.e. Secretary-General's reports, reports from United Nations conferences). Non-United Nations entities are widely consulted for the drafting of these reports, which therefore include an overview of issues at stake. The Assembly's awareness of the necessity to reduce the impact of disasters began in 1971 when it adopted a resolution for the creation of the *Office of the United Nations Disaster Relief Coordinator (UNDRO)* for the improved coordination of "assistance in cases of natural disaster and other disaster situations", including disaster mitigation. In 1988 the Assembly endorsed the establishment of a *Disaster Management Training Programme (DMTP)*, recommending the upgrading of professional skills in disaster management through inter-agency training programmes under the joint management of the *United Nations Development Programme (UNDP)* and UNDRO. The Assembly recognized the need to focus on disaster reduction as an activity in itself in 1987 and launched the International Decade for Natural Disaster Reduction in 1989 followed by ISDR in 1999. Resolutions were also passed on the need for cooperation to reduce the impact of the El Niño phenomenon (from 1997) and on early warning capacities of the United Nations system with regard to natural disasters (from 1994). Disaster reduction is generally discussed under the segment Environment and Sustainable Development in the Second Committee of the General Assembly. The Humanitarian segment of the Assembly might touch upon the subject when related to humanitarian issues ("relief to development" is discussed in the Third Committee).

Web site: www.un.org/ga/56/

Economic and Social Council

The Economic and Social Council is the principal organ coordinating the economic, social and related work of the United Nations and has 54 members, elected for three-year terms by the General Assembly. The Council cooperates with, and to a certain extent also coordinates, the work of United Nations programmes (such as *United Nations Development Programme (UNDP)*, the *United Nations Environment Programme (UNEP)* and the *United Nations Children's Fund (UNICEF)*) and the specialized agencies (such as *Food and Agriculture Organization (FAO)*, the *International Labour Organization (ILO)*, the *United Nations Educational, Scientific and Cultural Organization (UNESCO)* and the *World Health Organization (WHO)*, all of which report to the Council. The United Nations, and the Economic and Social Council in particular, are increasingly considering *non-governmental organizations (NGOs)*, including academic institutions, private sector and other stakeholders, as partners and valuable links to civil society. The Council has long since recognized that the promotion of economic growth and sustainable development cannot be achieved without adequate measures to prevent and reduce the impact of natural disasters. It has also consistently called for a coordinated approach to disaster reduction within and outside the United Nations system. Decisions and resolutions of the Council include recommendations to the General Assembly on supporting efforts for the good functioning of IDNDR and later on ISDR as well as on issues such as early warning and the El Niño phenomenon.

Nine functional commissions and five regional commissions are part of the Council's so-called machinery that carries out its work. The functional commissions, serviced by the United Nations Secretariat, are deliberative bodies whose role is to consider and make recommendations on issues in their areas of responsibility and expertise. Two commissions are particularly relevant to disaster reduction: the Commission on Sustainable Development (CSD) and the Commission on the Status of Women (CSW).

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United Nations Secretariat

The United Nations Secretariat, headed by the Secretary-General of the United Nations, services the General Assembly and the Economic and Social Council, and administers the programmes and policies laid down by them.

ISDR, placed under the direct authority of the Under-Secretary-General for Humanitarian Affairs, is the only entity within the Secretariat entirely dedicated to disaster reduction. The *Office for the Coordination of Humanitarian Affairs (OCHA)*, the *Department of Economic and Social Affairs (DESA)* and the secretariats of the regional commissions consider disaster reduction in relation to their mandated activities. The *United Nations Centre for Regional Development (UNCRD)* also performs specific disaster reduction-related activities, in particular in its Disaster Management Planning Hyogo Office in Kobe, Japan.

● The Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR)

Comprehensive information on the ISDR secretariat can be found in the section on ISDR (see pages 19- 20).

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● Office for the Coordination of Humanitarian Affairs (OCHA)

Formerly *Department of Humanitarian Affairs (DHA)*, which in turn had replaced UNDR0 in 1992, OCHA is led by the Under-Secretary-General for Humanitarian Affairs/Emergency Relief Coordinator and located in New York and Geneva. OCHA aims at alleviating human suffering by facilitating international coordination for the effective and efficient delivery of assistance to victims of natural and man-made disasters. While concentrating on the response side of disasters, OCHA also promotes preparedness and prevention efforts to reduce vulnerability to natural disasters and assists the operational humanitarian agencies in developing common policies to improve planning, preparedness and response to natural disasters, particularly for protracted disasters

such as drought. In this respect, the *Response Coordination Branch (RCB)* as well as the *Emergency Services Branch (ESB)* collaborate closely with UNDP and other relevant United Nations and non-United Nations programmes and agencies on activities such as improving links with national authorities, implementing lessons learned and/or organizing seminars to discuss coordination mechanisms. Moreover, the ISDR Secretariat in Geneva, OCHA and UNDP maintain periodic working meetings to share information and engage in common plans and activities related to disaster reduction. Working with the resident coordinator, the United Nations country team and through its regional disaster response advisers, OCHA maintains close contact with countries prone to natural disasters before and between crises. *The Regional Disaster Response Advisers* provide technical, strategic and training assistance to Governments, United Nations agencies and regional organizations in order to improve natural disaster planning, response and post-emergency reconstruction efforts. Desk officers based in Geneva monitor for each region weather conditions, earthquake bulletins and the news services for potential natural disasters as well as environmental and technological emergencies. The *United Nations Disaster Assessment and Coordination (UNDAC)* team is a stand-by instrument composed of national professionals drawn from Governments and/or agencies from around the globe and mobilized within 24 hours to assist affected countries and the United Nations resident coordinators in assessing damage and preparing recommendations for adequate support often including

actions towards disaster reduction. Administered by OCHA, *ReliefWeb* (www.reliefweb.int) is an online source of information on humanitarian emergencies, including useful tools and documentation for disaster prevention such as time-critical situation reports, maps and financial contribution tracking, searchable archives of over 150,000 emergency response documents and 15,000 links to country-specific background information. The *Inter-Agency Standing Committee (IASC)*, chaired by the Under-Secretary General for Humanitarian Affairs/Emergency Relief Coordinator, brings together a wide range of United Nations and non-United Nations humanitarian partners, including agencies, NGOs, and international organizations such as the Red Cross and Red Crescent Movement, to facilitate inter-agency decision-making on the response to complex emergencies and natural disasters.

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● Department of Economic and Social Affairs (UN/DESA)

This department is led by the Under-Secretary-General for Economic and Social Affairs and is located in New York. The predecessor to DESA, the Department of Policy Coordination and Sustainable Development, was created as a result of the Earth Summit, held in Rio in 1992. The DESA multidimensional programme promotes broad-based and sustainable development through an integrated approach to economic, social, environmental, population and gender-related aspects of development. The Department serves as the secretariat for the Commission on Sustainable Development and is currently organizing the World Summit

on Sustainable Development (Johannesburg, 26 August-4 September 2002). The functions of DESA include normative work, coordination and policy advisory services supplemented by research and training. DESA activities are guided by the programmes and platforms of action adopted by major United Nations conferences and summits, as well as the Economic and Social Council machinery. Several divisions of the Department are concerned with disaster reduction, particularly the *Division for Sustainable Development (DSD)* with its Water, Natural Resources and Small Islands Branch and the *Division for the Advancement of Women (DAW)*.

Division for Sustainable Development: The mission of DSD is to facilitate the implementation of Agenda 21, the Rio Declaration on Environment and Development, the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (also known as the Forest Principles), and the Global Programme of Action for Sustainable Development of Small Island Developing States (SIDS). The Division carries out multi-year work programmes on sustainable development indicators, with interest in expanding the work on disaster reduction indicators. DSD provides substantive services to the Economic and Social Council functional commission CSD. As such, it serves as the secretariat for the World Summit on Sustainable Development. CSD was created in December 1992 and has 53 members for terms of office of three years. Its function is to follow up on the Earth Summits.

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Division for the Advancement of Women: DAW promotes and supports the mainstreaming of a gender perspective into the work of intergovernmental bodies, policy and programmes of departments and offices of the United Nations Secretariat and the United Nations system at the national and regional levels. The Division also provides substantive servicing to the Economic and Social Council functional commission, CSW, which is composed of 45 members elected by the Council for a period of four years.

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● **United Nations Centre for Regional Development (UNCRD)**

The UNCRD head office, located in Nagoya, Japan, was created in 1971 and encourages through its substantive programmes for training and research in regional development as well as information dissemination. The Centre reports to DESA. Since 1992 the UNCRD Africa Office based in Nairobi has been mandated to carry out training and research activities, advisory services and information exchange related to local and regional development in African countries. The UNCRD Project Office for Latin America and the Caribbean was established in Bogotá, Colombia in 1997, to carry out UNCRD activities in Latin America and the Caribbean. It conducted three sub-regional workshops (1998) in collaboration with the Organization of American States (OAS) and the IDNDR secretariat, in order to assess sectoral needs in terms of vulnerability and risk reduction to natural hazards for sustainable cities and commercial corridors.

The UNCRD Disaster Management Planning Hyogo Office was established in Kobe, Hyogo Prefecture, in 1999 in the aftermath of the Great Hanshin-Awaji earthquake of 1995.

Activities of this office include basic research programmes for (a) the design of community-based projects for disaster management planning; and (b) disaster management capacity-building introducing best practices case studies in developing countries. During the past three years, the Hyogo Office has developed, tested and evaluated tools that are now recognized as the basic tools for disaster mitigation at community level. The office closely cooperated with the IDNDR Secretariat in carrying out the RADIUS (Risk Assessment Tools for Diagnosis of Urban Area against Seismic Disasters) Initiative (*see page 75*).

The Hyogo Office conducted research projects in developing countries with specific focus on urban vulnerability to earthquakes at the pre-disaster stage (Global Earthquake Safety Initiative (GESI)) and on rural vulnerability to earthquakes at the post-disaster stage (rehabilitation). In the latter the Gujarat earthquake was given special attention. In addition to these yearly programmes the Hyogo Office has been involved in developing a global database of active faults, and its possible hazards, in cooperation with the Asian Disaster Reduction Center (ADRC). It is also engaged in a community development project in Kathmandu Valley, Nepal, and a project promoting the concept of a School Earthquake Safety Initiative (SESI). As part of the disaster education campaign, the Hyogo Office initiated a Culture Exchange Programme between the high school students of Kathmandu, Nepal, and Kobe, Japan. The Office performed training programmes and capacity-building in urban and rural communities, organized workshops for the dissemination of best practices, provided advisory services and promoted networking of different sectors of communities.

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● **Regional Commissions**

The regional economic commissions were founded by the Economic and Social Council for the purposes of promoting greater economic cooperation within and between regions, contributing to the economic and social development of a region, coordinating actions directed towards this end and reinforcing economic relationships among the countries and with the other nations of the world. The five commissions are the Economic Commission for Europe (ECE), the Economic and Social Commission for Asia and the Pacific (ESCAP), the Economic Commission for Latin America and the Caribbean (ECLAC), the Economic Commission for Africa (ECA) and the Economic and Social Commission for Western Asia (ESCWA). The secretariats of these regional commissions are part of the United Nations Secretariat and perform similar functions including disaster reduction activities, although adapted to the needs and priorities of the region with which they are entrusted.

● **The secretariat of the Economic and Social Commission for Asia and the Pacific (ESCAP)**

Headed by an Executive Secretary at the level of Under-Secretary-General of the United Nations, the ESCAP secretariat is located in Bangkok, Thailand. This Commission, comprising 52 members and associate members, promotes capacity-building in developing countries and contributes to the mainstreaming of disaster reduction into sustainable development with particular focus on water-related disasters, especially floods. Activities in this context include the organization of seminars and training courses for flood control and management, a regional overview of experiences in water-related disaster management in Asia and a regional project for "strengthening capacity in participatory planning and management for flood mitigation and preparedness in large river basins". In cooperation with the World Meteorological Organization (WMO), ESCAP conducted a regional survey, which has contributed to the strengthening of regional cooperation in flood forecasting and disaster reduction. Similarly, ESCAP provided advisory services to the secretariat of the Mekong River Commission on the formulation of the regional strategy for flood management and mitigation.

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● **The secretariat of the Economic Commission for Latin America and the Caribbean (ECLAC)**

The ECLAC secretariat, led by an Executive Secretary, is based in Santiago de Chile with subregional headquarters in Mexico City and Port-of-Spain, Trinidad and Tobago, country offices in Bogotá, Brasília, Buenos Aires and Montevideo and a liaison office in Washington, D.C. The Commission, with its 41 member States and seven associate members, plays an active role in disaster reduction, concentrating especially on the socio-economic impact of natural and other related hazards. In this context, ECLAC organized a series of inter-agency assessment studies on the macroeconomic impact of natural disasters in the region since the earthquake in Managua in 1972, including the 1999 floods and landslides in Venezuela, the earthquakes in Colombia (1999) and in El Salvador (2001), Hurricanes Georges, Mitch (1998) and Keith (2000), as well as climatic variations like the El Niño current's effects (1997-1998) and the severe drought that affected Central America in 2001 and the earthquake of El Salvador in 2001. ECLAC has over the years developed a methodology to assess the impact of disasters on development including an environmental impact analysis, a gender perspective and a comprehensive analysis of the macroeconomic impact of disasters and its effect on reconstruction plans. Currently, this methodology is being disseminated with the support of organizations such as the Inter-American Development Bank, the Pan American Health Organization (PAHO)/WHO and the World Bank and training is being provided for its use. ECLAC is also advancing the development of indicators of vulnerability and risk, in terms of measuring the economic, social and environmental impact of extreme natural phenomena. In addition to these activities, the Commission has implemented training programmes for small island developing states vulnerable to hurricanes through its regional office for the Caribbean.

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● Office for Outer Space Affairs (OOSA)

Work of the General Assembly is also carried out by bodies it has established to study and report on specific issues. In this respect, the United Nations *Office for Outer Space Affairs* (OOSA), based in Vienna and linked to the United Nations *Committee on the Peaceful Uses of Outer Space* (COPUOS), has developed and is implementing a programme for an Integrated Space Application System for Disaster Management, in cooperation with a number of United Nations agencies and programmes as well as other entities such as the *Committee on Earth Observation Satellites* (CEOS). This activity is carried out in response to the call for implementing an integrated global system capable of using space applications and space-based services for disaster mitigation, relief and prevention (UNISPACE III Conference). Space technologies can play important roles in the reduction of disasters.

The use of such technologies can be particularly useful in the risk assessment, mitigation and preparedness phases of disaster management. Space technologies are also vital to the early warning and management of the effects of disasters. For developing countries to be able to incorporate the routine use of space technology-based solutions there is a need to increase awareness, build national capacity and also develop solutions that are customized and appropriate to the needs of the developing world. OOSA is focusing on the definition and successful transfer of such solutions by holding Regional Workshops (Africa, Asia and the Pacific, Latin America and the Caribbean) on the Use of Space Technology for Disaster Management. A regional plan of action will then be defined leading to the definition and implementation of pilot projects that will incorporate and refine the use of space technology for disaster management.

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Specialized agencies and other autonomous organizations and disaster reduction

Organizations and agencies part of the United Nations system carry out active programmes in support of disaster reduction and many of them have strengthened their disaster reduction capacity in their respective areas of competence during recent years. All agencies and programmes work with national or local authorities and in many cases with civil society organizations and groups.

Programmes and funds

● United Nations Development Programme

The overarching mission of UNDP is to help countries build national capacity to achieve sustainable human development. The Programme is giving top priority to the elimination of poverty and the building of equity by providing development advice, advocacy and grant support. UNDP, with headquarters in New York and specific functions in Geneva, delivers most of its services through its 132 country offices, supported by regional bureaux, specialized programmes and trust funds. In each country office, the UNDP resident representative normally also serves as the resident coordinator for the United Nations system as a whole.

UNDP is the most substantive United Nations programme to promote and support the implementation of risk and vulnerability reduction in developing countries. In 1997, a General Assembly decision transferred the responsibilities of the Emergency Relief Coordinator (head of OCHA) for operational activities for natural disaster mitigation, prevention and preparedness to UNDP while OCHA retained its coordination function of international relief operations. UNDP has been a member of the ISDR Inter-Agency Task Force for Disaster Reduction since its inception and chairs the Working Group on Risk, Vulnerability and Impact Assessment.

The UNDP Bureau for Crisis Prevention and Recovery (BCPR)-formerly known as the Emergency Response Division (ERD)-is the in-house mechanism set up to provide a quicker and more effective response in Countries in Special Development Situations (CSDS) through the provision of services. As part of BCPR, the Geneva-based Disaster Reduction and Recovery Programme (DRRP) focuses on promoting and supporting capacity-building and/or strengthening of appropriate regional

organizations, national authorities and institutions for mitigation, prevention and preparedness of natural, technological/industrial and environmental disasters, through a structure of regional advisers. Main functions of DRRP include support to preventive development and training by:

- Assessing vulnerability to crises and natural disasters;
- Establishing early warning systems;
- Developing and maintaining a framework of developmental responses and other contingency disaster plans;
- Forming and strengthening country United Nations disaster management teams;
- Integrating disaster preparedness, mitigation, prevention and response programmes into national development programmes;
- Regular reporting and updating of important developments in CSDS, as a part of the early warning process;
- Contributing to human resource development by improving capabilities in risk and vulnerability analyses; planning for contingencies; designing responsive structures; implementing prevention and mitigation strategies for disaster and crisis.

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The UNDP *Drylands Development Centre* formerly the Office to Combat Desertification and Drought (UNSO) -moved to Nairobi in early 2002. The Centre is responsible for promoting sound dryland management and development as well as drought preparedness and mitigation as part of sustainable human development. UNSO has been an advocate of the *United Nations Convention to Combat Desertification and Drought (UNCCD)* and provides technical and catalytic financial support to affected countries for the implementation of the Convention.

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Capacity 21 is a trust fund launched by UNDP after the Rio Earth Summit of 1992, which works with countries to build skills and a knowledge base to implement the principles of sustainable development as outlined in Agenda 21. Capacity 21 promotes a partnership for increased coping capacity to deal with natural disasters in small island developing States, in the framework of the World Summit on Sustainable Development and the Barbados Plan of Action. www.undp.org/capacity21/

● United Nations Environment Programme (UNEP)

UNEP is the leading global environmental authority and promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations. The Programme is based in Nairobi, Kenya, and counts several regional and thematic offices and programmes around the world. The UNEP Governing Council identified increasing environmental emergencies as one of the environmental threats that needed to be addressed and emphasized the important role the Programme played globally in the areas of emergency prevention, preparedness, assessment, mitigation and response. Through its

Disaster Management Branch in Nairobi, part of the Division for Environment Policy Implementation (DEPI), UNEP has developed a strategic framework on emergency prevention, preparedness, assessment, mitigation and response with an agenda for action which serve as basis for the development and implementation of programmes on disaster reduction at the national, subregional, regional and global levels. Further, has carried out a number of activities aimed at reducing the impact of natural and other related environmental and technological disasters in furtherance of the objectives of ISDR. It is a member of the ISDR Inter-Agency Task Force for Disaster Reduction and chairs the Task Force's Working Group on Early Warning. It also has a joint unit with OCHA in Geneva to assist countries in responding to a variety of environmental emergencies.

In line with its role in environmental monitoring, assessment and early warning, the UNEP Division for Early Warning and Assessment (DEWA) has launched a *Global Environment Outlook (GEO)* report series which contains baseline information on environmental emerging issues and threats, as well as policies being implemented at the global and regional levels. www.unep.org/DEWA.

The UNEP *Global Resource Information Database (GRID)* is a global network of environmental information centres and aims at providing and facilitating access to environmental data and information for decision-making and policy setting. It underpins the UNEP review of the state of the world's environment and provides early warning on environmental hazards. The UNEPNet partnership, a global information network, offers access to distributed and remote databases from different institutions to develop comprehensive and local solutions, often relying on best practices from various regions and countries of the world.

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The *UNEP Awareness and Preparedness for Emergencies at a Local Level (APELL)*, based at the Industry and Environment Office in Paris, is a programme serving as a tool for disaster prevention and preparedness and raises public awareness of the need to reduce environmental emergencies and damage. It seeks to minimize, particularly in developing countries, the occurrence and harmful effects of technological accidents and emergencies resulting from human activity or as the consequence of natural disasters.

Web site:

www.uneptie.org/pc/apell/disasters/disasters.html

● World Food Programme (WFP)

WFP is mandated by the United Nations to combat global hunger. Based in Rome, Italy, the Programme counts 85 country offices and eight regional offices to assist populations in need. As the food-aid arm of the United Nations, WFP meets emergency needs, provides the necessary logistics to deliver food and supports economic and social development by promoting policies, strategies and operations for the benefit of the poor and hungry. WFP has been a member of the ISDR Inter-Agency Task Force on Disaster Reduction since its inception in 2000.

In 1999 the WFP key strategy document entitled *Enabling Development* identified disaster mitigation as one of the five priority areas of action with a focus on reduction of the impact of natural hazards on food security for vulnerable populations. A steering committee for disaster mitigation was established to assist country and regional offices to integrate disaster mitigation activities into their development programmes. The WFP dual mandate for development and emergencies results in development activities designed to facilitate potential emergency response. Guidelines on disaster mitigation have been prepared and field-tested in pilot country offices. The formalization of the WFP role in disaster mitigation is reflected in the new generation of programming documents. In 2000 already nine of the 11 Country Strategy Outlines and Country Programmes that were approved by the Executive Board had

included disaster mitigation activities. For example, WFP is supporting water harvesting in Sudan to decrease the impact of drought on rural livelihoods. In Tanzania, the WFP Country Programme is using food-for-work activities to create assets, such as grain stores and access roads, in order to improve long-term food security and decrease the vulnerability of households to drought.

The WFP emphasis on early warning and contingency planning includes collaboration with the Framework Team based in New York and the WFP Vulnerability and Analysis Mapping Unit (VAM). The Office of the Humanitarian Adviser (OHA) is responsible for coordinating the overall contingency planning process, while the Augmented Logistics Intervention Team for Emergencies (ALITE) collates specific logistics-based contingency planning information such as logistics capacity assessments (LCAs).

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● United Nations Children's Fund (UNICEF)

UNICEF headquarters are based in New York. UNICEF has regional offices and country offices in 162 countries and territories around the world. The UNICEF mandate to protect and improve the well-being of the most vulnerable groups, children and women, anywhere in the world, by definition, includes the aspect of disaster preparedness and prevention. By supporting empowerment of communities at the local level and capacity-building at the national level, UNICEF programmes enhance abilities to deal with disasters and to mitigate the negative effects of disasters. Policy and procedural guidelines for UNICEF staff in emergencies include both emergency response and preparedness/prevention activities.

The foundation of UNICEF action lies in its long-term country programme approach and its development orientation. Recognizing the central importance of building capacity and self-reliance for effective and sustainable assistance and reducing the vulnerability of children to future disasters, UNICEF aims to enhance rather than supply locally available resources and mechanisms. The maximum involvement of individuals, communities and local and national institutions is stressed at all levels of UNICEF development and emergency action.

Following the recommendation of the Yokohama Strategy to include disaster reduction into national development plans, UNICEF programme and policy guidance includes incorporation of disaster reduction elements into country programmes in disaster-prone countries. Vulnerability and capacity assessment in relation to natural hazards is being introduced as an integral part of the situation analysis process at the country level. UNICEF cooperates with UNDP as part of the United Nations country teams at the country level in support of disaster preparedness activities in national development plans. UNICEF is playing an important role in tackling both analysis and capacity-building nationally and in the empowerment of communities. Selected programmes in disaster-prone countries enhance abilities to respond to immediate needs and to mitigate the negative effects of disasters. For example, a major thrust of UNICEF emergency assistance in a number of emergency countries is the development and institutionalization of local capacities for disaster preparedness and management.

In order to ensure adequate levels of preparedness for effective response in emergencies, UNICEF country and regional offices carry out preparedness planning as part of their planning and programming process. Preparedness planning includes risk assessment identifying all types of risks from natural hazards to economic distress and civil conflicts.

In addition to viewing support to sustainable development as the key element for disaster reduction, UNICEF country offices in different parts of the world are involved in specific activities geared towards improved awareness of potential natural disasters. These activities

include development of education and awareness materials and campaigns for children and adults. UNICEF collaborates closely with the ISDR secretariat outpost in Costa Rica and they have jointly developed educational and awareness materials available on the web sites of both organizations.

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● **United Nations Human Settlements Programme (UN-HABITAT)**

UN-HABITAT promotes socially and environmentally sustainable human settlements development, good urban governance and the achievement of adequate shelter for all. It is based in Nairobi, Kenya, and is assisted by three regional (Brazil, Japan and Kenya) and several liaison and information offices worldwide. The Programme has been a member of the ISDR Inter-Agency Task Force for Disaster Reduction since 2002.

The establishment of ISDR coincided with the consolidation of the process of restructuring carried out by UN-HABITAT. A key component of this process was the consolidation of the Risk and Disaster Management Programme (RDMP) and the establishment of the Disaster, Post-Conflict and Safety Section (DPCSS) to cater for an increasing demand from member countries for technical support, normative and policy tools and field operational capacity concerning disaster prevention, mitigation and post-disaster rehabilitation in human settlements, as well as on issues related to urban safety. UN-HABITAT disaster-related activities focus in particular on the physical and management components of shelter, infrastructure and service, with priority given to activities at the local level. Emphasis is given to the development of training and technical support programmes to increase the capacity of local authorities and communities for improved disaster and human settlements



management in a context of good local governance. UN-HABITAT is an active partner of ISDR, especially in the areas of land and urban management, impact assessment and capacity-building. Processes such as the Global Campaigns on Urban Governance and for Secure Tenure constitute important opportunities to promote disaster reduction in urban areas and strengthen collaboration with local authorities.

RDMP under DPCSS is a programme established to strengthen UN-HABITAT capacity to deliver technical cooperation and capacity-building services with a focus on direct country support, with the objective of helping vulnerable communities and human settlements to reduce vulnerability and better manage the effects of disasters and conflict. RDMP provides support to national governments, local authorities and communities in close cooperation with UN-HABITAT technical cooperation units and other specialized programmes. As part of its normative functions, RDMP develops and disseminates management tools and capacity-building activities. Its operational activities deliver direct support to national and local partners through:

- Technical advisory missions upon request by Governments and external support agencies;
- Execution of assessments in disaster-prone/hit and post-conflict countries;
- Identification, design, technical backstopping and follow-up of operational projects in response to countries' demands;
- Participation in donor consultations and negotiations for the provision of external support to affected countries;
- Assessment of global and regional demands for support on disasters and human settlements management and the design and implementation of global/regional projects and methodological approaches through collaboration with countries and other external support agencies.

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Specialized agencies

● Food and Agriculture Organization (FAO)

The FAO general mandate is to raise the levels of nutrition and standards of living, to improve agricultural productivity and to better the condition of rural populations. Based in Rome, Italy, FAO has engaged itself to help building a food-secure world for present and future generations over the next 15 years, as adopted in its Strategic Framework (2000). FAO counts five regional and five subregional offices and about 80 country offices working directly with member countries and other development partners at national level to coordinate interventions including with regard to disaster management. FAO is a member of the ISDR Task Force for Disaster Reduction and participates actively in its working groups.

The World Food Summit of 1996 mandated FAO, among others, to assist member countries develop national food insecurity and vulnerability information and mapping systems (FIVIMS), based on the existing national food security information systems, many of which were established with FAO assistance, with a view to halving malnutrition by 2015 and reducing food insecurity and rural poverty, which includes disaster preparedness as well as effective and sustainable responses to food and agricultural emergencies. FAO developed an important strategy of which the key component is to strengthen the capacity of communities and local institutions in preparing for and addressing natural disasters, recognizing that generally the resource-poor are the most vulnerable while the people most severely affected by disasters are often those living in rural areas. In order to reduce disruption of agricultural and food systems, this strategic objective focuses on:

- Strengthening disaster preparedness and mitigating the impact of emergencies that affect food security and the productive capacities of rural populations;
- Forecasting and providing early warning of adverse conditions in the food and agricultural sectors, and of impending food emergencies;
- Strengthening programmes for agricultural relief and rehabilitation, and facilitating the transition from emergency relief to

reconstruction and development in food and agriculture; and

- Strengthening local capacities and coping mechanisms by guiding the choice of agricultural practices, technologies and support services to reduce vulnerability and enhance resilience.

Through its normative and operational programmes, FAO assists and provides technical assistance to member States in the development and implementation of disaster prevention programmes and preparedness plans, in order to reduce the vulnerability of agricultural production systems to disasters. FAO, through its World Agricultural Information Centre (WAICENT), develops and maintains a web site on disaster-related activities to provide access to disaster reduction information and has mobilized international support through its Global Information and Early Warning System (GIEWS). This system monitors food supply and demand around the world, provides policy makers and analysts with up-to-date information on crop prospects and gives early warning on imminent food crises. FAO has upgraded its capability to provide an operational service on environmental information through an Advanced Real-Time Environmental Monitoring Information System (ARTEMIS) using satellite remote sensing data. Moreover, the FAO Environment and Natural Resources Service of the Sustainable Development Department develops various spatial information infrastructure and databases and uses integrated remote sensing and geographic information systems for sustainable development planning, including disaster impact assessments and mapping of risk and vulnerability to natural hazards.

For the sake of reducing impacts of disasters on rural poverty and food insecurity, FAO assists member countries in the adoption of sustainable agricultural and land-use systems. The FAO Land and Water Development Division plays an important role in reversing degradation and reducing vulnerability to disasters through promoting the development of sustainable and resilient agro-ecosystems and the efficient, productive and environmentally sound use of land and water resources. Integrated planning and management of land resources are an essential prerequisite to implementing the multiple national action plans and



sectoral strategies that emanated from the Agenda 21 process and related conventions and thereby to achieving sustainable agricultural and rural development.

The Special Programme for Food Security (SPFS) assists low-income food deficit countries in improving food security both at national and at household levels, through rapid increases in food production and productivity, by reducing year-to-year variability in production and by improving people's access to food. Chronic malnutrition and food insecurity can be caused by high seasonal and year-to-year variability in food supplies, often the result of unreliable rainfall and insufficient water for crop and livestock production. Community-centred nutrition programmes will strengthen livelihood resilience to natural disaster through increased household food security, better health and appropriate care for vulnerable individuals (small children, pregnant and lactating women, elderly people, the chronically sick and disabled).

The FAO Emergency Coordination Group, chaired by the Assistant Director-General of the Department of Technical Cooperation, is the organizational mechanism for the overall coordination of emergency and disaster reduction-related issues. An interdisciplinary process has been established within FAO to strengthen its capacity to address disaster prevention, mitigation and preparedness and post-emergency relief and rehabilitation in a more integrated way, together with member countries and partners. The areas of attention initially identified include:

- The preparation of a disaster management database;
- The development of a guide for emergency needs assessment and guidance on management of food and agricultural emergencies; and
- The development of strategies and capacity-building on drought mitigation, including a regional workshop and programme development on capacity-building in drought mitigation.

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● **United Nations Educational, Scientific and Cultural Organization (UNESCO)**

UNESCO has its headquarters in Paris, France, and 73 field offices and units in different parts of the world. The main objective of UNESCO is to contribute to peace and security in the world by promoting collaboration among nations through education, science, culture and communication in order to further universal respect for justice, for the rule of law and for human rights and fundamental freedoms.

UNESCO is a member of the ISDR Inter-Agency Task Force for Disaster Reduction and promotes activities aimed at developing a better scientific understanding of the occurrence and distribution of disasters in time and space in respect of natural hazards and the mitigation of their effects. It contributed actively to IDNDR. UNESCO is also active in the area of educational material development to raise public awareness and facilitate public information and the provision of technical advice on the hazard resistant construction of schools and the protection of cultural heritage.

The UNESCO scientific and technical contribution to disaster reduction is promoted under the Organization's natural hazards programmes in the Earth sciences and builds on its five intergovernmental and international scientific programmes: the International Geological Correlation Programme, the International Hydrological Programme, the Man and Biosphere Programme, the Intergovernmental Oceanographic Commission (IOC) and the Management of Social Transformations Programme (MOST). The Global Ocean Observing System (GOOS) hosted in IOC provides a framework to coordinate systematic observations of the world's oceans. Both the Medium-Term Strategy (2002-2007) and the Programme and Budget for 2002-2003 include provisions for an interdisciplinary programme related to natural disaster reduction.

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● World Health Organization (WHO)

WHO is the United Nations specialized agency with responsibility for health. WHO is a decentralized organization with about 150 country offices worldwide and six regional offices in Africa, the Americas, the Eastern Mediterranean region, Europe, South-East Asia and the Western Pacific. Its headquarters are based in Geneva, Switzerland. The purpose of WHO presence at country level is to assist member States to achieve sustainable national health policy goals and to draw on the experience of individual countries to build public health knowledge that benefits the rest of the world. WHO has been a member of the ISDR Task Force for Disaster Reduction since 2002.

WHO works at country, regional and global levels for disaster mitigation, emergency preparedness and response, as well as for advocacy for health and humanitarian action. Failure on the part of the health sector to be institutionally prepared is particularly costly, not only in terms of lives lost, but also technically and politically. WHO aims to achieve a reduction of avoidable death and illness that result from any type of natural or man-made disaster and to ensure that member States and the international community are equipped to prevent disasters and mitigate their health consequences, in synergy between relief and sustainable development. WHO applies the epidemiological method and the public health model to emergency management and disaster reduction. Risk reduction, preparedness and response against epidemics are responsibilities of WHO.

More specifically, WHO focuses on strengthening health systems for preparedness and response against all types of disaster. Training is provided to Ministries of Health and their staff in preparedness and response, as well as for the development of emergency contingency plans. WHO distributes guidelines, publications and audio-visual material on applying best public health practices in preparing for and assessing the impact of disasters. The WHO early health assessment and health intelligence web site provides situational information including baseline statistics, health situation reports and epidemiological surveillance data.

The health sector does not exist in isolation and must cooperate with other groups involved in the overall framework for emergency preparedness and establish priorities in accordance with the overall disaster response plan. WHO has several collaborating centres around the world, whose work is related to disaster reduction, including the Centre for Research on the Epidemiology of Disasters (CRED), School of Public Health at the University of Louvain in Brussels. In Latin America and the Caribbean, there is the School of Public Health at the University of Antioquia, Colombia, for higher education in disaster management issues and the Faculty of Engineering of the University of Chile for disaster mitigation in hospitals and health services.

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The WHO Regional Office for the Americas, the Pan-American Health Organization (PAHO), is the most active WHO office in the area of disaster reduction. PAHO is also part of the inter-American system and the office has been active in reducing the impact of natural and other related environmental and technological disasters in the Americas and the Caribbean since the mid-seventies. PAHO was a close collaborator and contributor to IDNDR in Latin America and the Caribbean. The PAHO disaster preparedness programme has three subregional offices (Barbados, Costa Rica and Quito). PAHO contributes to institutional strengthening by supporting the creation and enhancement of disaster programmes in the Ministries of Health in all countries of the region and promotes coordination with other sectors involved in disaster reduction. It organizes workshops on all aspects of disaster management for the benefit of professionals dealing with disaster reduction. In addition, PAHO encourages universities throughout the region to incorporate disaster management in their formal curriculum. The preparation and distribution of training materials have been a cornerstone of the programme. Over the last two decades this



effort has produced a considerable body of technical material (publications, slides and video programmes). Print copies are distributed free of charge to institutions dealing with disaster mitigation in member countries and electronic copies are also made available on the Internet for worldwide access. PAHO works at the highest level in member countries to ensure that disaster mitigation becomes an integral part of national disaster reduction programmes. Special programmes to develop technical guidelines and political support to vulnerability assessments and disaster mitigation for water systems and health services have been developed over the last decade.

PAHO has a letter of understanding with the ISDR Secretariat, in which both parties have agreed on a number of measures to strengthen cooperation in priority areas for the region, such as the publication of studies, joint lessons-learned exercises and the strengthening of the Regional Disaster Information Centre (CRID), a regional multi-organization consortium formed by the Coordinating Centre for the Prevention of Natural Disasters in Central America (CEPREDENAC), Costa Rica's : National Risk Prevention and Emergency Response Commission (CNE), the International Federation of Red Cross and Red Crescent Societies (IFRC), ISDR, Médecins sans frontières (MSF) and PAHO/WHO. PAHO, in collaboration with ISDR, is working on the implementation of a development plan for CRID in San José, Costa Rica. ISDR and PAHO have also agreed to increase access to disaster information, exchange and networking among countries and organizations in the region, through the joint support of CRID and national and subregional disaster information networks, including the Caribbean Disaster Information Network.

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● **World Meteorological Organization (WMO)**

Based in Geneva, Switzerland, WMO coordinates global scientific activity to allow increasingly prompt and accurate weather information and other services for public, private and commercial use. WMO activities contribute to the safety of life and property, the socio-economic development of nations and the protection of the environment.

WMO participated actively in the implementation of IDNDR and is now a member of the ISDR Inter-Agency Task Force for Disaster Reduction. It supports the work of its working groups, in particular those on Climate and Disaster Reduction (for which it has lead responsibility), on Early Warning and on Vulnerability and Risk Assessment. The WMO constituent bodies, including the Congress and the Executive Council, follow and provide guidance on the policy, scientific and technical aspects of the implementation of ISDR objectives at the regional and global levels.

As nearly three-quarters of all natural disasters are related to weather and climate, WMO has a number of scientific and technical programmes related to the mitigation of natural disasters supported by the participation of National Meteorological and Hydrological Services (NMHSs) and a number of Regional Specialized Meteorological Centres (RSMCs) worldwide. The WMO World Weather Watch (WWW) programme coordinates the preparation and distribution of weather, climate and hydrological data, analyses and forecast products to all nations. The WMO Tropical Cyclone Programme promotes the establishment of national and regionally coordinated systems to ensure effective preparedness so that the loss of life and damage caused by tropical cyclones and associated phenomena are reduced to a minimum. The WMO Public Weather Services (PWS) programme supports NMHSs in disaster reduction planning by providing a variety of routine forecasts and information to enhance the social and economic well-being of nations. The World Climate Programme (WCP) provides an authoritative

international scientific voice on climate, climate variations and climate change. WCP has provided advanced climate database management systems to many countries, with applications in several areas of disaster mitigation, especially drought. WMO continues to assist its members in the development of techniques to assess and combat drought, desertification and other extreme events through its agricultural meteorology programme. Through its leadership of the ISDR Working Group on Climate and Disaster Reduction, WMO contributes to the review of sectoral systems within and outside the United Nations that monitor climate sensitive emergencies. Of particular interest are the monitoring and prediction of climate-related natural disasters associated with the El Niño and La Niña phenomena. The World Weather Research Programme (WWRP) is aimed at developing improved and cost-effective techniques for forecasting high-impact weather and at promoting their applications among countries. The Hydrology and Water Resources Programme assists the national hydrological services of member countries to assess the risk of, and forecast, water-related hazards, in particular major floods and droughts.

WMO

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● The World Bank Group

The World Bank Group, based in Washington, D.C., United States, is one of the world's largest sources of development assistance. It works in more than 100 developing countries. The World Bank Group consists of five closely associated institutions, all owned by member countries that carry ultimate decision-making power. Each institution plays a distinct role in the mission to fight poverty. The term "World Bank" refers specifically to the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA).

IBRD provides loans and development assistance to middle-income countries and creditworthy poorer countries. It is not a profit-maximizing organization but has earned a net income every year since 1948, which is used to fund several developmental activities. The World Bank considers disaster reduction as an element in the fight against poverty linked to environmental management. In order to advance the goal of reducing the impact of disasters advocated by ISDR, the World Bank updated its strategies and procedures to promote proactive ways to integrate disaster prevention and mitigation into its development work.

IBRD, through its Disaster Management Facility (DMF), is a member of the Inter-agency Task Force on Disaster Reduction. DMF was established in July 1998 to promote disaster risk management as a priority issue for poverty reduction. DMF has worked actively to promote the integration of risk analysis into project design and the inclusion of effective prevention and mitigation measures into the Bank's Country Assistance Strategies. The staff has been trained to design safer investments empowering communities to reduce their vulnerability to disasters. Furthermore, disaster risk management is being mainstreamed into the Bank's development efforts. Reconstruction projects, such as those carried out in the aftermath of the earthquake in Turkey, of Hurricane Mitch in Central America and of the January 2001 earthquake in Gujarat, India, have been designed to go beyond mere rebuilding and to focus on how to rebuild in a better way to strengthen resilience to future disasters. Along the same lines, DMF pilot efforts are gradually being incorporated into Bank operations. A good example of this approach is in Mexico where, following a DMF case study to assess the capacity of the country to manage disaster risk, the Government requested the Bank to prepare a project aimed at reducing disaster losses.

The Bank is also working closely with its partners through the ProVention Consortium, which serves as mechanism for the various partners to combine efforts to gener-



ate evidence on the economic and financial impact of disasters on longer-term development, to develop methodologies and standards for conducting damage and needs assessments following a disaster, to strengthen communities' resilience to the impact of disasters and to identify innovations in risk transfer and financing.

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● **International Labour Organization (ILO)**

ILO is the United Nations agency specialized in matters related to labour and seeks the promotion of social justice and internationally recognized human and labour rights. ILO is based in Geneva, Switzerland.

In 1999, to address the new trends characterized by globalization, socially and environmentally sustainable growth patterns and the consequence of economic reforms and structural adjustment in many developing countries, ILO established a special In-Focus Programme on Crisis Response and Reconstruction (IFP/Crisis) that concentrates on various types of crises including natural disasters.

The Programme is implementing the ILO Decent Work approach-emphasizing employment-to lay the foundations for crisis prevention, by promoting employment and creating the conditions for long-term reintegration, reconstruction, economic growth and socio-political stability. Activities of the Programme related to disaster reduction include:

- Knowledge development-ILO knowledge in crisis situations is continuously reviewed, updated and expanded with the latest data and analyses. Links are strengthened with ILO technical units and field offices, external research institutions and crisis practitioners worldwide;

- Tools development-Ready-made guidelines and standard packages to answer the specific needs of each individual crisis context and to steer rapid response action. These essential tools underpin effective work, especially in ILO areas of concern;
- Technical assistance-Direct interventions in emergencies are undertaken, for rapid needs assessment, programme development and implementation and to reduce the likelihood and inverse impact of future crises;
- Capacity-building-Capacity to respond effectively to crises is strengthened through wide dissemination of the above tools, along with training programmes and advisory services;
- Advocacy-A variety of activities promote national, subregional, regional and international recognition of the employment dimension and other ILO crisis concerns and its contribution to effective crisis management. They include awareness-raising workshops, presentations, publications, videos and public material;
- Resource mobilization-Efforts are made to mobilize resources internally and externally for timely interventions.

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● **International Telecommunication Union (ITU)**

ITU, with its headquarters in Geneva, Switzerland, is an international organization where governments and the private sector coordinate global telecommunication networks and services. ITU is a member of the ISDR Inter-Agency Task Force on Disaster Reduction.

In 1994, the ITU Plenipotentiary Conference in Kyoto, following the Yokohama Conference on Natural Disaster Reduction, emphasized the importance of telecommunications for disaster mitigation and disaster relief operations. In 1998, the Tampere Convention on the Provision of Telecommunication Resources for

Disaster Mitigation and Relief Operations was adopted by the Intergovernmental Conference on Emergency Telecommunications (ICET-98). It raised concerns about the impact of disasters on communication facilities and information flows. Unexpected natural and man-made disasters can occur anywhere, at any time. Rapid response to organize and coordinate recovery operations is essential to save lives and restore community infrastructure. Disaster recovery activities depend upon availability and access to telecommunication resources. However, telecommunication networks often experience severe stress during these events due to high traffic demands and infrastructure damage.

Against this background, ITU is working on the development of global standards to support an Emergency Telecommunications Service (ETS). Many dimensions need to be addressed in achieving an effective solution for emergency telecommunications including technical aspects as well as issues associated with user requirements, operational, policy, legal and regulatory aspects. Cooperation and liaison among the many interest areas are essential to ensure consistency and completeness in the provisioning of an effective emergency telecommunications capability. ITU is therefore engaging in the following activities:

- Study of the impact on telecommunications of disaster events;
- Identification of requirements/applications of emergency telecommunication users;
- Identification of types/modes of telecommunications for emergencies;
- Definition of the capabilities and priority aspects needed for emergency telecommunications;
- Identification of means of interchange of emergency data for distributed databases;
- Identification of specific types and sources of information needed to provide emergency telecommunication services, including the means of conveyance;
- Identification of security aspects for authentication of users and prevention of interference with ETS traffic;
- Identification of those dealing with various aspects (technical and other) related to emergency telecommunications.

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Other entities

● United Nations University (UNU)

UNU, with headquarters in Tokyo, Japan, comprises 13 research and training centres and programmes around the world and its partners include over 30 United Nations organizations and more than 100 research institutions globally. The overall mission of UNU is to contribute, through research and capacity-building, to efforts to resolve the pressing global problems that are the concern of the United Nations Member States.

With regard to disaster reduction, UNU has focused its activities in support of the ISDR goals in three main areas: firstly, the social aspects of urban vulnerability (a UNU initiative has been designed to highlight, produce and disseminate methodologies for the analysis of urban social vulnerability); secondly, disaster information and technologies (activities which have been carried out in partnership with the University of Tokyo's International Center for Disaster Mitigation-Engineering (INCEDE)); and thirdly, enhanced preparedness for climate-related disasters, which has always been a high priority area for the University.

A number of initiatives developed over the years to address these important global issues have made a significant contribution in linking the scientific community and the United Nations system. One particular example is the study on the El Niño phenomenon, which was carried out as a joint project between the ISDR secretariat, the National Center for Atmospheric Research (NCAR) (Boulder, Colorado, United States), UNEP, UNU and WMO. This activity, which included the work of multidisciplinary teams in 16 countries, led to findings that have been crucial to improving preparedness for the next El Niño occurrence and other climate-related disasters. As a follow-up to the El Niño project, UNU has developed a new Climate Affairs Programme, which will encompass a broad spectrum of issues ranging from ethics and policy

formulation to the impact of climatic phenomena. An important contribution of this initiative is the development of a multidisciplinary Climate Affairs Capacity Building Programme, which facilitates capacity development to meet disaster reduction challenges. Finally, UNU together with the University of Geneva and the Federal School of Lausanne have provided fellowships to postgraduate students from developing countries to attend the international course in analysis and management of geologic risk. UNU also participates in the work of the Inter-Agency Task Force on Disaster Reduction as a member of the Working Group on Climate and Disasters.

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● United Nations Institute for Training and Research (UNITAR)

UNITAR is an autonomous body within the United Nations with a mandate to enhance the effectiveness of the United Nations through training and research activities. Its headquarters are located in Geneva, Switzerland, where a majority of the UNITAR training and capacity-building programmes are organized. It also has a liaison office in New York.

UNITAR has provided training and project services for policy and institutional development. These activities have addressed risk issues in the areas of chemical and waste management, climate change, biodiversity, land degradation, environmental law, environmental negotiations, national reconstruction, the use of information systems and the involvement of local authorities. UNITAR conducted a programme in collaboration with several other United Nations organizations, local authorities, NGOs, universities and the private sector consisting in launching

an International Training Centre for Local Actors (CIFAL) in Divonne-les-Bains, France. This Centre provides a service structure, an international meeting location and an exchange of experiences open to all actors involved with sustainable development and international cooperation at the local level.

Recognizing the utility of geographic information systems and other modern information and communication technologies for advancing disaster reduction, UNITAR has been organizing training sessions in these fields since 1986 as well as several training activities related to disaster reduction. These include training

sessions for African civil servants working in the field of land degradation, workshops for local authorities in Crimea and Lebanon and additional workshops for national decision makers in the Democratic Republic of the Congo and countries of the Southern Caucasus on the use of information systems for disaster reduction.

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Inter-agency mechanisms and common initiatives within the United Nations System

The ISDR Inter-Agency Task Force on Disaster Reduction is the only platform within the United Nations system entirely dedicated to the coordination and policy setting of disaster reduction. The other inter-agency United Nations platforms and tools mentioned below complement and contribute to the promotion and efficient implementation of disaster reduction activities.

● United Nations System Chief Executive Board for Coordination (CEB)

Web site: www.ceb.unsystem.org

Membership:

United Nations Secretariat, ILO, FAO, UNESCO, International Civil Aviation Organization (ICAO), WHO, World Bank, International Monetary Fund (IMF), Universal Postal Union (UPU), ITU, WMO, International Maritime Organization (IMO), World Intellectual Property Organization (WIPO), International Fund for Agricultural Development (IFAD), United Nations Industrial Development Organization (UNIDO), International Atomic Energy Agency (IAEA), World Trade Organization (WTO), United Nations Conference on Trade and Development (UNCTAD), UNDP, UNEP, Office of the United Nations High Commissioner for Refugees (UNHCR), United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), UNICEF, United Nations Population Fund (UNFPA), WFP, United Nations International Drug Control Programme (UNDCP), UN-HABITAT.

CEB-formerly the Administrative Committee on Coordination (ACC)-chaired by the Secretary-General of the United Nations, is the forum that brings together the executive heads of all United Nations organizations to further coordination and cooperation on the whole range of substantive and management issues facing the United Nations system.

Since 1998 the former ACC had been regularly informed of the activities of IDNDR and subsequently of ISDR. It had periodically considered disaster reduction among its agenda items and had issued several statements on the importance of increased inter-agency coordination in this field. ISDR summary reports of the meetings of

the Inter-Agency Task Force on Disaster Reduction are circulated to CEB through its secretariat. Several members of CEB are permanent members of the Inter-Agency Task Force on Disaster Reduction. This provides a unique opportunity for strengthening coordination among agencies and organizations active in disaster reduction, humanitarian assistance and related development and environmental issues.

● ISDR Inter-Agency Task Force on Disaster Reduction

Web site: www.unisdr.org

Membership:

United Nations system organizations: FAO, ITU, UNDP, UNEP, UNESCO, UN-HABITAT, WFP, WHO, WMO, World Bank.

Non-UN organizations:

ADRC, African Union (AU), ADPC, Commonwealth of Independent States (CIS) Interstate Council, Council of Europe EUR-OPA Major Hazards Agreement, Drought Monitoring Centre (Nairobi), GFMC, Ibero-American Association for Civil Defense and Protection, IFRC, International Council for Science (ICSU), Munich Re, OAS/Inter-American Committee on Natural Disaster Reduction (IACNDR), SOPAC.

Comprehensive information on the ISDR secretariat and the Inter-Agency Task Force on Disaster Reduction can be found in the section on ISDR (see pages 19-20).

United Nations Development Assistance Framework (UNDAF)

Web site: www.dgo.org/

UNDAF constitutes a key component of

the United Nations Secretary-General's reform proposals adopted in 1997, to promote common objectives, time frames as well as improved collaboration between United Nations programmes and funds. It has been designed as the centrepiece of United Nations development cooperation at country level. UNDAF is primarily a United Nations instrument to respond strategically to countries' development challenges and to the United Nations global agenda. UNDAF is intended to strengthen the capacity of host Governments to implement their development programmes and strengthen their relations with the United Nations system. It is complemented with Common Country Assessments (CCAs), carried out between the agencies and the host country authorities. UNDAF and CCAs are therefore useful tools for the incorporation of disaster risk assessments and reduction measures into inter-agency assessment and action in a country.

● United Nations Development Group (UNDG)

Web site: www.undg.org

UNDG Executive Committee membership: UNDP, UNICEF, UNFPA, WFP and other entities participating as warranted by their interests and mandates. The Office of the Spokesman for the Secretary-General and the United Nations Fund for International Partnerships (UNFIP) participate in UNDG as observers.

UNDG members: DESA, UNDCP, UN-HABITAT, United Nations Office for Project Services (UNOPS), United Nations Development Fund for Women (UNIFEM), Joint United Nations Programme on HIV/AIDS (UNAIDS), UNCTAD, WHO, IFAD, UNESCO, FAO, the regional economic commissions, the High Commissioner for Human Rights and the Special Representative of the Secretary-General for Children and Armed Conflict.

UNDG, chaired by the UNDP Administrator, provides a framework for greater coherence and cooperation in United Nations development operations. This

enables UNDG members to maximize their comparative advantages and build on and support the work of other members at the country level. As most of the UNDG members carry out activities towards disaster reduction (see previous pages of this section), this group represents an opportunity to integrate disaster reduction into other areas of concern, in particular sustainable development.

The DevLink web site, managed by UNDG, provides key documents, examples of good practice, training materials, sources of additional information and links to relevant United Nations and non-United Nations sites on UNDG areas of activity and in support of the implementation of the Millennium Declaration and the Secretary-General's reform programme, particularly CCAs and UNDAF.

● United Nations Disaster Management Training Programme (UNDMTP)

Web site: www.undmtp.org

Membership:

United Nations system agencies/organizations: FAO, IBRD, ILO, International Organization for Migration (IOM), OCHA, ISDR, Office of the United Nations High Commissioner for Human Rights (OHCHR), United Nations Centre for Human Settlements (UNCHS), UNCTAD, UNDP, UNEP, UNESCO, UNFPA, UNHCR, UNICEF, UNITAR, UNOPS, United Nations Staff College (UNSC), United Nations Volunteers (UNV), WFP, WHO, WMO.

Non-United Nations organizations: International Committee of the Red Cross (ICRC), International Council of Voluntary Agencies (ICVA), IFRC, National Refugee Commission (NRC), Steering Committee for Humanitarian Response (SCHR)

Under the management of UNDP, DMTP is an inter-agency tool shared to support capacity-building activities in the field of crisis and disaster management by undertaking training to meet the needs of government personnel, civil society groups, community leaders and partners in the



United Nations system. DMTP also provides training for in-country United Nations system Disaster Management Teams (DMT).

- **Disaster Management Teams**

DMT are established in countries where the United Nations system works, in different grades of formality, towards promoting coherence, coordination and information exchange among agencies in disaster-related matters and between the United Nations system and the host Government.

All relevant agencies with presence in the country are encouraged to participate in DMT.

UNDP, WFP, UNICEF, WHO (PAHO), FAO and UNESCO are the most commonly represented agencies in the Teams. While the spirit of DMT is to promote medium and long-term disaster reduction concerns in development planning to reduce vulnerability to natural or man-made hazards, the teams are however more active in the aftermath of disasters and serve as a coordinating mechanism to provide assistance for relief and recovery. In areas where similar natural disasters are recurrent, it is recommended that DMT embark systematically on preparedness programming as an exit strategy.

See: "The Role and Responsibilities of the UNDMTs" at the website www.undmtp.org



A faint, light blue world map is visible in the background of the top half of the page. The map shows the outlines of continents and oceans.

Chapter 7

Challenges for the future

- 1.1 Sum up - challenges ahead
- 1.2 Measurement of progress

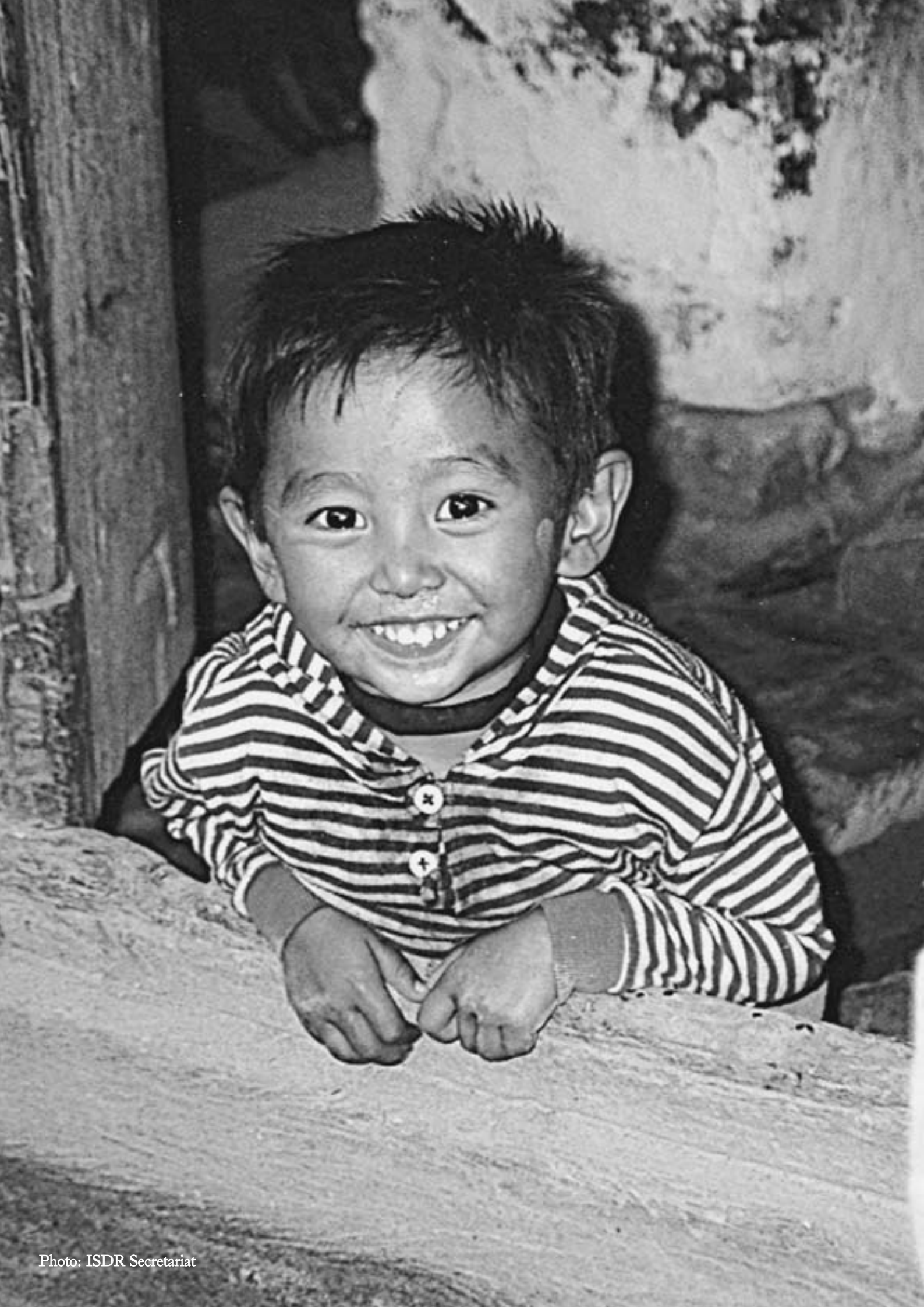


Photo: ISDR Secretariat

Challenges for the future

*IDNDR mid-review
in Yokohama*

*The mid-term review
of IDNDR, at the
World Conference on
Natural Disaster
Reduction in Yoko-
hama, May 1994,
revealed in its assess-
ment that “awareness
of the potential benefits
of disaster reduction is
still limited to spe-
cialised circles and has
yet not been successfully
communicated to all
sectors of society...” In
addition, it states that a
“number of positive
results have been
achieved...although
unevenly and not in the
concerted and systematic
way envisaged...”
These are challenges
still to be addressed.*

As recognized by the IDNDR Programme Forum in 1999, a great deal of learning and experience was gained by individuals, communities, governments and specialists from different fields during the Decade. Many national and local plans have benefited from progress made at all levels on employing new institutional and technical tools for improving disaster reduction practices. Particularly valuable advances occurred in the increasing use of risk assessments, specific methodologies and research initiatives, early warning systems, information, training, education and public awareness activities.

Nevertheless, no formal evaluation of achievements or systematic monitoring of progress was carried out. Therefore, the ISDR secretariat has embarked on developing a process for a continuous global review of disaster reduction initiatives. The aim is twofold: to gather and provide information on ongoing activities and the evolving “state of the art” of disaster risk reduction, and to initiate the development of a conceptual framework for monitoring progress made by governments, civil society and other relevant organizations.

This final chapter outlines some of the main conclusions and recommendations stemming from the research and consultation effort undertaken for this global review.

Only by showing evidence of the benefits of reducing the vulnerability to disasters can future investment and priorities in this area be sustained. The continuous work of local and grass roots organizations, governments, the scientific and technical community, international and regional organizations remains essential to unite efforts in a common process to ensure sustainable development. This is where the ISDR mechanisms should make a difference.

The process of reviewing disaster reduction initiatives is an essential function of the ISDR, which will be gradually enhanced. This initial work reflected in *Living with risk* will contribute to the process of the ten-year review of achievements and shortcomings in the implementation of the Yokohama Strategy and Plan of Action of 1994. This exercise, planned for 2003, is expected to be completed in 2004. It should also contribute to shaping the growing international agenda for disaster risk reduction.

This current issue of the global review is a preliminary version, intended for consultation and discussion. It is expected to spark an exchange of ideas and wider circulation of experiences among those interested in the subject – scholars, practitioners, policy-makers, leaders, managers and professionals concerned with the enormous losses in lives and assets caused by the lack of prevention and protection from disasters that slows development and renders it more difficult and expensive. The global review will be elaborated and refined further based on the comments received and additional experience disclosed by new developments.

Sum up – challenges ahead

Throughout this review it is often repeated that there is a need for disaster and risk reduction to be an essential part of broader sustainable development concerns. As discussed in chapter six, the international development targets set for the year 2015 in the Millennium Declaration cannot be reached unless the heavy toll of disasters in human and economic terms is reduced. That is because risk and vulnerability to natural, technological and ecological hazards are driven by social, economic and environmental activities. The subject has emerged as a new area of concern for governments in the preparatory process for the World Summit for Sustainable Development in August 2002.

It is important to remember that current development practices do not necessarily reduce communities' vulnerability to disasters. Ill-advised and misdirected development practices often increase the risk to disasters. The challenge of influencing and enhancing development plans, programmes and projects pursued by countries is still great.

The international community equally bears a responsibility to motivate, and indeed to support, policies and actions in developing countries that pursue structured and evident disaster risk reduction strategies. As long as the only message that national governments receive from the international development "community" in connection with disaster risks is the equivalent of, "please prepare a consolidated relief appeal when there is a crisis", and that the costs and associated responsibilities for poorly managed risks are transferred to the international community, there will remain slight incentive for the seriously disaster-prone developing countries to embrace significant, internal, commitments or responsibility for sustained disaster risk management practices.

In this respect there is a crucial role for international organizations and the collective interests of the United Nations system, in concert with the influential bilateral and multilateral development assistance agencies to support, rather than undermining national initiatives and local efforts to develop capacities for

Challenges for the Pacific islands – representative for many parts of the world

The following future challenges to incorporating a Comprehensive Hazard And Risk Management (known as CHARM in the Pacific) into national development planning were indicated in the regional ISDR review for the Pacific region, undertaken with SOPAC. These challenges are valid for most of the regions in the world and at a global scale and are therefore reproduced here.

Accomplishing a paradigm shift from managing disasters to managing risks: A big educational drive is needed to instil the distinctive concepts of hazards, vulnerability, risks and the value of managing risks. High-level advocacy and influential public champions are needed to promote risk reduction in their societies.

Producing more adequate hazard and vulnerability assessments and improve presentation: More work is needed to produce detailed hazards and vulnerability maps. Assessments should integrate community-derived perceptions and priorities about vulnerability and risk analysis.

Ensuring uniform and consistent approaches to a common problem: There are often several agencies delivering risk management services to countries within a given region. This results in over-taxing capacities of recipient countries and a potential confusion of purpose. In the Pacific specifically, a requirement would be agreed negotiations with major development partners to adopt a uniform approach and common standards to disaster risk management and consolidated support for its continued implementation.

Ensuring national integration and co-ordination: Agencies often create spheres of authority and accountability that result potentially in resistance or inflexibility. Formulating policy at 'whole-of-government' incorporating risk reduction programmes into national planning arrangements for sustainable development, enhancing information sharing, upgrading communications systems and training capabilities and providing adequate levels of resources can minimise such constraints.

Land use systems and tenure: Social relationships, land rights and local prerogatives are particularly complicated and varied across the Pacific region. Convincing, consistent and sustained public awareness and advocacy programmes have to be institutionalised in order to gain acceptable levels of understanding and commitment.

improved disaster risk reduction. The persistent extravagance too often displayed in emergency assistance following an "international" disaster, in contrast to the much smaller ongoing commitments to support local endeavours of disaster risk reduction, is nothing less. There is accordingly a serious need for international policy-makers to proceed beyond rhetorical resolutions and to invest in considered, and sustained, measures of disaster risk reduction. This can, and indeed should, be reflected by the incorporation of risk factors - starting with systematic risk assessments - in both emergency assistance grants and the more fundamental development assistance programmes underwritten by the international community.

This approach, needs to be coupled with the demanding task of accommodating the short-term and immediate needs of developing countries while still maintaining an appreciation of the value of medium and long-term objectives demanded by both disaster reduction and sustainable development. Too often these linkages have been either obscured, or ignored, in practice. These issues become glaring in those countries where "development" is a fundamental element of simple, basic survival for the majority of the population. To be effective, disaster risk reduction can only be integrated into all relevant sectors of national social and economic interest: health, education, environment, agriculture, transportation, infrastructure, communications, public administration, planning - even security. Responsible governance, in fact.

The challenges and priorities noted in the conclusions of previous chapters are not repeated here, but the overarching concerns for further strengthening include:

- **Increasing the widespread understanding of disaster risk.** This is a cross-cutting need related to all sectors. It includes a shift in approach towards the development of risk management as an essential tool for planning and managing development.
- **Bringing the ecological sphere into disaster risk reduction.** Disaster reduction has primarily focused on physical protection to hazards and the economic and social spheres of sustainable development. A challenge is to bring the ecological concerns and the considered management of natural resources more emphatically into disaster risk reduction. Environmental degradation and global change call for this.
- **Recognizing disaster risk reduction primarily as national and local responsibilities.** Increased evidence of national and local commitment is required, including institutional structures being in place. Cross-sectoral and policy cooperation is needed to build a culture of prevention linked to environmental and socio-economic activities.
- **Continuing efforts to decentralize risk management in practice.** Community participation and local decision making is essential to promote increased national public commitment.
- **Enhancing policy development and integration** to ensure that all relevant sectors include risk management as a basic tool under the overall perspective and goals of sustainable development.
- **Increasing education, information networking and research** on risk management, and developing tools to reduce gender and culture-sensitive risks, adapted to different geographical and cultural contexts.
- **Expanding partnerships** at all levels, including those among the private sector, academic institutions and NGOs working along with government. This should be emphasized as a main objective of national platforms to address disaster risk reduction in each country. For greater coherence and impact, these efforts need to be focussed and supported by methodological tools to establish links among initiatives, systematize and unify processes.
- **Development of specific methodologies** to reduce risk and vulnerability to disasters in such key areas as environmental management, land use planning, protection of critical facilities, financial tools and early warning. Take stock of existing tools and technologies and lessons-learned.
- **Measurement of progress.** The fundamental challenge is to achieve a reduction in fatalities and property loss from disasters in a growing number of communities and countries. In order to do this it is essential to show evidence that disaster risk reduction is being understood, measures are progressively being put into practice and targets or benchmarks and indicators are developed.

Measurement of progress – the benefits of reporting

Reduced losses from disasters, as well as reduced level of exposure to hazards, should become a more explicit development target in its own right, both nationally and globally, as recognised in the Millennium Development goals and through the ISDR.

At the outset of the task to conduct a global review of disaster reduction initiatives, the advisory panel for this review recommended that it should embark on the development of criteria to measure effectiveness of disaster risk reduction. These should ultimately reflect how lives and assets have been saved, as well as where countries stand in accomplishing the objectives of the ISDR.

A number of experts, scholars and agencies has called for the determination and application of specific disaster risk reduction baselines, targets and indicators. These could include commitment for integrating risk reduction into national planning and educational systems. These must necessarily vary taking account of each national context, hazard frequency and annual losses. Global targets could however aim at reducing the number of victims and economic losses by an agreed percentage over a specified period of time. Targets could be more specific for governments and local communities, reflecting local criteria and conditions or otherwise based on performance.

“Each country bears the primary responsibility for protecting its own people, infrastructure, and other national assets from the impact of natural disasters.”

Principle nine of the Yokohama Strategy and Plan of Action for a Safer World

This task is obviously a difficult and complex one. Scientific and technical approaches in the past have focused on indicators to suggest a hierarchy of accomplishment (number of risk assessments carried out, existence of databases, number of decrees or legal acts, research programmes, educational reforms, etc.). The quantitative measurement of the impact of individual disaster risk reduction initiatives or projects that typically span a relatively shorter time period, is difficult to achieve. If no disaster has occurred after the measure has been put in place it could be difficult to test the relative effectiveness of measures undertaken. One approach to

dealing with this dilemma would be to try and identify situations where a “before and after” scenario would apply.

Measuring the qualitative advancement is even more demanding as changes in perceptions, values, attitudes and behaviour are difficult to assess. However, these are the essential changes needed to move to a higher phase in the pursuit of sustainable development. Benchmarks and indicators for reducing disaster risk can also become valuable instruments to monitor other sustainable development requirements in fields such as education, community participation, local management and self reliance, sustainable livelihoods, environmental management, urban and rural or land-use planning, and gender balance.

Measuring the progress of disaster risk reduction in a country or region requires different frameworks at different time-scales. In the long term, disaster induced changes in the indicators of sustainable development, such as the Human Development Index, GDP, poverty reduction, improved environmental management practices can reflect, to a degree, the extent to which a community has become more resilient to disasters.

The ISDR secretariat is working with its partners to address these needs. With UNDP, in particular, it has initiated collaboration for the development of common criteria to identify and assess the impacts of disaster risk reduction. UNDP chairs the working group on vulnerability, risk and impact assessments of the Inter-Agency Task Force on Disaster Reduction, and is currently producing a Global Risk Vulnerability Index as part of the forthcoming World Vulnerability Report. Collaboration is also taking place with UN/DESA on sustainable development indicators and with a number of others such as the IFRC.

ISDR aims to assess and monitor disaster risk reduction by focussing on measuring the multiple processes leading to a culture of prevention, including the participation of the national and local communities in the application of the most up-to-date knowledge for risk management. In order to assure credibility and acceptance, it is essential to engage in a transparent and participatory process for developing and evaluating the performance of an appropriate set of indicators. Examples for specific priority in the development of “performance targets” are suggested in various sections of this global review.

Building performance targets

In order to develop and assess effective disaster risk reduction strategies, governments need to focus on a series of performance targets or benchmarks.

They need to be, among other things "SMART": sustainable, measurable, achievable, relevant and timely:

- **Sustainable** over time.
- **Measurable**, with defined criteria for success and specific benchmarks.
- **Achievable** within the time frame that governments set. This may extend over months or years depending on available resources and national priorities.
- **Relevant**, to satisfy varied national situations related to national hazards, vulnerabilities and capacities and set within national governmental structures.
- **Timely**, related to carefully time-framed tasks, with clear short and long term goals.

They must also be:

- Clearly **defined**.
- **Flexible**, to enable on course corrections to be made.
- **Adaptable** to suit changing needs and perceptions.
- Well **integrated** among sectors, line ministries or departments and between fields or disciplines.
- **Accepted** by all contributing bodies both inside and outside governments.
- **Reflecting on international experience** from countries that have succeeded in creating effective mitigation and preparedness strategies.

Performance targets need to be adapted to each specific geographical and cultural context and tested accordingly.

A collaborative effort to measure accomplishment

While the motivation and the responsibility to evaluate progress towards more effective risk reduction rests within individual countries and local communities, there is a collective requirement that extends throughout the disaster risk reduction community to determine broadly agreed terms of reference and to increase knowledge about available methodologies. Specific performance targets and priorities clearly will vary from country to country, but crucial areas of emphasis can be tied to various functions and abilities associated

with the different aspects of disaster risk reduction that all comprehensive strategies share.

- Designated government authorities at both national and local levels of responsibility will ideally work closely with specialized institutions and community-based organizations to apply the formulas considered most appropriate for their respective requirements. By drawing on their own local experiences though, they also can contribute to the broader search and progressive refinement of both methodologies and appropriate criteria that may hold wider relevance and appeal.
- Equally, international agencies representing both bilateral and multilateral interests can contribute to this on-going assessment process as part of realizing their on-going development policies, programmes and projects.
- Individual "centers of excellence" devoted to disaster reduction at local, national, regional and international levels of activity can further augment the process of identifying, compiling and circulating different approaches to evaluate the various dimensions of disaster risk management in practice.

In this respect, ISDR's extended international framework, associated technical specialists and interested institutions can contribute various examples or broad parameters of possible criteria within designated areas of interest. Working in concert, they can also facilitate the wider distribution and progressive refinement or validation of different needs and experience. There are crucial roles to compare, circulate and progressively consolidate possible approaches to gauge global progress, with the overall aim of enhancing and utilizing multiple capacities for a shared global purpose.

An example of one such conceptual framework suited to a particular set of circumstances is presented on the following pages. It was developed through national and sub-regional collaboration in the PREANDINO programme involving Bolivia, Colombia, Ecuador, Peru and Venezuela, with the encouragement of the ISDR secretariat. While the expressed need for this framework evolved within the countries concerned, its initial development also serves the purpose of this global review by demonstrating one approach to a systematic and structured review process of accomplishments in disaster risk management practice. The framework will continue to be refined as appropriate criteria become fashioned through further development and the methodology is honed through practical testing, but it represents an important start to the process.

Elements for development of indicators or performance targets for an institutional framework for disaster risk reduction and instilling a culture of prevention

Focus area for performance targets	Variable	Criteria for indicators <i>(existence of..., number of..., level of...)</i>
Impact on institutional framework	Political will (incorporation of disaster prevention in the political value system)	<ul style="list-style-type: none"> • Official statements • Formal decisions on disaster prevention and risk management • High-level programmes for promoting disaster prevention and risk reduction
	Institutional development (for risk management)	<ul style="list-style-type: none"> • Organization - degree of organizational development • Legal and juridical support • Risk reduction law or legislative acts (in related areas) • Other regulations • Budget for institutional strengthening and other disaster reduction actions
Impact on the planning process	Risk reduction and/or disaster prevention plans	Existence and development of risk reduction/prevention plans (within different relevant sectors)
	Incorporation of risk assessments and disaster prevention measures in development plans and control mechanisms	<ul style="list-style-type: none"> • Incorporation of risk assessments and risk reduction measures in development plans • Incorporation of risk assessments and prevention in land-use management plans • Consideration of disaster risk assessments in projects (directly or in conjunction with environmental impact assessments) • Coordination mechanisms for plan design • Establishment of critical capabilities for protecting lives and assets and implementing alternatives in disaster situations (such as, projects for control of floods and other natural hazards and for protection against their impact, vulnerability reduction for health facilities, evacuation routes, alternative life-lines, communication centres, airports, information management)
	Support systems for decision-making	<ul style="list-style-type: none"> • Information systems on risks and disasters • Impact measuring systems (indicators and methodologies) • Management assessment systems (management indicators)
Impact on the creation of a culture of prevention at the level of the entire society	Education and capacity building	<ul style="list-style-type: none"> • Incorporation of hazard and risk management in the basic primary and secondary curriculum (related to natural and social sciences and environmental education) • Incorporation of specialized topics in higher education • Higher education courses in prevention and risk management (architecture, engineering, urban planning, medicine and public health, agriculture, sociology, economy, pedagogy, history, among others) • Risk management training programmes for public administration and other stakeholders • Community training programmes
	Information and communication	<ul style="list-style-type: none"> • Formal prevention information and dissemination programmes • Channels of access to information (electronic and documentation centres) • Communication programmes aimed at the general population • Role of the media (permanent presentation of this type of information in weather forecast broadcasts; links between the media and specialized information production centres)

Methodological approach developed in the context of the PREANDINO programme (Bolivia, Colombia, Ecuador, Peru and Venezuela) and in collaboration with the ISDR secretariat.

Focus area for performance targets	Variable	Criteria for indicators (<i>existence of..., number of..., level of...</i>)
Impact on knowledge production for risk reduction and management		<ul style="list-style-type: none"> • Public awareness programmes (institutionalised) • Specialized information networks for risk reduction (public and private)
	Production of knowledge	<ul style="list-style-type: none"> • Research and analysis of hazards (natural, technological, environmental) • Vulnerability analysis and assessments (social, economic, physical and environmental vulnerability) • Risk assessments (risk maps) • Socio-economic impact studies (methodologies, estimates, lessons learned) • Development of planning methodologies
	Support infrastructure	<ul style="list-style-type: none"> • Monitoring networks, remote sensing, GIS and other information technology capacity • Communications network
	Institutional development of the knowledge sector	<ul style="list-style-type: none"> • Channels of coordination between researchers and/or monitors (inter-disciplinary and multi sectoral) • Role of academic institutions in research • Links between knowledge institutions and information producers • Channels for the dissemination of scientific and applied information to communities • Type of information generated (degree to which it meets the demand; product supply and level of detail)
Impact of the participation by the national community in prevention and risk reduction efforts	Private sector participation	<ul style="list-style-type: none"> • The insurance sector • Finance (criteria for approval of project financing) • Business and interest groups • Partnerships (public-private)
	Community action and participation	<ul style="list-style-type: none"> • Specialized NGOs that can play a technical or awareness role in disaster prevention • Community based organizations • Mechanisms for community participation • Agreements between the governments (national and local) and civil society (NGOs, organized communities)
Impact of specific disaster risk reduction measures	Demonstrated application	<ul style="list-style-type: none"> • Use of technical knowledge in engineering and other applications for vulnerability reduction (protection of critical facilities) • Existence and application of technical construction standards • Control mechanisms of the application of technical standards • Development and application of urban planning standards • Control mechanisms for urban planning regulations • Control mechanisms for land-use management plans • Programmes for improving the application of prevention techniques • Early warning systems (application of technology, extension of the warning network)



A window of opportunity

The two Chinese characters, which together form the word crisis, separately mean threat and opportunity. An etymology like this is a reminder that as conditions change, so can attitudes. In a world in which things seem sure to get worse, there is increasing incentive to make sure they do not.

When old menaces seem to multiply, new thinking must provide the solutions. Communities must adopt the notion that disaster impacts can be reduced and therefore not only wait for disasters to be managed. In some cases, it might be possible to reduce hazards themselves. If not, then it would certainly be possible to reduce human vulnerability to those hazards.

The combination of science and history is instructive – it provides the assurance that disasters that happen once can happen again and again. Earthquakes, for instance, are a fact of life at tectonic plate boundaries and these have been well-mapped. Floods are a fact of life on flood plains, and their rich soils are down-to-earth proof of it.

To go from disaster management to disaster risk reduction is to exploit hindsight and develop foresight through insight.

危机

Crisis =
threat + opportunity





Annex 1

Terminology: Basic terms of disaster risk reduction

Throughout this global review the ISDR secretariat presents main terms related to disaster risk reduction to practitioners and experts for their consideration and further refinement. They are based on a broad collection of different international sources, with the purpose of developing common understanding of terminology on disaster reduction, useful for the public, authorities and practitioners. This is a continuing effort to be reflected in future reviews, responding to a need expressed in several international venues, regional commentary and national responses to the ISDR questionnaire.

Acceptable risk

The level of loss a society or community considers acceptable given existing social, economic, political, cultural and technical conditions.

In engineering terms, acceptable risk is also used to describe structural and non-structural measures undertaken to reduce possible damage at a level, which does not harm people and property, according to codes or “accepted practice” based, among other issues, on a known probability of hazard.

Biological hazard

Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Examples of biological hazards: outbreaks of epidemic diseases, plant or animal contagion, insect plagues and extensive infestations.

Building codes

Ordinances and regulations controlling the design, construction, materials, alteration and occupancy of any structure for human safety and welfare. Building codes include both technical and functional standards.

Capacity

A combination of all the strengths and resources available within a community or organisation that can reduce the level of risk, or the effects of a disaster.

Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.

Capacity building

Efforts aimed to develop human skills within a community, organisation or institution needed to reduce the level of risk.

In extended understanding, capacity building also includes development of institutional, financial and other resources, such as technology at different levels and sectors of the society.

Climate change

Refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer).

Climate change may be due to natural internal processes or external forcing, or to persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2001).

Coping capacity

The manner in which people and organisations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster phenomenon or process.

The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards.

Counter measures

All measures taken to counter and reduce disaster risk. They most commonly referred to engineering (structural) measures but can also include other non-structural measures and tools designed and employed to avoid or limit the adverse impact of natural hazards and related environmental and technological disasters.

Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community/society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster risk reduction (disaster reduction)

The systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development.

The disaster risk reduction framework, as described in this review, is composed of:

- Risk awareness and assessment including hazard analysis and vulnerability/capacity analysis;
- Knowledge development including education, training, research and information;
- Public commitment and institutional frameworks, including organisational, policy, legislation and community action;
- Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments;
- Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

Early warning

The provision of timely and effective information, through identified institutions, that allow individuals at risk of a disaster, to take action to avoid or reduce their risk and prepare for effective response.

Early warning systems consist of three elements (i) forecasting and prediction of impending events, (ii) processing and dissemination of warnings to political authorities and population, and (iii) undertaking appropriate reaction to warnings.

Ecosystem

A system of interacting living organisms together with their physical environment.

The boundaries of what could be called an ecosystem are somewhat arbitrary, depending on the focus of interest or study. Thus the extent of an ecosystem may range from very small spatial scales to, ultimately, the entire Earth (IPCC, 2001).

El Niño-southern oscillation (ENSO)

An irregularly occurring pattern of abnormal warming of the surface coastal waters off Ecuador, Peru and Chile. This coupled atmosphere-ocean phenomenon is associated with the fluctuation of intertropical surface pressure pattern and circulation in the Indian and Pacific oceans, called the Southern Oscillation.

There have been a number of attempts to define El Niño, both quantitatively and qualitatively, but none has achieved universal recognition. This phenomenon triggers a shift in seasonal patterns of weather systems over many subtropical and mid-latitude parts of the globe.

La Niña is the opposite of an El Niño event, during which waters in the west Pacific are warmer than normal and trade winds are stronger.

Emergency management

The organisation, management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation.

Emergency management involves the plans, structures and arrangements which are established to bring together the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to deal with the whole spectrum of emergency needs. This is also known as disaster management.

Environmental impact assessment (EIA)

Study undertaken in order to assess the effect on a specified environment of the introduction of any new factor, which may upset the ecological balance.

EIA is a policy making tool that serves to provide evidence and analysis of environmental impacts of activities from conception to decision-making. It is utilised extensively in national programming and for international development assistance projects. An EIA must include a detailed risk assessment and provide alternatives solutions.

Environmental degradation

Processes induced by human behaviour and activities (sometimes combined with natural hazards), that damage the natural resource base or adversely alter natural processes or ecosystems. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards.

Some examples: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise, ozone depletion.

Forecast

Definite statement or statistical estimate of the occurrence of a future event (UNESCO, WMO).

This term is used with different meaning in different disciplines, as well as "prediction".

Geological hazard

Natural earth processes or phenomena, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Geological hazard

includes processes of a geological, neotectonic, geophysical, geomorphologic, geotechnical and hydrogeological nature.

Examples of geological hazards are: earthquakes, tsunamis; volcanic activity and emissions; mass movements (landslides, rockslides, rockfall, liquefaction, submarine slides, etc.); subsidence, surface collapse and geological fault activity.

Geographic information systems (GIS)

Computer programmes that combine a relational database with spatial interpretation and outputs in form of maps. A more elaborate definition is that of a system for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced. It is normally taken to include a spatially referenced database and appropriate applications software.

Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk reduction measures and its management.

Greenhouse gas (GHG)

A gas, such as water vapour, carbon dioxide, methane, chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), that absorbs and re-emits infrared radiation, warming the earth's surface and contributing to climate change (UNEP, 1998).

Hazard

A potentially damaging physical event, phenomenon and/or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) and/or induced by human processes (environmental degradation and technological hazards). Hazards can be combined, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.

Hazard analysis

Identification, studies and monitoring of any hazard to determine its potentiality, origin, characteristics and behaviour.

Hydrometeorological hazards

Natural processes or phenomena of atmospheric, hydrological or oceanographic nature, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Examples of hydrometeorological hazards are: floods, debris and mud flows; tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; drought, desertification, wild-land fires, heat waves, sand or dust storms; permafrost and avalanches.

La Niña

(see El Niño-southern oscillation).

Land-use planning

Branch of physical planning that determines the most desirable way land should be used. Involves land-use studies and mapping, analysis of data acquired, formulation of alternative land-use decisions and design of a long-range land-use plan for different geographical and administrative scales.

Land-use planning can help to mitigate disasters and reduce risks by discouraging settlements and construction of key installations in hazard prone areas, control of population density and expansion, and the siting of service routes in transport, power, water, sewerage and other critical facilities.

Mitigation

Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Natural hazards

Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

Natural hazards can be classified by origin in: geological, hydrometeorological or biological.

Preparedness

Activities and measures taken in advance to ensure effective response to the impact of disaster, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location.

Prevention

Activities to provide outright avoidance of the adverse impact of hazards and related environmental, technological and biological disasters.

Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education, prevention refers to changing attitude and behaviour towards a "culture of prevention".

Public awareness

The processes of informing the general population, increasing their levels of consciousness about risks and how to take action to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.

Public awareness activities support a change in behaviour leading towards a culture of prevention. This involves public information, dissemination, education, radio or television broadcasts and the use of printed media, as well as, the establishment of disaster information centres and networks.

Public information

Information, facts and knowledge provided or learned as a result of research or study, which is public, open to the people as a whole.

Recovery

Decisions and actions taken after a disaster with a view to restoring the living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Recovery (rehabilitation and reconstruction) is an opportunity to develop and apply disaster risk reduction measures.

Relief / response

The provision of assistance and/or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Resilience / resilient

The capacity of a system, community or society to resist or to change in order that it may obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is capable of organising itself, and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster.

Retrofitting (or upgrading)

Reinforcement of structures in order to be more resistant to the forces of natural hazards.

Retrofitting involves consideration of changes in the mass, stiffness, damping, load path and ductility and can involve radical changes such as the introduction of energy absorbing dampers and base isolation systems. Examples of retrofitting includes the consideration of wind loading to strengthen and minimize the wind force, or in earthquake prone areas, the strengthening of structures by adding shear walls.

Risk

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable/capable conditions. Conventionally risk is expressed by the equation $\text{Risk} = \text{Hazards} \times \text{Vulnerability} / \text{Capacity}$.

Beyond expressing a probability of physical harm, it is crucial to appreciate that risks are always created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share

the same perceptions of risk and their underlying causes.

Risk assessment/analysis

A process to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability/capacity that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

The process of conducting a risk assessment is based in a review of both technical features of hazards such as their location, intensity, frequency, and probability, and also the analysis of the physical, social and economic dimensions of vulnerability, while taking particular account of the coping capabilities pertinent to the risk scenarios.

Risk reduction measures

The development and application of policies, procedures and capacities of the society and communities to lessen the negative impacts of a possible impact of natural hazards and related environmental and technological disasters. This includes structural and non structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, as well as the development of coping capabilities.

Risk management

The systematic management of administrative decisions, organisation, operational skills and responsibilities to apply policies, strategies and practices for *disaster risk reduction*.

Structural measures

Engineering measures and construction of hazard-resistant and protective structures and infrastructure

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of “needs”, in particular the essential needs of the world’s poor, to which overriding priority should be given; and the idea of limi-

tations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987).

Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, which all relate to disaster risk reduction.

Technological hazards

Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Some examples: industrial pollution, nuclear activities and radioactivity, toxic wastes, dam failures; transport, industrial or technological accidents (explosions, fires, spills).

Vulnerability

A set of conditions and processes resulting from physical, social, economical, and environmental factors, which increase the susceptibility of a community to the impact of hazards.

Positive factors, that increase the ability of people and the society they live in, to cope effectively with hazards, that increase their resilience, or that otherwise reduce their susceptibility, are considered as capacities.

Wildland fire

Any unplanned and uncontrolled fire regardless of ignition, that may damage or benefit land of recognised value to a society.

Annex 2

Directory: International, regional, national, and specialized organizations involved in disaster reduction and related issues

This list contains brief descriptive information and contact details of the academic and research institutions, specialized governmental and non-governmental organizations mentioned in the Global Review. Additional information about the United Nations is listed in Chapter 6.2 "UN agencies and scope of activities". The ISDR Secretariat is preparing a more comprehensive directory focusing on internet sources on disaster reduction and related issues. This directory, compiled in a database, will be available on the ISDR Website www.unisdr.org.

The ISDR secretariat would be pleased to receive your comments, corrections or additional information for future versions.

African Center of Meteorological Applications for Development (ACMAD), Niamey, Niger

ACMAD is the focal point in fostering regional cooperation among the fifty-three African states with the rest of the world in climate and environmental concerns with regard to sustainable social and economic development. The center coordinates the activities of the National Meteorological and Hydrological Services (NMHSs) of these countries. <http://205.156.54.206/ia/acmad.htm> <http://www.acmad.ne/uk/>

African Union

The African Union is the successor to the Organization of African Unity launched in Durban, South Africa in July, 2002. <http://www.africa-union.org/>

Agence européenne pour le Développement et la Santé (AEDES)

The European Agency for the Development and Health focuses on public health policies, food security and social programmes such as gender policy. <http://www.aedes.be/>

Agency of Industrial Science and Technology (AIST), Japan

The National Institute of Advanced Industrial Science and Technology (AIST), is an Independent Administrative Institution under the Ministry of Economy, Trade and Industry. On April, 2001 the new AIST began operations. It comprises 15 research institutes previously under the former Agency of Industrial Science and Technology (the former AIST) in the Ministry of International Trade and the Weights and Measures Training Institute. AIST is Japan's largest public research organization. http://www.aist.go.jp/index_en.html

Alliance of Small Island States (AOSIS)

AOSIS is a coalition of small island and low-lying coastal countries that share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change. It functions primarily as an ad hoc lobby and negotiating voice for small island developing states (SIDS) within the United Nations system. AOSIS has a membership of 43 states and territories, drawn from all oceans and regions of the world: Africa, Caribbean, Indian Ocean, Mediterranean, Pacific and South China Sea. Thirty-seven are members of the United Nations, close to 28 percent of developing countries, and 20 percent of the UN's total membership. Together, SIDS communities constitute some five percent of the global population. Member States of AOSIS work together primarily through their New York diplomatic Missions to the United Nations. <http://www.sidsnet.org/aosis>

ASEAN Experts Group on Disaster Management (AEGDM)

ASEAN cooperation on natural and man-made disasters is coordinated by AEGDM, which was established in 1976, and which meets every two years to discuss and share experiences of the region's disaster management and mitigation activities. <http://www.adpc.aic.ac.th/pdr-sea/newsletter/issue3/pdr-update.html>

ASEAN Regional Forum (ARF)

ARF is a regional platform of ASEAN countries and dialogue partners for confidence building and dialogue on regional security concerns. It was established in 1994. It draws together 23 countries which have an impact on or are involved in the security of the Asia Pacific region. It comprises the 10 ASEAN member states (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam); the 10 ASEAN dialogue partners (Australia, Canada, China, the European Union, India, Japan, New Zealand, Republic of Korea, Russia and the United States); the one ASEAN observer (Papua New Guinea); as well as the Democratic Peoples Republic of Korea and Mongolia.

<http://www.dfat.gov.au/arf/arfintro.html>

Asian Development Bank (ADB), Manila, Philippines

ADB is a multilateral development finance institution dedicated to reducing poverty in Asia and the Pacific. <http://www.adb.org/>

Asian Disaster Preparedness Center (ADPC), Bangkok, Thailand

ADPC is a regional resource center established in 1986 dedicated to disaster reduction for safer communities and sustainable development in Asia and the Pacific. It is recognized as an important focal point for promoting disaster awareness and developing capabilities to foster institutionalized disaster management and mitigation policies. <http://www.adpc.ait.ac.th/>

Asian Disaster Reduction Center (ADRC), Kobe, Japan

ADRC was established in July 1998 to promote multilateral cooperation for disaster reduction and to network the various players in the region. It has held annual meetings to network the focal points in governments of its member countries. Its activities focus on information sharing, capacity building and cooperation. It has developed several successful capacity building programmes with its member countries. www.adrc.or.jp

Asian Institute of Technology (AIT), Bangkok, Thailand

AIT is an international graduate institution of higher learning with a mission to develop highly qualified and committed professionals who will play a leading role in the sustainable development of the region and its integration into the global economy. <http://www.ait.ac.th/>

Asia-Pacific Economic Cooperation (APEC), Singapore

Its goal is to advance economic dynamism and sense of community within the Asia-Pacific region.

APEC has established itself as the primary regional vehicle for promoting open trade and practical economic and technical cooperation. <http://www.apecsec.org.sg/>

Association of Caribbean States (ACS), Port of Spain, Trinidad and Tobago, West Indies

The Convention Establishing the ACS was signed on 24 July 1994 in Cartagena de Indias, Colombia, with the aim of promoting consultation, cooperation and concerted action among all the countries of the Caribbean, comprising 25 Member States and three Associate Members. Eight other non-independent Caribbean states are eligible for associate membership. Its current focus is on cooperation in trade, transport, sustainable tourism and natural disasters. <http://www.acs-aec.org/>

Association of South East Asian Nations (ASEAN), Bangkok, Thailand

The ASEAN Declaration states that the aims and purposes of the Association are: (i) to accelerate the economic growth, social progress and cultural development in the region through joint endeavours in the spirit of equality and partnership in order to strengthen the foundation for a prosperous and peaceful community of Southeast Asian nations, and (ii) to promote regional peace and stability through abiding respect for justice and the rule of law in the relationship among countries in the region and adherence to the principles of the United Nations Charter. <http://www.aseansec.org/>

Auckland Local Authority Hazard Liaison Group, New Zealand

It was established by the Auckland Regional Council to enhance communication between local authorities in hazard management issues and to facilitate intra-council communication. The Group was set up to recognize the link between hazard mitigation and land use planning, and the need to develop tools in areas to successfully manage risk, and to improve communication between those working in the area of sustainable development and environment management.

<http://www.ema.gov.au/5virtuallibrary/pdfs/vol16no4/pardy.pdf>

Australian Emergency Management Institute (AEMI), Victoria, Australia (See : EMAI)

AEMI was an arm of Emergency Management Australia (EMA), which is the federal agency responsible for reducing the impact of natural and man-made disasters on the Australian community. AEMI as a registered training organisation, annually conducting a range of Commonwealth-funded activities designed to improve Australia's capability to cope with disasters. <http://www.emergency.nsw.gov.au/AEMI.htm>

Australian Geological Survey Organization (AGSO)

Geoscience Australia is the national agency for geoscience research and information. It contributes to enhance economic, social and environmental benefits to the community - by providing input for decisions that impact upon resource use, management of the environment, and the safety and well-being of Australians. Its major planned outcomes are: enhanced global attractiveness of Australia's offshore and onshore exploration, improved resource management and environmental protection, safer communities and transportation. <http://www.agso.gov.au/>

Benfield Greig Hazard Research Centre (BGHRC), University College London, United Kingdom

The BGHRC is an academic research centre which comprises three groups: Geological Hazards, Meteorological and Space Hazards, and Disaster Management. The BGHRC provides a conduit for the transfer of cutting-edge natural hazard and risk research, practice, and innovation from the academic environment to the business world and government and international agencies. www.bghrc.com

Bureau de la protection des infrastructures essentielles et de la protection civile, Canada (BPIEPC). Also Office of Critical Infrastructure Protection and Emergency Preparedness (OCIEPEP)

Its mission is to enhance the safety and security of Canadians in their physical and cyber environment.

<http://www.ociepep-bpiepc.gc.ca/index.html>

Business and Industry Council for Emergency Planning and Preparedness (BICEPP)

In 1983, the Mayor of Los Angeles and a group of business leaders met to discuss disaster preparedness. This group subsequently became a steering committee and formed the Business and Industry Council for Emergency Planning and Preparedness (BICEPP). It was established as a private sector, self-help association funded by annual sponsorship donations. BICEPP later evolved into a non-profit corporation, lead by an Executive Committee and a Board of Directors. Its goal is to provide a forum for information exchange, to enhance emergency preparedness and contingency planning within the business community.

<http://www.bicepp.org/>

Canadian International Development Agency (CIDA)

CIDA supports sustainable development activities in order to reduce poverty and to contribute to a more secure, equitable and prosperous world. <http://www.acdi-cida.gc.ca/index.htm>

Caribbean Community (CARICOM)

Its mission is :”To provide dynamic leadership and service, in partnership with Community institutions and Groups, toward the attainment of a viable, internationally competitive and sustainable Community, with improved quality of life for all.” <http://www.caricom.org/>

Caribbean Development Bank (CDB), St. Michael, Barbados

CDB intends to be the leading Caribbean development finance institution, working in an efficient, responsive and collaborative manner with its borrowing members, leading towards the systematic reduction of poverty in member countries, through social and economic development. <http://www.caribank.org/>

Caribbean Disaster Emergency Response Agency (CDERA), St. Michael, Barbados

CDERA is an intergovernmental, regional disaster management organization with 16 participating states, headquartered in Barbados. CDERA's main function is to launch an immediate and coordinated response to any disastrous event affecting any participating state, once the state requests such assistance. www.cdra.org

Central American Bank for Economic Integration (CABEI), Honduras

CABEI, as a development bank and the financial arm of integration, has as its mission to promote progress and integration in the Isthmus, to foment economic growth with equity and to respect the environment, by means of supporting public and private projects and programs that create productive employment and contribute to improve productivity and competitiveness, as well as to increase the human development indices of the region. Headquartered in Tegucigalpa, Honduras, CABEI was founded on December 13, 1960, by the Republics of Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica to promote regional integration and development. The bank's membership has since grown to include the extra-regional members of Mexico, the Republic of China (Taiwan), Argentina and, most recently, Colombia. <http://www.bcie.org/>

Central Committee for Flood and Storm Control (CCFSC), Viet Nam

The CCFSC Control is responsible for emergency responses to disastrous events in Viet Nam.

Central European Disaster Prevention Forum (CEUDIP)

This Forum has been established in 1999 by decision of the Central European Committees for the International Decade for Natural Disaster Reduction of the United Nations (IDNDR). This was done in order to continue the efforts initiated during the Decade by the countries of Central Europe (Czech Republic, Germany, Hungary, Poland and Slovakia) in activities requiring collaboration of neighbouring countries in all types of disasters, in particular in floods on rivers which are shared by these countries. The main focus was on early warning, but other important issues are being mutually considered, including the media's role, disaster prevention and mitigation and legislation on states of emergency. <http://www.unisdr.org/unisdr/dirregional.htm>

Centre International de Formation des Acteurs locaux (CIFAL), France (International Training Centre for Local Actors)

The objectives of the center are: to contribute to crisis management by UN agencies; to focus on the role of local community for emergency humanitarian response and aids for reconstruction and to establish partnership with UN agencies and other international actors. <http://www.unitar.org/cifal/>

Center for Ecology and Hydrology (CEH), United Kingdom

The Centre for Ecology and Hydrology's site at Wallingford is home to the hydrology research centre for the United Kingdom (the former Institute of Hydrology), as well as the British Geological Survey's hydrogeology research group, the publishing office of the International Association of Hydrological Sciences (IAHS Press) and a section of the Natural Environment Research Council's (NERC) central IT Solutions and Services Group. www.nerc-wallingford.ac.uk www.ceh.ac.uk

Center for Integration of Natural Disaster Information (CINDI), United States Geological Survey

CINDI is a research and operational facility that explores methods for collecting, integrating, and communicating information about the risks posed by natural hazards and the effects of natural disasters. <http://mac.usgs.gov/isb/pubs/factsheets/fs00301.html>

Center on Integrated Rural Development for Asia and the Pacific (CIRDAP), Dhaka, Bangladesh

CIRDAP is a regional, intergovernmental and autonomous institution established in July 1979 by the countries of Asia and the Pacific region. The Food and Agriculture Organization (FAO) of the United Nations, which had the support of several other UN bodies and donor countries and agencies such as Japan, and the Swedish International Development Agency took the initiative for its creation. The member countries of CIRDAP are Afghanistan, Bangladesh, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam. <http://www.cirdap.org.sg/>

Centre européen de prévention des risques (CEPR), France

The CEPR is a center on applied sciences in the field of prevention. Its work is founded on the expertise of insurers, researchers, and manufacturers of products and services. <http://www.cepr.tm.fr/fr/index.htm>

Centre for Research on the Epidemiology of Disasters (CRED), Catholic University of

Louvain, Brussels, Belgium Although the main focus of the Centre is on safeguards, public health and the sanitary aspects of disasters, CRED also studies the socio-economic and long-term effects of these large-scale disasters. Increasingly, preparedness, principally at the level of human resource development as well as problems linked to the management of crises, have gained a higher profile within CRED's activities. It maintains the OFDA/CRED international disaster database EM-DAT. <http://www.cred.be/>

Centre Régional AGRHYMET, Niamey, Niger

Created in 1974, AGRHYMET is a specialized hydro-meteorological institute of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS) <http://www.agrhymet.ne/AGRHYMET>

Centro de Coordinación para la Prevención de Desastres Naturales en América Central (CEPREDENAC), Republic of Panama (Coordinating Centre for the Prevention of Natural Disasters in Central America)

CEPREDENAC was established in 1988 as a coordination center for strengthening the capacity of the region as a whole to reduce the vulnerability of the population to the effects of natural disasters. In May 1995, CEPREDENAC became an official organization set up to foster the Central American Integration System (SICA) with the Governments of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama as members. www.cepredenac.org/

Centro Nacional de Prevención de Desastres (CENAPRED), Mexico (National Center for Disaster Prevention)

The National Centre for Disaster Prevention was created by an Agreement of Cooperation between the governments of Mexico and Japan for the use and transfer of technology for the prevention of disasters. <http://www.cenapred.unam.mx/>

Centro Peruano Japonés de Investigaciones Sísmicas y Mitigación de Desastres (CISMID), (Peruvian-Japanese Centre for Seismic Research and Disaster Mitigation)

<http://www.cismid.uni.edu.pe/>

Centro Regional de Información de Desastres (CRID), San José, Costa Rica (Regional Disaster Information Centre)

CRID is an initiative sponsored by six organizations that decided to join efforts to ensure the compilation and dissemination of disaster-related information in Latin America and the Caribbean. Its mission is to promote the development of a prevention culture in the Latin American and Caribbean countries, through the compilation and dissemination of disaster-related information, and the promotion of co-operative efforts to improve risk management in the region. www.crid.or.cr

Center for Disease Control and prevention (CDC) Atlanta, United States

CDC is recognized as the lead federal agency for protecting the health and safety of people – at home and abroad, providing credible information to enhance health decisions, and promoting health through strong partnerships. CDC serves as the national focus for developing and applying disease prevention and control, environmental health, and health promotion and education activities designed to improve the health of the people of the United States. <http://www.cdc.gov/>

Comité permanent Inter-Etats de Lutte Contre la Sécheresse dans le Sahel (CILSS), Ouagadougou,

Burkina Faso (Permanent Interstate Committee for Drought Control in the Sahel)

Its mission is to be involved in the research of food security and to combat the effects of drought and desertification for better ecological stability. <http://www.cilss.org/>

Comisión Centroamericana de Ambiente y Desarrollo (CCAD), El Salvador (Central American Commission for Environment and Development)

It is called to protect and, at the same time, give value to the regional patrimony, which is characterized by its biological diversity and ecosystems. Accordingly, it is also called to be a bridge of collaboration between the countries of the region seeking the adoption of the themes of sustainable development by soliciting the collaboration of all the parties that work in the field of development. It is the regional institution in Central America responsible for the coordination of Corridor activities and other regional environment and development initiatives in Central America. <http://ccad.sgsica.org/>

Comisión Nacional de Prevención de Riesgos y Atención de Emergencias (CNE), Costa Rica

(National Risk Prevention and Emergency Response Commission)

The National Commission for Risk Prevention and Emergency Management is the entity responsible for the coordination of prevention work on risk and for the mitigation and response to emergency situations (Article 19 of the Legislature). The development of the National Law for Emergencies, on the 14th of August, 1969, was the foundation for the National Commission. www.cne.go.cr

Comisión Permanente de Contingencias (COPECO), Honduras (The Permanent Commission for Contingencies)

Presently, the Executive Council is organizing the lobbying of a new law which will make the management of contingencies more efficient and which will support the creation of a National System for the prevention, mitigation and management of disasters and emergencies. <http://www.copeco.hn/>

Commission for the Geological Map of the World (CGMW)

The CGMW's aims are to promote, coordinate and publish synthetic Earth sciences maps, at small scale, of continental and / or oceanic areas of the World. It is a non-profit scientific and pedagogic body governed by French law.

http://ccgm.free.fr/ccgm_gb.html

-*World Geological Maps Search System* : <http://www.aist.go.jp/RIODB/g-mapi/welcome.html>

Committee on Earth Observation Satellites (CEOS)

CEOS is an international organization charged with coordinating international civil spaceborne missions designated to observe and study planet Earth. Comprising 41 space agencies and other national and international organizations, CEOS is recognized as the major international forum for the coordination of Earth observation satellite programs and for interaction of these programs with users of satellite data worldwide. <http://www.ceos.org/>

Committee on the Peaceful Uses of Outer Space (COPUOS), United Nations

The Committee on the Peaceful Uses of Outer Space was set up by the United Nations General Assembly in 1959 to review the scope of international cooperation in peaceful uses of outer space, to devise programmes in this field to be undertaken under United Nations auspices, to encourage continued research and the dissemination of information on outer space matters, and to study legal problems arising from the exploration of outer space. <http://www.oosa.unvienna.org/COPUOS/copuos.html>

Consejo Regional de Cooperación Agrícola (CORECA) para América Central, México y la República Dominicana (Regional Council for Agricultural Cooperation in Central America, Mexico and the Dominican Republic)

The development of Regional Council for Agricultural Cooperation (CORECA) began in 1980 when a meeting of the International and Regional Committee on Agronomic Security, under the guidance of Panama and the Dominican Republic, put forward the idea of establishing a political forum at the Ministerial level for the agricultural sector. The Council's principal objective was to serve as a permanent forum for consultation and cooperation between the various political parties of the regions' agricultural sectors. Particularly, it would focus on raising the quality of life for farmers, improving the environment, initiating technological development and offering wide-ranging cooperation. The Member States of CORECA include : Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and the Dominican Republic. <http://www.sagarpa.gob.mx/Dgai/coreca.htm>

Consultative Group for International Agricultural Research (CGIAR)

The CGIAR was created in 1971, when its first formal meeting was held at the World Bank. Its mission is now to contribute, through its research, to promoting sustainable agriculture for food security in developing countries. Membership of the Group has increased from eighteen to fifty-eight, the number of CGIAR centers has grown to sixteen, and their research interests have been diversified.

<http://www.cgiar.org/>

Coordinadora Nacional para la Reducción de Desastres (CONRED), Guatemala (National Coordinator for Disaster Reduction)

<http://www.conred.org/>

Coordinating Committee for Coastal and Offshore Geoscience Programmes in East and Southeast Asia (CCOP), Bangkok, Thailand

CCOP is an Intergovernmental Organization focused on regional geo-scientific aspects. It consists of 11 member countries i.e., Cambodia, China, Indonesia, Japan, Republic of Korea, Malaysia, Papua New Guinea, The Philippines, Singapore, Thailand, Vietnam and is supported by 14 cooperating countries and several international organizations. <http://www.ccop.or.th/>

Coordinating Council for Disaster Management (CCGC), Mozambique

The Co-ordinating Council for Disaster Management (CCGC) is the government body responsible for policy decisions relating to disasters. The Prime Minister chairs the CCGC and his deputy is the Minister of Foreign Affairs & Co-operation.

Cooperative for Assistance and Relief Everywhere (CARE)

CARE, an NGO, consists of 11 member organizations, working as a global force dedicated to achieving lasting victory over poverty. <http://www.care.org/>

Corporación Andina de Fomento (CAF), Caracas, Venezuela (Andean Development Corporation)

The CAF is made up of Latin American and Caribbean shareholders (Bolivia, Colombia, Ecuador, Peru, Venezuela, Argentina, Brazil, Chile, Jamaica, Mexico, Panama, Paraguay, and Trinidad and Tobago and 22 private

banks in the Andean region). It has the mission of backing the sustainable development of its shareholder countries and of integration by raising funds to provide a range of financial services.
<http://www.comunidadandina.org/ingles/who/caf.htm>

Council for Scientific and Industrial Research (CSIR), South Africa

Constituted as a Science Council by an Act of Parliament, the CSIR operates as a market-oriented contract and consortium research partner to its clients and stakeholders. CSIR focuses on building Africa's capacity in Environmental Impact Assessment (EIA) project management. CSIR Water, Environment and Forestry Technology (Environmentek) has been involved in the development and presentation of EIA capacity building courses for the past 10 years. www.csir.co.za

Council of Europe – EUR-OPA Major Hazards Agreement

The Committee of Ministers of the Council of Europe has set up the Open Partial Agreement in 1987. This intergovernmental Agreement is a platform for cooperation in the field of major natural and technological disasters between Eastern Europe, the Mediterranean area and Western Europe concerning knowledge about prevention, risk management, post-crisis analysis and rehabilitation.

http://www.coe.int/T/E/Cultural_Co-operation/Disasters/
<http://ps.superb.net/icod/OPA.HTM>

Cranfield Disaster Management Center, University of Cranfield, United Kingdom

The Disaster Management Centre was founded in 1985. Its aim is to save lives and livelihoods at risk from disaster impact through the promotion of risk and vulnerability reduction, preparedness and effective disaster response. The Disaster Management Centre believes that disaster risks and vulnerabilities can be reduced through the application of sound management principles and practice. <http://www.cranfield.ac.uk/deptsshr.htm>

Department of Hydrology and Meteorology (DHM), Nepal

DHM is an organisation under the Ministry of Science and Technology. The department with headquarters in Kathmandu has four basin offices: Karnali Basin Office in Surkhet, Narayani Basin Office in Pokhara, Bagmati Basin Office in Kathmandu, and Kosi Basin Office in Dharan. DHM has a mandate from to monitor all the hydrological and meteorological activities in Nepal. The scope of work includes the monitoring of river hydrology, climate, agrometeorology, sediment, air quality, water quality, limnology, snow hydrology, glaciology, and wind and solar energy. General and aviation weather forecasts are the regular services provided by DHM. As a member of the World Meteorological Organisation (WMO), DHM contributes to the global exchange of meteorological data on a regular basis. DHM actively participates in the programs of relevant international organisations, such as, UNESCO's International Hydrological Program (IHP) and WMO's Operational Hydrology Program (OHP). <http://www.dhm.gov.np/>

Department of International Development (DFID), United Kingdom

DFID is a United Kingdom Government department, working to promote sustainable development and eliminate world poverty. <http://www.dfid.gov.uk/>

Deutsches Forschungsnetz Naturkatastrophen (DFNK), Germany (German Research Network for Natural Disasters)

The German Research Network for Natural Disasters is an initiative of German research programmes and institutions. The Network's goal is to collect, organize and disseminate information from research, knowledge and methodology on the topic of natural disasters taken from technical, environmental and social research sources working in this field. <http://dfnk.gfz-potsdam.de/index.html>

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Germany (German Agency for Technical Cooperation)

GTZ is a government-owned corporation for international cooperation with worldwide operations. In more than 120 partner countries, GTZ is supporting many development projects and programmes, chiefly under commissions from the German Federal Government. GTZ's aim is to improve the living conditions and perspectives of people in developing and transition countries. <http://www.gtz.de/>

Deutsches Komitee für Katastrophenvorsorge e.V. (DKKV) (German Committee for Disaster Reduction)

The tasks of the DKKV for disaster reduction are numerous and to a degree very particular: From technical projects researching the effects of disasters on society to political programmes encouraging the growth of disaster reduction initiatives. <http://www.dkkv.org/>

Disaster Management and Mitigation Unit (DMMU), Zambia

In 1998, the Government of Zambia established the DMMU as part of the Vice President's Office to coordinate disaster related activities. The DMMU is supported by a Technical Committee, which includes the Ministry of Agriculture's Office of Early Warning Systems (EWS), the Ministry of Agriculture Food and Fisheries, the Central Statistical Office, and key line ministries such as Health, Finance and Economic Development.

Disaster Management Center, University of Wisconsin, USA.

The center's goal is to help improve the emergency management performance of non-governmental organizations, local and national governments, and international organizations, through a comprehensive professional development program in disaster management. Distance learning is the principal approach for this international program. <http://dmc.engr.wisc.edu/about/edlinks.html>

Disaster Management Facility (DMF), World Bank, Washington D.C., USA

DMF aims to reduce human suffering and economic losses caused by natural and technological disasters. Making sure that disaster prevention and mitigation are integral parts of development requires action, the DMF takes action by providing technical support to World Bank operations, promoting capacity-building, and establishing partnerships with the international and scientific community working on disaster issues. <http://www.worldbank.org/dmf/mission.htm>

Disaster Management Institute of Southern Africa. (DMISA), South Africa

DMISA is an organisation where everyone involved in Disaster Management can relate to others with similar interests, and creates opportunities for the improvement of disaster management in Southern Africa. <http://www.cmc.gov.za/pht/DMISA.htm>

Disaster Management Technical Council (CTGC), Mozambique

The CTGC provides technical back-up to the National Disaster Management Institute (INGC), an autonomous institution under the Ministry of Foreign Affairs and Cooperation.

Disaster Management Unit, (DMU), Standing Office of the Central Committee for Flood and Storm Control (CCFSC), Vietnam

The Vietnam Disaster Management Unit (DMU) is the mechanism chosen by the Government of Vietnam and UNDP to join together over 1000 years of Vietnamese flood protection culture with twenty-first century western technology to better protect the entire population of Vietnam against the annual natural disasters that ravage the country. <http://www.undp.org.vn/dmu/index.html>

Disaster Recovery Business Alliance (DRBA)

DRBA is an organization, a process and a product that is designed to provide an improvement in a community's ability to deal with disaster recovery by the formation of an effective alliance between the private and public sectors of a community. It offers a tested model to assist local leaders in forming and facilitating a lifeline-based planning organization to serve a local community. It was established and funded by the Electric Power Research Institute (EPRI) and co-founded by the Department of Energy, and the Association of Contingency Planners (ACP). DRBA has formed partnerships with many public and private sector organizations such as the Central United States Earthquake Consortium (CUSEC), National Emergency Management Association (NEMA), the Institute for Business and Home Safety (IBHS) and many others. <http://www.acp-international.com/drba/>

Disaster Research Center, University of Delaware, USA

DRC, is a social science research center devoted to the study of disasters. It was established at Ohio State University in 1963 and moved to the University of Delaware in 1985. The center conducts field and survey research on group, organizational and community preparation for, response to, and recovery from natural and technological disasters and other community-wide crises. DRC researchers have carried out systematic studies on a broad range of disaster types, including hurricanes, floods, earthquakes, tornadoes, hazardous chemical incidents, plane crashes. <http://www.udel.edu/DRC/nodhtml.html>

Drought Monitoring Centre (DMC), Harare, Zimbabwe and Nairobi, Kenya

The Drought Monitoring Centres (DMCs) for Eastern and Southern Africa are charged with the responsibility of monitoring of drought and other climatic conditions in a timely manner with respect to intensity, geographical extent, duration and impact upon agricultural production and to give early warning for the formulation of appropriate strategies to combat any anticipated adverse effects. <http://www.meteo.go.ke/dmc/contact.html> <http://lion.meteo.go.ke/dmc/>

Earthquake Disaster Mitigation Research Center (EDM), Miki, Japan

The main purpose of the EDM is to produce "Frontier Research on Earthquake Disaster Mitigation for Urban Regions." The major research activities are performed by three research teams: the disaster process simulation team, the disaster information system team and the structural performance team. <http://www.edm.bosai.go.jp/english.htm>

Earthquake Engineering Research Institute (EERI), Oakland, California, USA

The objective of EERI is to reduce earthquake risk by advancing the science and practice of earthquake engineering, by improving understanding of the impact of earthquakes on the physical, social, economic, political and cultural environment, and by advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes. <http://www.eeri.org/>

EMERCOM Russia

Ministry of Civil Defense and Emergencies. <http://emercom.on.ufanet.ru/>

Emergency Management Australia (EMA)

EMA provides national leadership in the development of measures to reduce risk to communities and manage the consequences of disasters. It is the Federal Agency responsible for reducing the impact of natural and man-made disasters on the Australian community. <http://www.ema.gov.au/>

Emergency Management Australia Institute (EMAI), Mt. Macedon, Australia

Emergency Management Australia's research and training centre at Mt Macedon was renamed the "Emergency Management Australia Institute" (EMAI) in January, 2002. The change was made to better reflect the Institute as an integral part of EMA's core business and to stress the holistic nature of the organisation's operations across its sites in Canberra and Mt. Macedon Victoria. EMAI conducts a program of activities which includes the National Studies Program, education and training activities, resource development to support the curriculum and the provision of information through the Australian Emergency Management Information Centre. EMAI is the education and information arm of Emergency Management Australia (EMA). <http://www.ema.gov.au/fs-education.html>

Emergency Preparedness Canada (EPC)

see: Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP). http://www.ocipep-bpiepc.gc.ca/home/index_e.html

Environment and Society Institute (ESI), State University of New York, Buffalo, USA

It offers courses on engineering and applied sciences and hosts the National Centre for Geographic Information and Analysis (NCGIA), the Center for Urban Studies. The Multidisciplinary Center for Earthquake Engineering Research (MCEER) is an affiliated research center. <http://www.buffalo.edu/>

European Community Humanitarian Office (ECHO)

The European Union's mandate to ECHO is to provide emergency assistance and relief to the victims of natural disasters or armed conflict outside the European Union. The aid is intended to go directly to those in distress, irrespective of race, religion or political convictions. http://europa.eu.int/comm/echo/en/index_en.html

European Environment Agency (EEA), Copenhagen, Denmark

The EEA aims to support sustainable development and to help achieve significant and measurable improvement in Europe's environment through the provision of timely, targeted, relevant and reliable information to policy making agents and the public. <http://www.eea.eu.int/>

European Directorate General Joint Research Centre (JRC)

The Joint Research Centre (JRC) Directorate-General is an integral part of the European Commission. It provides independent scientific and technical advice to the Commission, the European Parliament, the Council of Ministers and EU Member States in support of European Union (EU) policies. Its main aim is to help to create a safer, cleaner, healthier and more competitive Europe. Its seven scientific institutes carry out research of direct concern to EU citizens. It provides technical know-how both directly and through co-ordinating and contributing to numerous broader networks linking industry, universities and national institutes. The JRC is playing an important role in helping establish the European Research Area (ERA). <http://www.jrc.org/>

European Laboratory for Structural Assessment – Earthquake Engineering (ELSA), Ispra, Italy

The construction of bridges, viaducts, buildings or tunnels, which can withstand earthquakes, involves using particularly sophisticated simulation laboratories. The most prestigious of these is ELSA, which is a technological flagship for the European Commission's Joint Research Centre. <http://europa.eu.int/comm/research/success/en/env/0071e.html>

European Research Area (ERA)

On 18, January 2000 the European Commission adopted this Communication "Towards a European Research Area" which is meant to contribute to the creation of better overall framework conditions for research in Europe. ERA is regrouping all Community supports for the better coordination of research activities and the convergence of research and innovation policies, at national and EU levels. http://europa.eu.int/comm/research/era/index_en.html

European Union (EU)

The European Union (EU) was set through the process of European integration was launched on 9 May 1950 when France officially proposed to create 'the first concrete foundation of a European federation'. Six countries (Belgium, Germany, France, Italy, Luxembourg and the Netherlands) joined from the very beginning. Today, after four waves of accessions (1973: Denmark, Ireland and the United Kingdom; 1981: Greece; 1986: Spain and Portugal; 1995: Austria, Finland and Sweden) the EU has 15 Member States and is preparing for the accession of 13 eastern and southern European countries. Its main agencies are: European Parliament, Council of the Union, European Commission, Court of Justice, Court of Auditors, European Central Bank, European Economic and Social Committee, Committee of the Regions, European Investment Bank, European Ombudsman. <http://www.europa.eu.int/>

Experimental Climate Prediction Center (ECPC), USA

ECPC is developing an integrated regional climate prediction capability by undertaking basic research to identify coupled land-atmosphere-ocean linkages. ECPC models are being used to make routine experimental forecasts, which are continually evaluated in order to demonstrate their utility to various sectors on temporal scales ranging from seasonal to interannual but also touching upon daily and decadal to centennial time scales. Once ECPC has demonstrated the usefulness of various forecast tools and methodologies, its goal is to transfer these experimental methodologies to NCEP, IRI and various regional application centers.

<http://ecpc.ucsd.edu/>

Facultad Latinoamericana de Ciencias Sociales (FLASCO), (Latin American Social Science Faculty)

The faculty's creation is based on the recommendation of UNESCO and the governments of Latin America and the Caribbean. Its objective is to promote education, research and technical cooperation in the field of social sciences for the entire region. www.flasco.cl

Federal Highway Administration (FHWA), US Government

The Federal Highway Administration (FHWA) is a part of the U.S. Department of Transportation, headquartered in Washington, D.C., with field offices across the United States. Its mission is to provide leadership, expertise, resources and information in cooperation with partners to enhance the country's economic vitality, the quality of life, and the environment. The FHWA directly administers a number of highway transportation activities including standards development, research and technology, training, technical assistance, highway access to federally owned lands and Indian lands, and commercial vehicle safety enforcement. Further, FHWA has a significant role, working through partnerships, programs, policies, and allocating resources which facilitate the strategic development and maintenance of State and local transportation systems as effective and efficient elements of the national intermodal transportation system. <http://www.fhwa.dot.gov/>

Federation of Indian Chambers of Commerce and Industry (FICCI)

FICCI was established in 1927, on the advice of Mahatma Gandhi, to garner support for India's independence and to further the interests of the Indian business community. Today, after five decades of Indian independence, FICCI is in the vanguard of nation building and is moving ahead to integrate the Indian economy with the global mainstream. <http://www.ficci.com/ficci/index.htm>

Fondo para la Reconstrucción y el Desarrollo Social del Eje Cafetero (FOREC), Armenia, Colombia

The Fund for Reconstruction and Social Development in the Coffee Region is a specialized agency with its headquarters in Armenia administered by a legal staff under financial and political autonomy. Its objective is to promote the necessary work on economic, social and ecological reconstruction in the Andean region affected by the earthquake of 25 January, 1999. FOREC's mission is to manage the public commitment of national institutions and agencies in the reconstruction work with honesty, clarity, will and efficiency in the use of the public resources and technological assistance offered for this work. FOREC received the UN Sasakawa Award for Disaster Reduction in 2000. <http://www.forec.gov.co/>

Food, Agriculture and Natural Resources (FANR) - Development Unit, Harare, Zimbabwe

The Southern African Development Community (SADC) is promoting regional Cooperation in economic development. It has adopted a Programme of Action covering cooperation in various sectors, including food security and natural resources management. In order to enhance food security for all in the region, SADC established a Food Security Programme. Its secretariat is formed by the Food, Agriculture and Natural Resources (FANR) Development Unit. <http://www.sadc-fanr.org.zw/>

Foundation for International Community Assistance (FINCA)

FINCA has been helping families to create their own solution to poverty since 1984. FINCA provides financial services to the world's poorest families so they can create their own jobs, raise household incomes and improve their standard of living.

<http://www.villagebanking.org/>

Foundation for the Support of Women's Work (FSWW)

The FSWW established in 1986 by a group of women from different backgrounds, is a non-profit NGO. It aims to build social, economic and community assets for and by grassroots women, and support their leadership throughout Turkey in improving the quality of their lives and of the community. http://www.un.org/womenwatch/daw/csw/env_manage/documents/EP11-2001Nov07.pdf

Fundación Nacional para el Desarrollo (FUNDE), El Salvador (National Development Foundation)

FUNDE's mission is to offer critical thinking, analysis and proposals for sustainable development and to engage the different parties and leading institutions of the country with research and assistance in order to better the quality of life and opportunities of the marginalized. <http://www.funde.org/>

Fundación para la Cooperación y el Desarrollo Communal (CORDES), El Salvador (Development Corporation)

Founded in 1988, CORDES is a non-governmental organization dedicated to the management of socio-economic development of the rural communities in El Salvador, where the poverty and destruction from the war have affected human settlements by forcing the people out of their land. http://www.geocities.com/lia_hernandez/Perfil.html

Fundación Salvadoreña para la Asistencia Integral (FUSAI), El Salvador (Salvadorian Foundation for Integral Assistance)

Its mission is to support the socioeconomic integration of sectors, regions and parties marginalized in society with the benefits of development <http://www.fusai.org/>

GeoHazards International (GHI), California, USA

GHI was established in 1993 as a nonprofit organization to reduce death and injury caused by earthquakes in the world's most vulnerable communities. In particular, GHI makes a community safer by raising awareness of its risk, building local institutions to manage that risk, and strengthening schools to protect and train the community's future generations. <http://www.geohaz.org/>

Geological Survey of Japan (GSJ)

GSJ is one of the 15 research institutes of the National Institute of Advanced Industrial Science and Technology (AIST). <http://www.aist.go.jp/GSJ/>

General Directorate of Civil Protection, Governorate of Grand Alger, Algeria

The General Directorate has carried out significant training activities on disaster prevention and the organization of international forums on disaster prevention.

Global Fire Monitoring Center (GFMC), Freiburg, Germany

The Global Fire Monitoring Center (GFMC) was established in 1998 at the Fire Ecology and Biomass Burning Research Group, a subdivision of the Biogeochemistry Department of the Max Planck Institute for Chemistry (Mainz, Germany). Founded in the 1970s at Freiburg University (Germany) the Fire Ecology Research Group was incorporated into the Max Planck Institute for Chemistry in 1990. <http://www2.ruf.uni-freiburg.de/fireglobe/>

Gujarat State Disaster Management Authorities (GSDMA), India

The Government of Gujarat established the Gujarat State Disaster Management Authority in February, 2001 to co-ordinate the comprehensive earthquake recovery program. The GSDMA is registered as a society with a vision to go beyond reconstruction and make Gujarat economically vibrant, agriculturally and industrially competitive with improved standards of living and with a capacity to mitigate and manage future disasters. <http://www.gsdma.org/>

High Powered Committee (HPC) on Disaster Management Plans, Government of India

HPC has been constituted to review existing arrangements for preparedness and mitigation of natural and manmade disasters including industrial, nuclear, biological and chemical disasters; recommend measures for strengthening organizational structures, and recommend a comprehensive model plan for management of these disasters at National, State and District Level. <http://www.ndmindia.nic.in/committee/hpcomm.html>

Hungarian National Directorate General for Disaster Management (HNDGDM), Budapest

From January, 2000 an integrated organization, the National Directorate for Disaster Management, Ministry of Interior has been established in Hungary as the central organ of the integral national disaster management. It was established on the basis of the legal predecessors, that is, the Civil Protection and the Fire Service. The system of protection against disasters is divided into three levels : international, national, the level of municipalities.

Ibero-American Association of Civil Defense and Civil Protection, Spain

The Ibero-American Association for Civil Defense and Protection emerged from a 1-5 July 1996 meeting organized in Santiago, Chile, by the Pro Tempore Secretariat of the Space Conference of the Americas and Chile's ONEMI. The subject of the meeting was the use of aerospace technology in disaster prevention and mitigation.

<http://www.proteccioncivil.org/asociacion/aigo0.htm>

http://www.crid.or.cr/crid/EIRD/DIRDNINF/No1_a1_2000/INGLES/pagina30.htm

Institute for Business Home Safety (IBHS), Boston, USA

The Institute for Business & Home Safety (IBHS) is a nonprofit association sponsored by the insurance industry that engages in communication, education, engineering and research. Its mission is to reduce deaths, injuries, property damage, economic losses and human suffering caused by natural disasters. <http://www.ibhs.org/>

Institute of Physical and Chemical Research (RIKEN), Japan

RIKEN carries out high level experimental and research work in a wide range of fields, including physics, chemistry, medical science, biology, and engineering extending from basic research to practical application. <http://www.riken.go.jp/>

Instituto Nacional de Gestao de Calamidades (INGC), Mozambique (National Disaster Management Institute)

Day-to-day management of matters relating to disasters is the responsibility of the National Disaster Management Institute. This is an autonomous institution under the Ministry of Foreign Affairs & Cooperation.

Instituto Nicaraguense de Estudios Territoriales (INETER), Managua, Nicaragua, (Nicaraguan Institute for Territorial Studies)

INETER is the technical and scientific body of the State that provides its services to the entire population in such areas as basic information (Cartography, Meteorology, Hydrology, etc.) as well as projects and studies of the environment which contribute to socio-economic development and the lowering of vulnerability to natural disasters, continuously tracking dangerous natural phenomena. <http://www.ineter.gob.ni/>

Inter-American Committee for Natural Disaster Reduction (IACNDR)

The IACNDR is the main forum of the OAS and the Inter American System for the analysis of policies and strategies aimed at natural disaster reduction in the context of the sustainable development of member states. The OAS General Assembly established the IACNDR based on the need to strengthen the role of the OAS in natural disaster reduction and emergency preparedness.

Inter-American Development Bank (IADB), Washington , DC, USA

The IADB is the oldest and largest regional multilateral development institution. It was established in December 1959 to help accelerate economic and social development in Latin America and the Caribbean. <http://www.iadb.org/>

Inter-departmental Disaster Management Committee, South Africa

In April 1999, the Interim Disaster Management Centre was replaced with the Inter-departmental Disaster Management Committee to deal with disasters and other phenomena and to give advice to the Committee. The National Disaster Management Centre came into operation on 1 April 2000. <http://www.gov.za/structure/disaster.htm>

Intergovernmental Authority on Development (IGAD), Djibouti, Republic of Djibouti (Autorité Intergouvernementale pour le développement)

IGAD's vision is based on determination of the Governments of the Sub-region to pool resources and co-ordinate development activities in order to tackle the present and future challenges more efficiently, and enable the sub-region to interact and compete in the global economy. www.igadregion.org

Intergovernmental Oceanographic Commission (IOC), Paris, France

The Intergovernmental Oceanographic Commission of UNESCO was founded in 1960 on the basis of the recognition that "the oceans, covering some seventy percent of the earth's surface, exert a profound influence on mankind and even on all forms of life on Earth... In order to properly interpret the full value of the oceans to mankind, they must be studied from many points of view. While pioneering research and new ideas usually come from individuals and small groups, many aspects of oceanic investigations present far too formidable a task to be undertaken by any one nation or even a few nations." <http://ioc.unesco.org/iocweb/default.htm>

Intergovernmental Panel on Climate Change (IPCC)

In 1988, UNEP and WMO jointly established the Intergovernmental Panel on Climate Change (IPCC) as concern over climate change became a political issue. The purpose of the IPCC was to assess the state of knowledge on the various aspects of climate change including science, environmental and socio-economic impacts and response strategies. The IPCC is recognized as the most authoritative scientific and technical voice on climate change, and its assessments had a profound influence on the negotiators of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. The IPCC continues to provide governments with scientific, technical and socio-economic information relevant to evaluating the risks and developing a response to global climate change. <http://www.grida.no/climate/vital/16.htm> www.ipcc.ch

Inter-ministerial Committee for Disaster Management (IMC), South Africa

The IMC provides leadership for the development and implementation of national policy on disaster management. Under the leadership of the IMC, the Department of Constitutional Development published the Green Paper on Disaster Management for South Africa for comment in February 1998. After consultation with key role players and comments from both the private and public sectors around the Green Paper, the White Paper evolved. www.polity.org.za

International Association of Earthquake Engineering (IAEE), Japan

The IAEE aims to promote international cooperation among scientists and engineers in the field of earthquake engineering through interchange of knowledge, ideas, and results of research and practical experience. <http://www.iaee.or.jp/>

International Association of Seismology and Physics of the Earth's Interior (IASPEI)

The purpose of IASPEI is to promote the study of problems relating to earthquakes, to the propagation of seismic waves, and to the internal structure, properties and processes of the Earth; to initiate and co-ordinate the conduct of researches which depend on cooperation between different countries, and to provide for their scientific discussion; to facilitate particular researches on scientific and applied seismology, such as the comparison of instruments used in different countries, researches on blasting and generally all matters to which seismology is related. <http://www.seismo.com/iaspei/home.html>

International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI)

The Association represents the primary international focus for: (1) research in volcanology, (2) efforts to mitigate volcanic disasters, and (3) research into closely related disciplines, such as igneous geochemistry and petrology, geochronology, volcanogenic mineral deposits, and the physics of the generation and ascent of magmas in the upper mantle and crust. <http://www.iavcei.org/>

International Bank for Reconstruction and Development (IBRD), The World Bank

Established in 1945, IBRD aims to reduce poverty in middle-income and creditworthy poorer countries by promoting sustainable development, through loans, guarantees, and other analytical and advisory services.

International Center for Integrated Mountain Development (ICIMOD), Nepal

ICIMOD is committed to developing an economically and environmentally sound ecosystem and improving living standards of mountain communities, mainly in the Hindu Kush-Himalayas area. <http://www.icimod.org.sg/>

International Center for Theoretical Physics (ICTP), Trieste, Italy

Founded in 1964 by Abdus Salam (Nobel Laureate), ICTP operates under the aegis of two United Nations Agencies: UNESCO and IAEA and is regularised by agreement with the Government of Italy which provides the major part of the Centre's funding. One of the main aims of ICTP is to foster the growth of advanced studies in developing countries. <http://www.ictp.trieste.it/>

International Center for Disaster Mitigation Engineering (INCEDE), University of Tokyo, Japan

Established in 1991 as a national contribution of Japan towards the United Nations IDNDR, INCEDE serves as a forum for national and international researchers in disaster-mitigation engineering and as an information clearance house. <http://incede.iis.u-tokyo.ac.jp/>

International Commission for the Protection of the Rhine (ICPR), (Internationalen Kommission zum Schutz des Rheins (IKSR))

Nobody is more aware of the fact that water protection is an international affair than the Dutch. The Rhine pollution has always shown particularly negative effects in the Netherlands. That is why the Netherlands united the Rhine-bordering countries (Switzerland, France, Luxembourg, Germany) to discuss problems of water protection and to look for common solutions. The "International Commission for the Protection of the Rhine against Pollution" (ICPR) was founded in Basel on July, 1950. <http://www.iksr.org/index.htm>

International Committee of the Red Cross (ICRC)

ICRC is an impartial, neutral and independent organization whose exclusively humanitarian mission is to protect the lives and dignity of victims of war and internal violence and to provide them with assistance. It directs and coordinates the international relief activities conducted by the Red Cross and Red Crescent Movement in situations of conflict. It also endeavours to prevent suffering by promoting and strengthening humanitarian law and universal humanitarian principles. <http://www.icrc.org/>

International Council of Science (ICSU), Paris, France

ICSU is a non-governmental organization, founded in 1931 to bring together natural scientists in international scientific endeavour. It comprises 98 multidisciplinary National Scientific Members (scientific research councils or science academies) and 26 international, single discipline Scientific Unions to provide a wide spectrum of scientific expertise enabling members to address international, interdisciplinary issues which none could handle alone. www.icsu.org

International Council of Voluntary Agencies (ICVA), Switzerland

The International Council of Voluntary Agencies (ICVA), founded in 1962, is a global network of human rights, humanitarian, and development NGOs, which focuses its information exchange and advocacy efforts primarily on humanitarian affairs and refugee issues. <http://www.icva.ch/>

International Decade for Natural Disaster Reduction (IDNDR), 1990-1999

An International Decade for Natural Disaster Reduction, beginning on 1 January 1990, was launched by the United Nations, following the adoption of Resolution 44/236 (22 December 1989). The Decade was intended to reduce, through concerted international action, especially in developing countries, loss of life, poverty damage and social and economic disruption caused by natural disasters. To support the activities of the Decade, a Secretariat was established at the United Nations Office in Geneva, in close association with UNDRO.

International Development Association (IDA), The World Bank

The International Development Association, IDA, is the World Bank's concessional lending window. It provides long-term loans at zero interest to the poorest of the developing countries. IDA helps build the human capital, policies, institutions, and physical infrastructure that these countries urgently need to achieve faster, environmentally sustainable growth. IDA's goal is to reduce disparities across and within countries, especially in access to primary education, basic health, and water supply and sanitation and to bring more people into the mainstream by raising their productivity. <http://www.worldbank.org/ida/>

International Drought Information Center, University of Nebraska, USA

The University of Nebraska at Lincoln established the International Drought Information Center (IDIC) to better understand the problem of drought. IDIC strives to improve communication about prediction, monitoring, impact assessment, adjustment and adaptation, and planning and response to drought.

<http://www.ngdc.noaa.gov/seg/hazard/resource/methaz/drtinfoa.html>
www.enso.unl.edu/agmet/centers.htm

International Federation of Red Cross and Red Crescent Societies (IFRC)

IFRC is the world's largest humanitarian organization, providing assistance without discrimination as to nationality, race, religious beliefs, class or political opinions. <http://www.ifrc.org/>

International Institute for Disaster Risk Management (IDRM), Manila, Philippines

The IDRM promotes international standards and best practices in disaster and risk management. It works on principles of continuous learning, organizational and individual professional development. IDRM experts and partners are committed to applying appropriate, innovative and inexpensive solutions to development and disaster risk management. <http://www.idrmhome.org/>

International Institute of Earthquake Engineering and Seismology (IIEES), Tehran, Iran

The main goal of IIEES is seismic risk reduction and mitigation both in Iran and the region by promoting research and education in science and technology related to seismotectonic, seismology and earthquake engineering. IIEES activity in research covers all aspects of earthquakes from tectonic study to retrofitting complex structure; and in education from public education to Ph.D program in earthquake engineering. http://www.iiees.ac.ir/English/eng_index.html

International Institute for Sustainable Development (IISD), Winnipeg, Manitoba, Canada

Its mission is to champion innovation, enabling societies to live sustainably. It advances policy recommendations on international trade and investment, economic policy, climate change, measurement and indicators, and natural resource management to make development sustainable. By using the Internet it covers and reports on international negotiations and brokers knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and a better dialogue between North and South. IISDnet identifies issues, sets goals, and compiles information on sustainable growth. www.iisd.org/default.asp

International Organization for Standardization (ISO), Geneva, Switzerland

ISO is a worldwide federation of national standards bodies from some 140 countries, one from each country. ISO is a non-governmental organization established in 1947. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity. ISO's work results in international agreements which are published as International Standards. www.iso.org

International Research Institute for Climate Prediction (IRI), NY, United States

IRI was established as a cooperative agreement between US NOAA Office of Global Programs and Columbia University. IRI is a unit of the Columbia Earth Institute located at Lamont-Doherty Earth Observatory. The vision of the IRI is that of an innovative science institution working to accelerate the ability of societies worldwide to cope with climate fluctuations, especially those that cause devastating impacts on humans and the environment, thereby reaping the benefits of decades of research on the predictability of El Niño-Southern Oscillation phenomenon and other climate variations. By orchestrating a wide network of collaborations and comprehensive programs that couple physical science research and applications research with capacity building, the IRI is a unique institution in the international development of applications of climate prediction. <http://iri.ldeo.columbia.edu/>

Internationale Kommission zum Schutz des Rheines, (IKSR), Germany. See: International Commission

for the protection of the Rhine(ICPR). <http://www.iksr.org/>

International Tsunami Information Center (ITIC), Honolulu, Hawaii

ITIC was established on 12 November 1965 by the Intergovernmental Oceanographic UNESCO. In 1968, IOC formed an International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU). ITIC monitors the activities of the Tsunami Warning System in the Pacific.

<http://www.shoa.cl/oceano/itic/frontpage.html>

Instituto Nacional de Gestao de Calamidades, (INGC), Mozambique (National Institute for Disaster Management)

The National Institute for Disaster Management was created in June 1999, under the Ministry of Foreign Affairs and Cooperation. It has an executive role in preventive actions and assistance for victims and areas at risk or affected by disasters. http://www.teleda-ta.mz/ingc/default_eng.htm

Japan International Cooperation Agency (JICA)

JICA is responsible for the technical cooperation aspect of Japan's Official Development Assistance (ODA) programs. Technical cooperation and a variety of programmes are aimed at the transfer of technology and knowledge that can serve the socio-economic development of the developing countries. <http://www.jica.go.jp/>

Japan Meteorology Agency (JMA)

The major activities of JMA are: (1) to issue warnings, advisories and forecasts in short-range, one-week and long range ; (2) to deal with the global environmental issues such as global warming and ozone depletion; (3) to provide information on earthquake and volcanic activities. <http://www.kishou.go.jp/english/index.html>

La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED), (The Latin American Network for the Social Study of Disaster Prevention)

Initially conceived as a mechanism to facilitate comparative research of natural disasters from a social perspective, LA Red has developed into the focal point for hundreds of individuals and institutions working in the field of disaster and risk management in the different countries of Latin America and the Caribbean. <http://www.desenredando.org/>

Médecins sans Frontières (MSF)

MSF is an international humanitarian aid organization that provides emergency medical assistance to populations in danger in more than 80 countries. In countries where health structures are insufficient or even non-existent, MSF collaborates with authorities such as the ministries of health to provide assistance. MSF works in rehabilitation of hospitals and dispensaries, vaccination programmes and water and sanitation projects. MSF also works in remote health care centres, slum areas and provides training of local personnel. All this is done with the objective of rebuilding health structures to acceptable levels. <http://www.msf.org/>

Megacities 2000 Foundation, Netherlands

The Megacities Foundation in the Netherlands was started as a direct result of an initiative taken by UNESCO which asked the International Academy of Architecture (IAA) to focus attention on the problems of the explosively growing megalopolises. The Megacities Foundation was created in December 1994 and has since organised the following events: Step-up conference, May 1995 in Rotterdam: "Megacities 2000" First Megacities Lecture, February 1997 in The Hague: Peter Hall, "Megacities, world cities and global cities" Second Megacities Lecture, November 1998 in The Hague: Saskia Sassen, "Urban Economy and Fading Distance, Cities in the Unlimited Space of a Global Network" (working title) http://www.megacities.nl/main.htm_

Mekong River Commission (MRC), Cambodia

MRC promotes and co-ordinates sustainable management and development of water and related resources among countries bordering the Mekong River in Southeast Asia. <http://www.mrcmekong.org/>

Ministerio de Medio Ambiente y Recursos Naturales (MARN), El Salvador (Ministry of Environment and Natural Resources)

Its mission is to direct an effective management of the environment through the clear policies and all-encompassing initiatives which help sustain development of the Salvadorian society. <http://www.marn.gob.sv/>

Ministry of Science and Technology (MCT), Venezuela

Its mission is : To develop policies, strategies and plans which support the creation of a scientific and technical entity that carries out research and initiatives in pursuit of satisfying the needs of the population and promoting the national industry; To strengthen research and development initiatives for the improvement of innovations and national production; To support postgraduate programmes that foment scientific, technical and humanitarian development in the country; To collaborate with the Ministry of Commerce and Industry and other regional organizations in the support of the national industry; To support and strengthen the scientific and technical community as an important tool for socio-economic development. <http://www.mct.gov.ve/>

Multi-disciplinary Center for Earthquake Engineering Research (MCEER), Buffalo, NY, USA

MCEER's overall goal is to enhance the seismic resiliency of communities through improved engineering and management tools for critical infrastructure systems (water supply, electric power, hospitals, transportation systems). Seismic resilience (technical, organizational, social and economic) is by reduced probability of system failure, reduced consequences due to failure, and reduced time to system restoration. MCEER works toward this goal by conducting integrated research, outreach, and education activities in partnership with the users of the center products. <http://mceer.buffalo.edu/>

Munich Reinsurance, Germany

MunichRe is not only a world leader in reinsurance but it has also strategically strengthened its business with strong involvement in primary insurance and in asset management. Knowledge and expertise, client services and preferred partner in risk: these are the attributes which characterize Munich Re. It covers a range of special subjects such as: risk management and industrial insurance, alternative risk transfer. In "Topics", a publication which appears twice a year, Munich Re experts look at the current situation of natural disasters throughout the world and current topics and trends in the insurance industry. "Topics" also presents new Munich Re products and services, as well as the world map on natural catastrophes. <http://www.munichre.com/index.html>

Musokotwane Environment Resource Centre for Southern Africa (IMERCSA), Zimbabwe

IMERCSA is a unit established in 1994, within the Southern African Research and Documentation Centre (SARDC). IMERCSA has bibliographic databases with more than 6,000 records on the environment and disaster management issues. Its contacts databases, which list individual experts and organizations involved in environment and disaster management issues in the SADC region, have a total of about 2,600 entries. The centre also has a public library with reading facilities for policy planners, researchers, diplomats, journalists, and others interested in issues with a regional perspective. IMERCSA provides in-house training for young documentalists and journalists. In collaboration with regionally-based organizations, IMERCSA also carries out training workshops mainly for environmental journalists in southern Africa. Although the centre does not carry out primary research, it responds to information requests from researchers who are involved in this activity. IMERCSA has produced several books and environmental articles, factsheets and reports on topical environmental issues in the SADC region. <http://www.sardc.net/imercsa/>

National Aeronautics and Space Administration (NASA), USA

Since its inception in 1958, NASA has accomplished many great scientific and technological feats in air and space. NASA technology also has been adapted for many non-aerospace uses by the private sector. NASA remains a leading force in scientific research and in stimulating public interest in aerospace exploration, as well as science and technology in general. <http://www.nasa.gov/>

National Center for Atmospheric Research (NCAR), Boulder, Colorado, United States

It is NCAR's mission to plan, organize, and conduct atmospheric and related research programs in collaboration with the universities and other institutions, to provide state-of-the-art research tools and facilities to the atmospheric sciences community, to support and enhance university atmospheric science education, and to facilitate the transfer of technology to both the public and private sectors. Created in 1960, the Center is operated by the University Corporation for Atmospheric Research (UCAR) under a cooperative agreement with the National Science Foundation. <http://www.ncar.ucar.edu/ncar/index.html>

National Center for Disaster Management (NCDM), New Dehli, India

NCDM has been established by the Government of India and located in the Indian Institute of Public Administration with the objectives of providing training programs for senior and middle level administrative government officials which sensitize them for disaster mitigation; coordinating the research activities in different aspects of disaster management at national level.

National Committee for Disaster Management (NCDM), Phnom Penh, Cambodia

In 1995, as a result of the country's experience with regularly occurring disasters, the Royal Government of Cambodia established NCDM. Its responsibilities are defined in terms of, not only providing timely and effective emergency relief to the victims of disasters, but also developing preventive measures to reduce loss of lives and property. This is accomplished by applying scientific and technical knowledge to mitigate disasters. www.cred.be/centre/research/ncdm.pdf

National Disaster Management Centre (NDMC), Pretoria, South Africa

Its mission is to improve knowledge, awareness and understanding of disasters, and to coordinate and facilitate Access to information and resources in order to promote and support comprehensive, integrated and effective disaster management in South Africa. <http://sandmc.pwv.gov.za/>

National Disaster Prevention and Preparedness Commission (DPPC), Addis Ababa, Ethiopia

Formerly known as the Relief and Rehabilitation Commission. It was first established in June 1974 following the outbreak of famine in the two northern provinces of Ethiopia. In August 1995, it was re-established as the DPPC. The objectives of the Commission cover prevention, preparedness and response aspects of disaster management.

National Directorate of Water (DNA), Mozambique, (Direcção Nacional de Aguas)

DNA is responsible for water policy and its implementation, strategic and integrated planning on the management of water resources as well as water supply and sanitation services. The Directorate is a government agency working under the Ministry of Public Works and Housing. <http://www.dna.mz/>

National Institute for Meteorology, Mozambique (INAM), (Instituto Nacional de Meteorologia)

Its mission is to minimize the impacts of hydrometeorological hazards and contribute to sustainable development and the reduction of poverty. <http://www.inam.gov.mz/>

National Institute of Advanced Industrial Science and Technology (AIST), Japan

AIST is an Independent Administrative Institution under the Ministry of Economy, Trade and Industry. On April, 2001, the National Institute of Advanced Industrial Science and Technology began operations. It comprises 15 research institutes previously under the former Agency of Industrial Science and Technology in the Ministry of International Trade and Industry and the Weights and Measures Training Institute. http://www.ais.t.go.jp/index_en.html

National Institute of Rural Development (NIRD), Hyderabad, India

NIRD is India's apex body for undertaking training, research, action research and consultancy functions in the rural development sector. It works as an autonomous organization supported by the Ministry of Rural Areas and Employment, Government of India. www.nird.org

National Emergency Management Association (NEMA), USA

NEMA is the professional association of state, Pacific and Caribbean insular state emergency management directors committed to providing national leadership and expertise in comprehensive emergency management. It serves as a vital information and assistance resource for state and territorial directors and their governors, while forging strategic partnerships to advance continuous improvements in emergency management. <http://www.nemaweb.org/index.cfm>

National Oceanic & Atmospheric Administration (NOAA), Washington DC, USA

NOAA's mission is to describe and predict changes in the Earth's environment, and conserve and wisely manage the Nation's coastal and marine resources. NOAA's strategy consists of seven interrelated strategic goals for environmental assessment, prediction and stewardship. <http://www.noaa.gov/>

National Science Foundation (NSF), Washington DC, USA

NSF is an independent agency of the US Government, established by the National Science Foundation Act of 1950. Its mission is to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense. <http://www.nsf.gov/>

National Society for Earthquake Technology (NSET), Kathmandu, Nepal

NSET strives to assist all communities in Nepal to become earthquake safer by developing and implementing organized approaches to managing and minimizing earthquake risks. <http://www.nset.org.np/home.htm>

Natural Hazards Research and Applications Information Center, University of Colorado, Boulder, Colorado, USA

The Center is a national and international clearinghouse that provides information on natural hazards and human adjustments to these risks. The center's prime goal is to increase communication among hazard and disaster researchers and individuals, agencies, and organizations who are actively working to reduce disaster damage and suffering. The Natural Hazards Center carries out its mission in four principal areas: information dissemination, an annual workshop, research, and library services. <http://www.colorado.edu/hazards/intro.html>

Nuclear Regulatory Commission (NRC), United States

NRC is an independent agency established by the Energy Reorganization Act of 1974 to regulate civilian use of nuclear materials. <http://www.nrc.gov/who-we-are.html>

Office Fédéral de l'Environnement, des Forêts, et du Paysage (OFEFP), Suisse (Swiss Agency for the Environment, Forests and Landscape, (SAEFL), Switzerland)

SAEFL is the responsible federal office for environment. It is integrated into the Federal Department of Environment, Transportation, Energy and Communication. <http://www.umwelt-schweiz.ch/buwal/fr/index.html>
<http://www.umwelt-schweiz.ch/buwal/eng/index.html>

Office for Foreign Disaster Assistance/U.S. Agency for International Development (OFDA/USAID)

OFDA/USAID has been the principal US agency to extend assistance to countries recovering from disaster, trying to escape poverty, and engaging in democratic reforms. USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State. http://www.usaid.gov/hum_response/ofda/

Office of Disaster Preparedness and Emergency Management (ODPEM), Kingston, Jamaica

The Office of Disaster Preparedness and Emergency Management is committed to taking pro-active and timely measures to prevent or reduce the impact of hazards in Jamaica, its people, natural resources and economy through its trained and professional staff, the use of appropriate technology and collaborative efforts with national, regional and international agencies. <http://www.odpem.org.jm/>

Organization for Economic Cooperation and Development (OECD), Paris, France

The OECD groups 30 member countries sharing a commitment to democratic government and the market economy. With active relationships with some 70 other countries, NGOs and civil society, it has a global reach. Best known for its publications and its statistics, its work covers economic and social issues from macroeconomics, to trade, education, development, science and innovation. <http://www.oecd.org/>

Organization of American States (OAS), (Organización de Estados Americanos), Washington, DC, USA

The nations of the Americas are working more closely together than ever before –strengthening democracy, advancing human rights, promoting peace and security, expanding trade and tackling complex problems caused by poverty, drugs and corruption. Together they are building a better future for the next generation. At the outset of a new century and a new millennium, the challenge is how to turn citizens' high expectations into reality. OAS is playing a central role in working toward many of the goals that are shared by the countries of North, Central and South America and the Caribbean. <http://www.oas.org/>

Organization of Eastern Caribbean States (OECS), Castries, St Lucia

The OECS came into being on 18 June, 1981, when seven Eastern Caribbean countries signed a treaty agreeing to co-operate with each other and promote unity and solidarity among the Members. It is composed of 9 Member States: Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines and 2 Associated Member States: Anguilla, British Virgin Islands. <http://www.imf.org/external/np/sec/decdo/oecs.htm> <http://oecs.org>

Organization of Rural Associations for Progress (ORAP), Zimbabwe

ORAP was founded in 1981 by a small group of people in Matabeleland Province to discuss development options following the independence war which ended in 1980. ORAP aims at creating employment and greater self reliance through promoting culturally relevant self-help activities. The organisation also aims at encouraging grassroots programme development and promoting economic and financial autonomy.

<http://iisd1.iisd.ca/50comm/commdb/desc/d41.htm>

Overseas Development Institute (ODI), United Kingdom

Its mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. It does this by locking together high-quality applied research, practical policy advice, and policy-focused dissemination and debate. It works with partners in the public and private sectors, in both developing and developed countries. <http://www.odi.org.uk/>

Pacific Tsunami Warning Centre (PTWC), Honolulu, Hawaii

Established in 1949, the PTWC in Ewa Beach, Hawaii, provides warnings for tsunamis to most countries in the Pacific Basin as well as to Hawaii and all other U.S interests in the Pacific outside of Alaska and the U.S West Coast. Those areas are served by the West Coast / Alaska Tsunami Warning Center (WC/ATWC) in Palmer, Alaska. PTWC is also the warning center for Hawaii's local and regional tsunamis. <http://www.prh.noaa.gov/pr/ptwc/>

Philippine Commission on Higher Education (CHED)

CHED is mandated to undertake the following tasks: 1. Promote quality education; 2. Take appropriate steps to ensure that education shall be accessible to all; and 3. Ensure and protect academic freedom for the continuing intellectual growth, the advancement of learning and research, the development of responsible and effective leadership, the education of high level professionals, and the enrichment of historical and cultural heritage. www.info.com.ph/~chedco

Philippine Institute for Volcanology and Seismology (PHIVOLCS), Quezon City, Philippines

The principal goal of PHIVOLCS is to formulate up-to-date and comprehensive disaster preparedness and loss reduction action plans for volcanic eruption, earthquake occurrences and related geotectonic processes/phenomena (e.g. faulting, landslides and tsunamis) which imprint significant impacts on man and his environment. A corollary goal is to exploit the positive aspects of these processes to uplift of the people's quality of life. In line with its role in the promotion of science and technology in the country, PHIVOLCS undertakes activities geared towards making people aware of volcanoes and volcanology, earthquakes and seismology, and to understand why, where and how natural disasters of volcanic and seismic origins occur in the Philippines.

<http://www.phivolcs.dost.gov.ph/>

Phnom Penh Regional Platform on Sustainable Development for Asia and the Pacific, Phnom Pehn, Cambodia

The High-level Regional Meeting for the World Summit on Sustainable Development (WSSD) reviewed the progress in the implementation of Agenda 21 in the region and identifies key policy issues, priorities, goals, constraints and actions in preparation for the WSSD.

http://www.johannesburgsummit.org/html/prep_process/asiapacific.html

PLANAT (Swiss National Platform for Natural Hazards), Bern, Switzerland

The Federal Council aims to improve prevention in the field of natural hazards. To this end, it created the national PLATform for NATural hazards - PLANAT. This consultative body of the Confederation is organized as an extra parliamentary commission.

Whilst taking care to avoid a duplication of efforts, it also ensures a better use of the existing structures.

<http://www.planat.ch/e/index.htm>

Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

The founding of the Potsdam Institute for Climate Impact Research in 1992 arose out of the growing need among political decision-makers to be informed about the consequences of Global Change. Of particular importance in this respect was the question of increasing concentrations of CO₂ in the atmosphere and the effect this would have on climate, the environment and society. Since then PIK has been involved in investigating the ecological, geophysical and socioeconomic aspects of worldwide climatic change, and climate-impact research has become part of a comprehensive Earth system analysis. <http://www.pik-potsdam.de/>

ProVention Consortium (Disaster Management Facility, World Bank)

Its mission is "to help developing countries build sustainable and successful economies and to reduce the human suffering that too often results from natural and technological catastrophes". The ProVention Consortium is a global coalition of governments, international organizations, academic institutions, the private sector, and civil society organizations aimed at reducing disaster impacts in developing countries. The Consortium functions as a network to share knowledge and to connect and leverage resources to reduce disaster risk. It focuses on synergy and coordination so that efforts, and benefits, are shared. <http://www.proventionconsortium.org/>

Regional Consultative Committee (RCC) in Disaster Management, Bangkok, Thailand

Within the framework of the Advisory Council, an ADPC Consultative Committee on Regional Cooperation in Disaster Management has been established. The Committee comprises members of the ADPC Board of Trustees/Advisory Council who are working in key Government positions in the National Disaster Management systems of countries of the Asian region. The role of RCC is to provide an informal consultative mechanism for development of action strategies for disaster reduction in the region and promotion of cooperative programs on a regional and sub-regional basis; so as to guide ADPC's work.
<http://www.adpc.ait.ac.th/pdp/consultative.html>

Regional Early Warning Unit (REWU), SADC, Harare, Zimbabwe

The SADC Regional Early Warning Unit is an institution of the Southern African Development Community financially supported through contributions from Member States. The SADC Regional Early Warning System operates as an integrated project, comprising a Regional Early Warning Unit (REWU), based in Harare, and autonomous National Early Warning Units in each of the ten original SADC member states.
<http://www.sadc-fanr.org.zw/rewu/rewu.htm>

Regional Remote Sensing Unit (RRSU), SADC, Harare, Zimbabwe

The main objective is to strengthen national and regional capabilities in the area of remote sensing and GIS for use of early warning for food security and natural resources management. <http://www.sadc-fanr.org.zw/rrsu/rrsu.htm>

Regional Unit for Technical Assistance (RUTA), (Unidad regional de asistencia técnica), Costa Rica

RUTA is the collaboration between governments and international development agencies in the sustainable development of rural areas in Central America. Its mission is to contribute to sustainable rural growth in order to reduce rural poverty in the Central American region by means of national and regional development agendas – a common effort between governments, civil societies and social agencies. www.ruta.org

Save the Children Fund, United Kingdom (SCF-UK)

SCF-UK is the leading United Kingdom charity working to create a better world for children. <http://193.129.255.93/>

Secretaría General de Planificación (SEGEPLAN), Guatemala (Planning Secretariat)

The Secretariat of Planning and Programming (SEGEPLAN) is an institution that supports decision making, within the Presidency and other centers of public policy formulation in the Executive Branch, by providing specific social-economic information that facilitates informed decisions related to the country's development. <http://www.segeplan.gob.gt/>

Sistema de Integración Centroamericana (SICA)

SICA, and its secretariat, is a regional organization created by the Central American Presidents in the Declaration of Tegucigalpa with the purpose of offering its technical services as well as political expertise to the initiatives of regional integration, and particularly to the development of the Central American Union.
<http://www.sicanet.org.sv/>

Sistema Nacional para la Prevención, Mitigación y Atención de Desastres (SNPMAD), Nicaragua (National System for Disaster Prevention, Mitigation and Attention)

On March, 2000, the "Legislation 337" was approved for the establishment of the National System for the Prevention, Mitigation of, and Attention to Disasters (the System). The National Committee is the administrative entity of the System, whose role it is to define the policies and plans of the System, as well as to assist the President of the Republic with the declaration of a State of Emergency and approve the annual budget directed to the National Fund for Disasters. In order to meet its objectives in terms of the prevention, mitigation of, and attention to disasters, the System has established Commissions for Sectorial Initiatives for the execution of the plans adopted by the National System. Legislation 337 stipulates that the Commissions shall be organized and coordinated at the Ministerial level.
<http://www.sosnicaragua.gob.ni/>

Sistema Nacional de Protección Civil (SINAPROC), Panama (National Civil Protection System)

SINAPROC is an infrastructure of programmes, institutional relationships, methodologies and processes, which coordinates the common efforts of the institutions of the three governmental hierarchies, as well as the public and private social agencies, to protect society against the dangers of natural risks and disasters.
<http://www.c-com.net.pa/~snpce/>

South African Qualifications Authorities (SAQA)

The South African Qualifications Authority is a body of 29 members appointed by the Ministers of Education and Labour. The members are nominated by identified national stakeholders in education and training. Its *National Qualifications Framework* is the set of principles and guidelines by which records of learner achievement are registered to enable national recognition of acquired skills and knowledge, thereby ensuring an integrated system that encourages life-long learning.
<http://www.saqa.org.za/>

South Asian Association for Regional Cooperation (SAARC), Kathmandu, Nepal

SAARC was established when its Charter was formally adopted on 8 December, 1985 by the Heads of State or Government of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. SAARC provides a platform for the peoples of South Asia to work together in a spirit of friendship, trust and understanding. It aims to accelerate the process of economic and social development in Member States. <http://www.saarc-sec.org/>

South Pacific Applied Geoscience Commission (SOPAC), Fiji

Its mission is to improve the well being of the peoples of Pacific Island developing states through the application of geoscience to the management and sustainable development of their non-living resources. SOPAC member countries include: Australia, Cook Islands, Federated States of Micronesia, Fiji, French Polynesia (Associate), Guam, Kiribati, Marshall Islands, New Caledonia (Associate), Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu. www.sopac.org.fj/

Southern Africa Development Community (SADC), Gaborone, Botswana

The primary role of SADC is to help define regional priorities, facilitate integration, assist in mobilizing resources and to maximize the regional impact of projects. The approach is to address national priorities through regional action. The SADC Programme of Action is made up of all the programmes and projects approved by the Council of Ministers. www.sadc.int <http://www.sadcreview.com/>

- SADC Food and Natural Resources Coordination Unit (See FANR)**- SADC Environmental and Land Management Coordination United Nations**

The SADC Environment and Land Management Sector (ELMS) has been given the responsibility to catalyse the transition towards environmentally sustainable development within the SADC countries. Thus the overall objective of the sector, like its mandate, is long term and conforms to the SADC Treaty "to achieve sustainable utilisation of natural resources and effective protection of the environment."

<http://www.sadcreview.com/sectoral%20reports%202001/environmentandland.htm>

- SADC Water Resources Coordination Unit

In view of the importance of the role that water plays in ensuring the well-being of the peoples of SADC, a distinct Water Sector was established by the community in 1996. The day-to-day coordination activities of the sector are undertaken by a dedicated unit known as the SADC Water Sector Coordinating Unit (SADC WSCU), located in the Ministry of Natural Resources, in Lesotho. The vision of the SADC Water Sector is, "to attain the sustainable, integrated planning, development, utilisation and management of water resources that contribute to the attainment of SADC's overall objectives of an integrated regional economy on the basis of balance, equity and mutual benefit for all member States". <http://www.sadcwscu.org.ls/>

Southern Alliance for Indigenous Resources (SAFIRE), Harare, Zimbabwe

SAFIRE was founded in October 1994 and since then it has steadily evolved to become one of the larger environmental NGOs in Southern Africa, and is associated particularly with natural products development, forestry related issues in communal lands, and with participatory approaches to community based natural resource management. <http://www.safireweb.org/>

Southern African Research and Documentation Center (SARDC), Harare, Zimbabwe

SARDC's objective is to improve the base of knowledge about economic, political, cultural and social developments, and their implications, by making information accessible to governments and policy makers, non-governmental organizations, the private sector, regional and international organizations, development agencies, parliaments, and the media. <http://www.sardc.net/>

Southern Common Market (MERCOSUR) Agreement

The Treaty establishes a Common Market between the Argentine Republic, the Federal Republic of Brazil, the Republic of Paraguay and the Eastern Republic of Uruguay. <http://www.sice.oas.org/trade/mrcsr/mrcsrtoc.asp>

Sustainable Environment and Ecological Development Society (SEEDS), New Delhi, India

SEEDS, a non-profit voluntary organization, is a collective endeavor of young professionals drawn from development related fields. It originated as an informal group of like-minded people, getting together for the purpose of creative research projects of academic interest. The group was later formalized in early 1994 and has been active in the field ever since. It is involved in research activities in community development, disaster management, environmental planning, transport planning, and urban and regional planning. Activities are carried out on behalf of government, semi-government and international development agencies. Independent programs on vital issues are also taken up. <http://www.gdrc.org/uem/seeds.html>

Swedish International Development Agency (SIDA)

SIDA creates the preconditions for change and sustainable development. <http://www.sida.org/>

Swiss Agency for Development and Cooperation (SDC), (Agencia Suiza para el desarrollo y la cooperacion (COSUDE))

SDC is part of the Swiss Federal Department of Foreign Affairs. Its mandate is based on the Federal Law on International Development Cooperation and Humanitarian Aid enacted on 19 March 1976, and on a federal decree of 24 March 1995 on cooperation with the countries of Eastern Europe. In order to make the greatest contribution, SDC concentrates its long-term efforts on cooperating in development in specific sectors and with a limited number of countries in Africa, Asia, Latin America and Eastern Europe. In Latin America, the Swiss Cooperation has chosen to focus its efforts on Peru, Bolivia, Ecuador and Central America, particularly Nicaragua. http://www.eda.admin.ch/lima_emb/s/home/devcop.html
http://194.230.65.134/dezaweb2/frame_ie.asp?bgstyle=bg_homepage

Swiss Reinsurance Company (SwissRE), Zurich, Switzerland

Swiss Re - the global reinsurer: With more than 70 offices in 30 countries. The Financial Services Business Group brings together world-class capital management expertise and risk-taking capabilities. Swiss Re's success in business is attributable to two factors: intelligent risk management and, at its heart, an in-depth analysis of the nature of risk. The product of the first is a contract; the product of the second is published work (top topics, Sigma). <http://www.swissre.com/>

Technicon, University of Technology, Free State, South Africa

The research mission of the Technikon Free State, a South African university of technology is in line with the higher education mission of teaching, research and community service: To advance, transfer and sustain knowledge and understanding, through the conduct of career teaching, research and scholarship, as well as community capacity building and services, at the highest international standards, for the benefit of national and international communities and that of the Free State Province in particular. <http://www.tofs.ac.za/index.asp>

Third World Academy of Sciences (TWAS), Italy

The Third World Academy of Sciences is an autonomous international organization, founded in Trieste, Italy, in 1983 by a distinguished group of scientists under the leadership of the late Nobel laureate Abdus Salam of Pakistan. It was officially launched by the then Secretary General of the United Nations in 1985. Since 1986, TWAS has been supporting research work of scientific merit in 100 countries in the South through a variety of programmes. In addition, joint activities have been developed with UNESCO, the Abdus Salam International Centre for Theoretical Physics (ICTP), ICSU, the International Foundation for Science (IFS) and the International Science Programme (ISP).

Tropical Cyclone Regional Specialized Meteorological Centres (RSMCs), World Meteorological Organization (WMO)

RSMCS is a network of five centres designated by WMO as Tropical Cyclone Regional Specialized Meteorological Centres (RSMCs) and located in:

La Réunion, www.meteor.fr/temps/domtom/La_Reunion/trajGP/data/home_trajGP

Miami, www.nhc.noaa.gov/products

Nadi (Fiji), www.met.gov.fj/advisories

New Delhi, www.imd.ernet.in/services/cyclone/cyclone-warning-services

Tokyo, <http://ddb.kishou.go.jp/typhoon/cyclone/cyclone.html>

and six specialized tropical cyclone warning centres with regional responsibility to carry out activities coordinated at the global and regional levels by WMO through its World Weather Watch and Tropical Cyclone Programmes. They are located in:

Brisbane, www.bom.gov.au/weather/qld/cyclone

Darwin, www.bom.gov.au/weather/nt/inside/cyclone/cyclone.shtml

Perth, www.bom.gov.au/weather/wa

Wellington, www.metservice.co.nz/forecasts/high_seas.asp

Port Moresby,

and **Honolulu**, www.nws.noaa.gov/pr/hnl/cphc/pages/cphc.html

Turkana Drought Contingency Planning Unit (TDCPU), Kenya

The Early Warning System of Turkana was set up in 1987. It operates at the sub-national level, for the district of Turkana in the northern part of Kenya. It is run by local government, by the TDCPU. It provides information on how early warning data can be translated and communicated to decision makers.

Uganda's Seismic Safety Association (USSA)

In 1997, following the WSSI High Level Meeting in Kampala, the Uganda Seismic Safety Association was formed. USSA is a non-profit professional organization some of whose members are affiliated to the Uganda Institution of Professional Engineers, International Federation of Red Cross and Red Crescent Societies, Government Ministries, NGOs, insurance industry, community leaders, and members from the general public.

Ukuvuka – Operation Firestop, South Africa

Operating within the scope of the authority of the local municipal authorities and the Cape Peninsula National Park, the Ukuvuka Campaign intends to accomplish the work identified by a public awareness campaign, through management support, funding, communication, monitoring and facilitation. <http://www.ukuvuka.org.za/>

Unit for Sustainable Development and Environment of the Organization of American States (USDE/OAS), Washington DC, USA

The Unit for Sustainable Development and Environment is the principal technical arm of the OAS General Secretariat for responding to the needs of member states on issues relating to sustainable development within an economic development context. Technical issues addressed by the USDE include transboundary management of water resources, reduction of vulnerability to natural hazards, public participation in decision-making, climate change, sea-level rise, coastal-zone management, renewable energy planning, and biodiversity. <http://www.oas.org/usde/USDE.htm>

United Nations Center for Regional Development/Disaster Management Planning Hyogo Office (UNCRD/DMPHO), Japan

UNCRD/DMPHO was established in Kobe in 1999 after the Great Hanshin-Awaji Earthquake of 1995. While applying the lessons learned from the experience of the earthquake of 1995, the Hyogo office has formulated integrated projects for 'Sustainable Development through Disaster Management'. The office has three basic research programs: 1) Design of community based projects for disaster management planning, 2) School earthquake safety project, and 3) Disaster management capacity building program to introduce best practices case studies on disaster management in developing countries. http://www.hyogo.uncrd.or.jp/ws2002/index_e.html

United States Agency for International Development (USAID), Washington DC, USA

USAID is an independent federal government agency that receives overall foreign policy guidance from the Secretary of State. The agency works to support long-term and equitable economic growth and advancing U.S. foreign policy objectives by supporting: economic growth, agricultural and trade; global health; and, democracy, conflict prevention and humanitarian assistance. <http://www.usaid.gov/>

United States Federal Emergency Management Agency (FEMA), Washington DC, USA

FEMA is an independent agency of the federal government, reporting to the President. Its mission is to reduce loss of life and property and to protect the nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery. www.fema.gov

United States Geological Survey (USGS), Reston, Virginia, USA

The USGS provides reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy and mineral resources and enhance and protect the quality of life. <http://www.usgs.gov/>

Universidad Nacional de Trujillo, Peru (National University)

Peru's National University at Trujillo operates as the Technical Secretariat for the General Coordination of EDUPLAN in Latin America and the Caribbean. <http://www.unitru.edu.pe/>

University of Cape Town, South Africa

The Environmental Evaluation Unit and the Disaster Mitigation for Sustained Livelihoods Project (DIMP) are associated with the department and operate from the Shell Environmental and Geographical Science building. The staff of these units consult on a wide range of practical environmental issues and problems, and also contribute to the teaching and research activities of the academic department. <http://www.uct.ac.za/>

University of Potchefstroom, South Africa

The university is in the process of establishing an African Centre for Disaster Studies (ACDS). (<http://www.puk.ac.za/fakulteite/lettere/sosialestudies/acds/>) <http://www.puk.ac.za/>

Other universities dealing with disaster management and related issues

Universidad de Costa Rica (UCR), (University of Costa Rica) <http://www.ucr.ac.cr/>

Universidad del Valle, Bogota, Colombia <http://www.univalle.edu.co/>

Universidad del Valle, Guatemala <http://www.uvg.edu.gt/>

Universidad de los Andes, Bogota, Colombia <http://www.uniandes.edu.co/home-visitantes/>

Universidad Nacional de Cuyo, Mendoza, Argentina <http://www.uncu.edu.ar/nueva/index.html>

Universidad Nacional de Nicaragua (UNAN), (National University of Nicaragua) <http://www.unan.edu.ni/>

Universidad Nacional, Heredia, Costa Rica (UNA), (National University, Heredia, Costa Rica) www.una.ac.cr

University of Cranfield, United Kingdom <http://www.cranfield.ac.uk/>

University of the Free State, South Africa <http://www.uovs.ac.za/>

University of Mutare, Zimbabwe <http://www.carbon.org/AfricaUniv.htm>

University of Nairobi, Kenya <http://www.uonbi.ac.ke/>

University of Witwatersrand, South Africa <http://www.cs.wits.ac.za/>

Wetlands International

Wetlands International is a leading global non-profit organisation dedicated solely to the crucial work of wetland conservation and sustainable management. Well-established networks of experts and close partnerships with key organisations provide Wetlands International with the essential tools for catalysing conservation activities worldwide. Activities are based on sound science and have been carried out in over 120 countries. Its mission is to sustain and restore wetlands, their resources and biodiversity for future generations through research, information exchange and conservation activities worldwide. <http://www.wetlands.org/>

World Conservation Union (IUCN), Switzerland

IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. <http://www.iucn.org/>

World Organization of Volcano Observatories (WOVO),

The World Organization of Volcano Observatories was established as the result of a meeting of representatives from world-wide volcano observatories, held in Guadeloupe in 1981. WOVO became the International Association of Volcanology and Chemistry of the Earth's Interior Commission in the following year. <http://volcano.und.nodak.edu/vwdocs/wovo/>

World Wide Fund for Nature (WWF)

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by: conserving the world's biological diversity ensuring that the use of renewable natural resources is sustainable promoting the reduction of pollution and wasteful consumption. Since it was founded in 1961, WWF has become one of the world's largest and most effective independent organizations dedicated to the conservation of nature. <http://www.panda.org>

Zambesi River Authority (ZRA)

The bi-national Zambesi River Authority (ZRA) was established through an agreement between Zambia and Zimbabwe. ZRA now has the responsibility for operation and maintenance of the Kariba Dam, while the two power plants are operated by power companies of the respective countries.

Zentrum für Naturrisiken und Entwicklung (ZENEb), Germany (Center for Natural Hazards and Development)

The objective of ZENEb is the creation of a "culture of a prevention" for the advancement of sustainable development. Accordingly, initiatives in the reduction of vulnerability of natural hazards are being made in cooperation with issues of science and policy. <http://www.giub.uni-bonn.de/zeneb/>

Annex 3 List of ACRONYMS

a	
ACC	Administrative Committee on Coordination (now CEB)
ACMAD	African Center of Meteorological Applications for Development (Centre africain des applications de la météorologie pour le développement), Niamey, Niger
ACS	Association of Caribbean States
ADB	Asian Development Bank, Manila, Philippines
ADMIN	Australian Disaster Management Information Network
ADPC	Asian Disaster Preparedness Center, Bangkok, Thailand
ADRC	Asian Disaster Reduction Center, Kobe, Japan
ADRRN	Asian Disaster Reduction and Response Network
AEDES	Agence Européenne pour le Développement et la Santé
AEGDM	ASEAN Experts Group on Disaster Management
AEMI	Australian Emergency Management Institute (now EMAI)
AGIS	Agriculture Geo-referenced Information System
AGMP	Agricultural Meteorology Programme, WMO
AGRHYMET	Specialized hydrometeorological institute of the Permanent Interstate Committee for Drought Control in the SAHEL (CILSS). See also : CILSS, Comité permanent Inter Etats de Lutte Contre la Sécheresse dans le SAHEL.
AGSO	Australian Geological Survey Organization
AIDIS	Asociación Interamericana de Ingeniería sanitaria y Ambiental (Panamerican Engineering Association for the Public Health and Environment)
AIST	Agency of Industrial Science & Technology, Japan
AIT	Asian Institute of Technology, Bangkok, Thailand
ALIDES	Alianza para el Desarrollo Sostenible (Alliance for Sustainable Development), Central America
ALITE	Augmented Logistics Intervention Team for Emergencies, WFP
AOSIS	Alliance of Small Islands States
APEC	Asia-Pacific Economic Cooperation
APELL	Awareness and Preparedness for Emergencies at the Local Level (UNEP Program)
ARF	ASEAN Regional Forum (for Regional Cooperation in Disaster Management)
ARPDM	ASEAN Regional Program on Disaster Management
ARTEMIS	Advanced Real Time Environmental Information Monitoring System, FAO
ASEAN	Association of South East Asian Nations
AU	African Union
AUDMP	Asian Urban Disaster Mitigation Program, ADPC, Thailand
AusDIN	Australian Disaster Information Network
AVHRR	Advanced Very High Resolution Radiometer
b	
BCPR	Bureau for Crisis Prevention and Recovery, UNDP (formerly Emergency Response Division, ERD)
BGHRC	Benfield Greig Hazard Research Centre, University College London, United Kingdom
BIBEX	Biomass Burning Experiment
BICEPP	Business and Industry Council for Emergency Planning and Preparedness
BIT	Bandung Institute of Technology, Indonesia
BPIEPC	Bureau de la protection des infrastructures essentielles et de la protection civile, Canada. See Also: OCIPEP, Office of Critical Infrastructure Protection and Emergency Preparedness
c	
CABEI	Central American Bank for Economic Integration
CAMI	Central American Mitigation Initiative (Iniciativa Centroamericana para la Mitigación)
CAC	Consejo Agrícola Centroamericano (Central American Agricultural Advisory Board)
CAF	Corporación Andina de Fomento (Andean Development Corporation)
CARDIN	Caribbean Disaster Information Network
CARE	Cooperative for Assistance and Relief Everywhere
CARICOM	Caribbean Community
CBD	United Nations Convention on Biological Diversity
CBDM	Community Based Disaster Management

CCAs	Common Country Assessments
CCAD	Comisión Centroamericana de Ambiente y Desarrollo (Central American Commission for Environment and Development)
CCFSC	Central Committee for Flood and Storm Control, Vietnam
CCGC	Coordinating Council for Disaster Management, Mozambique
CCOP	Coordinating Committee for Coastal and Offshore Geoscience Programmes in East and Southeast Asia
CCP	Cluster Cities Project
CDB	Caribbean Development Bank
CDC	Center for Disease Control and Prevention, Atlanta, USA
CDERA	Caribbean Disaster Emergency Response Agency
CDM	Clean Development Mechanism, UNFCCC
CDMP	Caribbean Disaster Mitigation Project
CDPC	Cranfield Disaster Preparedness Center, United Kingdom
CDRN	Citizen's Disaster Response Network, Philippines
CEB	United Nations System Chief Executives Board for Coordination (formerly ACC)
CEH	Center for Ecology and Hydrology, United Kingdom
CENAPRED	National Center for Disaster Prevention, Mexico
CEOS	Committee on Earth Observation Satellites
CEPREDENAC	Centro de Coordinación para la Prevención de Desastres Naturales en America Central (Coordinating Centre for the Prevention of Natural Disasters in Central America)
CEP	Caribbean Environment Program, UNEP
CEPAL	Comisión Económica para America Latina (Economic Commission for Latin America)
CEPR	Centre européen pour prévention des risques (European Center for Risk Mitigation), France
CEUDIP	Central European Disaster Prevention Forum
CGIAR	Consultative Group for International Agricultural Research
CGMW	Commission for the Geological Map of the World
CHARM	Comprehensive Hazard and Risk Management Program (Pacific Island States)
CHED	Philippine Commission on Higher Education
CIDA	Canadian International Development Agency
CIFAL	International Training Centre for Local Actors, Divonne-les-Bains, France
CIMDEN	Center for Disaster Research and Mitigation, Guatemala
CILSS	Comité permanent Inter Etats de Lutte Contre la Sécheresse dans le SAHEL (Permanent Inter-state Committee for Drought Control in the SAHEL)
CINDI	Center for Integration of Natural Disaster Information (USGS)
CIRDAP	Center on Integrated Rural Development for Asia and the Pacific, Dhaka, Bangladesh
CIS	Commonwealth of Independent States
CISMID	Centro Peruano Japonés de Investigaciones Sísmicas y Mitigación de Desastres
CLIVAR	Climate Variability and Predictability, Project, World Climate Research Programme
CNCIDR	China National Committee for International Disaster Reduction
CNCNDR	China National Center for Natural Disaster Reduction
CNDR	Corporate Network for Disaster Reduction
CNE	Comisión Nacional de Prevención de Riesgos y Atención de Emergencias, Costa Rica (National Risk Prevention and Emergency Response Commission)
CNHAP	Canadian Natural Hazards Assessment Project
COEN	Comite de Emergencia Nacional, El Salvador (Committee for National Emergency)
COHG	Conference of Heads of Governments of the Caribbean Community
CONRED	Coordinadora Nacional para la Reducción de Desastres, Guatemala (National Coordinator for Disaster Reduction)
COP	Conference of the Parties
COPECO	Comisión Permanente de Contingencias, Honduras (Permanent Commission Contingency)
COPUOS	United Nations Committee for Peaceful Use of Outer Space
CORDES	Corporación para el Desarrollo, El Salvador (Development Corporation)
CORECA	Consejo Regional de Cooperación Agrícola (Central American Advisory Board for Agricultural Cooperation)
COST	European Cooperation in the Field of Scientific and Technical Research
COSUDE	Agencia Suiza para el desarrollo y la cooperación (COSUDE), (Swiss Agency for Development and Cooperation (SDC))
CPACC	Caribbean Planning for Adaptation to Global Climate Change (project)
CPP	Cyclone Preparedness Program (Bangladesh Red Crescent Society)

CRED	Centre for Research on the Epidemiology of Disasters, Catholic University of Louvain, Brussels, Belgium
CRID	Centro Regional de Información sobre Desastres, América Latina y El Caribe, Costa Rica (Regional Disaster Information Centre, Latin America and the Caribbean)
CSD	Commission on Sustainable Development, United Nations
CSDS	Countries in Special Development Situations
CSIR	Council for Scientific and Industrial Research, South Africa
CST	UNCCD's Committee on Science and Technology
CSW	Commission on the Status of Women, United Nations
CTGC	Disaster Management Technical Council, Mozambique
D	
DAPSA	Department of Early Warning and Food Security, Mozambique
DAW	Division for the Advancement of Women, United Nations
DDMFC	Department of Dyke Management and Flood Control, Vietnam
DEPHA	Data Exchange Platform for the Horn of Africa
DEPI	Division for Environment Policy Implementation, UNEP
DESA	United Nations Department of Economic and Social Affairs
DESINVENTAR	Inventario de Desastres, LA RED, (Disaster Inventory)
DEWA	Division for Early Warning and Assessment, UNEP
DFID	Department for International Development, United Kingdom
DFNK	Deutsches Forschungsnetz Naturkatastrophen (German Research Network for Natural Disasters)
DG JRC	Directorate General Joint Research Centre
DHA	Department of Humanitarian Affairs (now UN/OCHA)
DHM	Department of Hydrology and Meteorology, Nepal
DiMP	Disaster Mitigation for Sustainable Livelihoods Programme, University of Cape Town, South Africa
DIPECHO	Disaster Preparedness, European Community Humanitarian Office
DISMAC	Disaster Management Committee at National Divisional and Districts levels, Fiji
DKKV	Deutsches Komitee für Katastrophenvorsorge e.V. (German Committee for Disaster Reduction)
DMC	Drought Monitoring Centre (Harare, Zimbabwe and Nairobi, Kenya)
DMF	Disaster Management Facility, IBRD
DMIS	Disaster Management Information System, IFRC
DMISA	Disaster Management Institute of Southern Africa, South Africa
DMMU	Disaster Management and Mitigation Unit, Zambia
DMT	Disaster Management Teams
DMTP	Disaster Management Training Programme, United Nations
DMU	Disaster Management Unit, Vietnam
DNA	National Directorate of Water, Mozambique
DPCCN	Department for the Prevention and Control of Natural Disasters, Mozambique
DPCSS	Disaster, Post-Conflict and Safety Section, UN-HABITAT
DPCC	Disaster Prevention and Preparedness Commission, Ethiopia
DRBA	Disaster Recovery Business Alliance
DRRP	Disaster Reduction and Recovery Programme, UNDP
DSD	Division for Sustainable Development, United Nations
E	
EANHMP	Eastern Asia Natural Hazards Mapping Project
EAPAP	Environment Assessment Program for Asia-Pacific (Asian Institute of Technology, Bangkok, Thailand)
ECA	Economic Commission for Africa, United Nations, Addis Ababa, Ethiopia
ECE	Economic Commission for Europe, United Nations, Geneva, Switzerland
ECHO	European Community Humanitarian Office
ECLAC	Economic Commission for Latin America and the Caribbean, United Nations, Santiago, Chile
ECOSOC	United Nations Economic and Social Council
ECPC	Experimental Climate Prediction Centre, USA
EDM	Earthquake Disaster Mitigation Research Center, Miki, Japan
EEA	European Environment Agency, Copenhagen, Denmark
EERI	Earthquake Engineering Research Institute, Oakland, California, USA
EEZ	Exclusive Economic Zone

EHP/USGS	Earthquake Hazards Program of the United States Geological Survey
EIA	Environmental Impact Assessment
ELMS	Environment and Land Management Sector of SADC, Southern Africa
ELSA	European Laboratory for Structural Assessment – Earthquake Engineering
EMA	Emergency Management Australia
EMAI	Emergency Management Australia Institute (former AEMI)
EM-DAT	Emergency Events Database (CRED, Catholic University of Louvain)
EMI	Earthquake and Megacities Initiative
EMS	Environmental Management Systems
ENSO	El Niño Southern Oscillation
EPC	Emergency Preparedness Canada
EPOCH	European Programme on Climatology and Natural Hazards
EQTAP	Earthquake and Tsunami Disaster Mitigation Technologies in the Asia-Pacific Region
ERA	European Research Area
ERD	Emergency Response Division, UNDP (now BCPR)
ERWIN	Early Warning System for tropical cyclone, Cook Islands
ESB	Emergency Services Branch, UN/OCHA
ESCAP	Economic and Social Commission of Asian and the Pacific, Bangkok, Thailand, United Nations
ESCWA	Economic and Social Commission for Western Asia, Beirut, Lebanon, United Nations
ESPRIT	European Strategic Programme for Research and Information Technology
ETS	Emergency Telecommunications Service, ITU
EU	European Union
EUR-OPA	Major Hazards Agreement of the Council of Europe
EWARN	Early Warning and Response Network, Southern Sudan
EWSs	Early Warning Systems

FANR	Food, Agriculture and Natural Resources Sector of SADC, Southern Africa
FAO	Food and Agriculture Organization, United Nations
FAO/AGL	Food and Agriculture Organization/Land and Water Development Division
FDR	Fire Danger Rating
FEMA	Federal Emergency Management Agency, US Government
FEMID	Fortalecimiento de Estructuras Locales para la Mitigación de Desastres (Strengthening of Local Structures for Disaster Mitigation)
FEWS	Famine Early Warning System
FEWSNET	Famine Early Warning System Network
FHWA	Federal Highway Administration, US Government
FICCI	Federation of Indian Chambers of Commerce and Industry
FINCA	Foundation for International Community Assistance
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems, FAO
FLACSO	Facultad Latinoamericana de Ciencias Sociales (Latin American Social Science Faculty)
FOREC	Fondo para la Reconstrucción y el Desarrollo Social del Eje Cafetero, Manizales, Colombia
FSWW	Foundation for the Support of Women's Work
FUNDE	Fundación Nacional para el Desarrollo (National Development Foundation)
FUSAI	Fundación Salvadoreña para la Asistencia Integral, El Salvador (Salvadorian Foundation for Integral Assistance)

GA	General Assembly, United Nations
GADR	Global Alliance for Disaster Reduction, USA
GAV	Vulnerability Analysis Group
GCOS	Global Climate Observing System
GDIN	Global Disaster Information Network
GDP	Gross Domestic Product
GEF	Global Environmental Facility (implemented by UNDP, UNEP and the World Bank)

GEO	Global Environment Outlook Report, UNEP
GESI	Global Earthquake Safety Initiative, Hyogo Office, Japan
GFMC	Global Fire Monitoring Center, Germany
GHI	GeoHazards International, California, USA
GIEWS	Global Information Early Warning System, FAO
GIS	Geographic Information Systems
GLIDES	GL obal ID entifier number
GLO-DISNET	Global Disaster Information Network
GLOF	Glacial Lake Outburst Flood
GMES	Global Monitoring for the Environment and Security (EU initiative)
GMGS	Groupe Maghrébin de Génie Sismique
GNP	Gross National Product
GOOS	Global Ocean Observing System
GPHIN	Global Public Health Intelligence Network
GPS	Global Positioning System
GRID	Global Resource Information Database, UNEP
GROOTS	Grass Root Organization Operating in Sisterhood
GSDMA	Gujarat State Disaster Management Authority, India
GSJ	Geological Survey of Japan
GSHAP	Global Seismic Hazard Assessment Program
GTOS	Global Terrestrial Observing System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation)
HAZ TAIWAN	
HAZUS	Natural Hazard Loss Estimation Methodology, FEMA
HDR	Human Development Report, UNDP
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HNDGDM	Hungarian National Directorate General for Disaster Management
HOMS	Hydrological Operational Multipurpose System of WMO
HPC-DMP	High Powered Committee on Disaster Management Plans, India
HYCOS	Hydrological Cycle Observing System
IACNDR	
IADB	Inter-American Development Bank. See also: IDB.
IAEA	International Atomic Energy Agency, United Nations
IAEE	International Association of Earthquake Engineering, Tokyo, Japan
IASC	Inter-Agency Standing Committee
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IATF	Inter-Agency Task Force (ISDR)
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
IBHS	Institute for Business and Home Safety, USA
IBRD	International Bank for Reconstruction and Development, World Bank
ICAO	International Civil Aviation Organization
ICET	Intergovernmental Conference on Emergency Telecommunications
ICIMOD	International Center for Integrated Mountain Development, Nepal
ICRC	International Committee of the Red Cross
ICSU	International Council of Science, Paris, France
ICTP	International Center for Theoretical Physics, Trieste, Italy
ICVA	International Council of Voluntary Agencies
ICWE	International Conference on Water and the Environment, United Nations
IDA	International Development Association, World Bank
IDAACA	International Distributed Active Archive Centre for Africa
IDB	Inter-American Development Bank (Banco Interamericano de Desarrollo). See also: IADB
IDF	Institutional Development Fund, World Bank
IDMC	Inter-departmental Disaster Management Committee, South Africa
IDNDR	International Decade for Natural Disaster Reduction, 1990-1999

IDPs	Integrated Development Plans
IDRM	International Institute for Disaster Risk Management, Manila, Philippines
IERMP	Iran Earthquake Risk Mitigation Program
IFAD	International Fund for Agricultural Development
IFFM	Integrated Forest Fire Management (Project, Indonesia)
IFP/Crisis	In-Focus Programme on Crisis Response and Reconstruction, ILO
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAC	International Global Atmospheric Chemistry
IGAD	Intergovernmental Authority on Development, Republic of Djibouti
IGADD	Intergovernmental Authority on Drought and Development (now IGAD since 1996)
IGBP	International Geosphere-Biosphere Programme
IGCP	International Geological Correlation Programme, UNESCO
IGOS	Integrated Global Observing Strategy
IHP	International Hydrological Programme, UNESCO
IIEES	International Institute of Earthquake Engineering and Seismology, Iran
IIPA	Indian Institute of Public Administration
IISD	International Institute for Sustainable Development, Canada
IKSR	Internationale Kommission zum Schutz des Rheines, Germany (International Commission for the Protection of the Rhine (ICPR))
ILO	International Labour Organization, United Nations
IMC	Inter-ministerial Committee for Disaster Management, South Africa
IMERCSA	Musokotwane Environment Resource Centre for Southern Africa, Zimbabwe
IMF	International Monetary Fund
IMO	International Maritime Organization
INAM	National Institute for Meteorology, Mozambique
INCEDE	International Centre for Disaster Mitigation Engineering, University of Tokyo
INDECI	National Civil Defence System, Peru
INGC	Instituto Nacional de Gestao de Calamidades, Mozambique (National Institute for the Management of Calamities)
INETER	Instituto Nicaraguense de Estudios Territoriales (Nicaraguan Institute for Territorial Studies)
IOC	Intergovernmental Oceanographic Commission
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IRCEN	International Research Centre for the El Niño Phenomenon, Guayaquil, Ecuador
IRI	International Research Institute for Climate Prediction, Columbia University, USA
ISDR	International Strategy for Disaster Reduction, United Nations
ISO	International Organization for Standardization, Switzerland
ISP	Integral Sustainable Production Units
ITIC	International Tsunami Information Center, Honolulu, Hawaii
ITU	International Telecommunication Union, United Nations
IUCN	The World Conservation Union
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
JMA	Japan Meteorological Agency
KBDI	Keetch-Byram Drought Index
KVERMP	Kathmandu Valley Earthquake Risk Management Project, NSET, Nepal
LA RED	La Red de Estudios Sociales en Prevención de Desastres en América Latina (The Latin American Network for the Social Study of Disaster Prevention)
LCAS	Logistics Capacity Assessments, WFP
LDCs	Least Developed Countries
LIDERES	Curso Internacional para Gerentes sobre la salud, desastres y desarrollo (PAHO)
LILACS	Latin American and Caribbean Health Science Literature

MAB	Man and Biosphere Programme, UNESCO
MADER	Ministry of Agricultural and Rural Development, Mozambique
MANDISA	Monitoring, Mapping and Analysis of Disaster Incidents in South Africa
MARN	Ministerio de Medio Ambiente y Recursos Naturales, El Salvador (Ministry of Environment and Natural Resources)
MATE	Ministère de l'Aménagement du Territoire et de l'Environnement, France (Ministry of land use planning and environment)
MCEER	Multi-disciplinary Center for Earthquake Engineering Research, USA
MCT	Ministry of Science and Technology, Venezuela
MDSP	Minister of sustainable development and planning, Bolivia
MEER	Marmara Earthquake Emergency Reconstruction Project
MEGS	Maharashtra Employment Guarantee Scheme
MERCOSUR	Southern Common Market, South America
MOST	Management of Social Transformations Programme, UNESCO
MOU	Memorandum of Understanding
MRC	Mekong River Commission, Cambodia
MSF	Médecins sans Frontières
MSP	Multi-stakeholder processes
NaDiVA	National Disaster Vulnerability Atlas, South Africa
NANADISK-NET	National Natural Disaster Knowledge Network, India
NASA	National Aeronautics and Space Administration, USA
NASG	North African Scientific Group
NCAR	National Center for Atmospheric Research, Boulder, Colorado, USA
NCDM	National Committee for Disaster Management
NDC	National Development Commission, El Salvador (Comisión Nacional de Desarrollo)
NDMC	National Disaster Management Centre, South Africa
NDMO	National Disaster Management Office
NDMS	National Disaster Mitigation Strategy, Canada
NDRP	National Disaster Reduction Plan, People's Republic of China
NDVI	Normalized Difference Vegetation Index
NEAP	National or regional Environmental Action Plan
NEDIES	Natural and Environmental Disaster Information Exchange System
NEMA	National Emergency Management Association, USA
NEMO	Network of State Hazard Mitigation Officers, USA
NEPAD	New Partnership for Africa's Development
NEWU	National Early Warning Unit, Africa
NFIP	National Flood Insurance Program, USA
NICT	New Information and Communication Technologies
NIRD	National Institute of Rural Development, Hyderabad, India
NMHSs	National Meteorological and Hydrological Services, WMO
NOAA	National Oceanic and Atmospheric Administration, USA
NOVIB	Netherlands Organisation for International Development Cooperation
NRA	National Resource Accounts
NRC	Nuclear Regulatory Commission
NSA	National Systems for Environmental Accounting
NSF	National Science Foundation, USA
NSET	National Society for Earthquake Technology, Nepal
OAS	Organization of American States (Organización de Estados Americanos), Washington, DC, USA
OCIPEP	Office of Critical Infrastructure Protection and Emergency Preparedness, Canada. Also see: BPIEPC, Bureau de la protection des infrastructures essentielles et de la protection civile
ODA	Official Development Assistance
ODI	Overseas Development Institute, United Kingdom
ODPEM	Office of Disaster Preparedness and Emergency Management, Jamaica
OECD	Organization for Economic Cooperation and Development, Paris, France
OECS	Organization of Eastern Caribbean States, Castries, Santa Lucia

OFDA/USAID	Office for Foreign Disaster Assistance/US Agency for International Development
OFEPF	Office Fédéral de l'Environnement, des Forêts, et du Paysage, Suisse (Swiss Agency for the Environment, Forests and Landscape, Economics and Climate Section).
OGP/NOAA	Office of Global Program/National Oceanic and Atmospheric Administration, USA
OHA	Office of the Humanitarian Adviser, WFP
OHCHR	Office of the United Nations High Commissioner for Human Rights
OOSA	Office for Outer Space Affairs, United Nations
ORAP	Organisation of Rural Associations for Progress, Zimbabwe
OSDMA	Orissa State Disaster Mitigation Authority, India
OSIRIS	Operational Solutions for the Management of Inundation Risks in the Information Society (project)

PACD	Plan of Action to Combat Desertification
PAHO	Pan American Health Organization (Organización Panamericana para la Salud), Washington, DC, USA
PBSP	Philippine Business for Social Progress, Manila, Philippines
PHIVOLCS	Philippine Institute for Volcanology and Seismology
PICCAP	Pacific Island Climate Change Assistance Program
PIK	Postdam Institute for Climate Impact Research, Germany
PLANAT	National Platform for Natural Hazards, Switzerland
PPP 2000	Public Private Partnership – 2000, Washington DC, USA
PRA	Participatory Rapid Appraisals
PREANDINO	Andean Regional Programme for Risk Prevention and Reduction, Caracas, Venezuela
PRECLIF	Project for the Local Prevention and Control of Forest Fires, Guatemala
PREVAC	Programa de Prevención de Desastres en América Central (Disaster Prevention Program in Central America)
PTWS	Pacific Tsunami Warning System
PTWC	Pacific Tsunami Warning Centre, Hawaii
PWS	Public Weather Services, WMO

RADIUS	R isk A ssessment Tools for D iagnosis of U rban Areas against S eismic Disasters
RADIX	Radical Interpretation of Disaster
RCB	Response Coordination Branch, UN/OCHA
RCC	Regional Consultative Committee on regional cooperation in disaster management, Asia
RCCs	Regional Climate Centers, WMO
RCOFs	Regional Climate Outlook Forums
RDMP	Risk Disaster Management Programme, UN-HABITAT
REIS	Regional Environmental Information System
RELEMR	Reduction of Earthquake Losses in the Eastern Mediterranean Region (project)
RELSAT	Strengthening of local structures and early warning systems (project)
RESCDAM	Development of rescue actions based on dam-break flood analysis (project)
REWS	Regional Early Warning System, Africa
REWU	Regional Early Warning Unit, SADC, Zimbabwe
RIKEN	Institute of Physical and Chemical Research, Japan
RRSU	Regional Remote Sensing Unit, SADC, Zimbabwe
RSMCs	World Meteorological Organization Specialized Regional Meteorological Centers
RTD	Research and Technological Development, EU
UTA	Regional Unit for Technical Assistance (Project UNDP/World Bank)

SAARC	South Asian Association for Regional Cooperation, Kathmandu, Nepal
SADC	Southern Africa Development Community
SADCC	Southern African Development Coordination Conference
SAFIRE	Southern Alliance for Indigenous Resources
SAR	Synthetic Aperture Radar
SAQA	South African Qualifications Authority

SARCOF	Southern Africa Region Climate Outlook Forum
SARDC	Southern African Research and Documentation Center, Zimbabwe
SAREC	Swedish Agency for Research Cooperation with Developing Countries
SBO	School Building Organization, Greece
SCF-UK	Save the Children Fund, United Kingdom
SCHR	Southern Centre for Human Rights, USA
SEAGA	Socio-Economic and Gender Analysis
SEEA	System for Environmental Economic Accounting
SEEDS	Sustainable Environment and Ecological Development Society, India
SEGEPLAN	Secretaría General de Planificación, Guatemala, (Planning Secretariat)
SEISMED	Co-operative Project for Seismic Risk Reduction in the Mediterranean Region
SERMP	Suva Earthquake Risk Management Scenario Pilot Project, Fiji
SESAME	Secure European System for Applications in a Multi-vendor Environment
SESI	School Earthquake Safety Initiative, UNCRD/DMPHO
SETSAN	Secretariat for Food Security and Nutrition, Mozambique
SICA	Sistema de Integración Centroamericana (Central American Integration System)
SIDS	Small Island Developing States
SIDS-POA	Small Island Developing States Program of Action
SIDA	Swedish International Development Agency
SINAPROC	Sistema Nacional de Protección Civil, Panama (National Civil Protection System)
SNPMAD	Sistema Nacional de Prevención, Mitigación y Atención de Desastres, Nicaragua (National System for Disaster Prevention, Mitigation and Attention)
SNET	Servicio Nacional de Estudios Territoriales, El Salvador (National Service for Territorial Studies)
SOPAC	South Pacific Applied Geoscience Commission, Fiji
SOPAC-DMU	South Pacific Applied Geoscience Commission B Disaster Management Unit
SPDRP	South Pacific Disaster Reduction Program (UNDP South Pacific Office)
SPFS	Special Programme for Food Security, FAO
SPPO	South Pacific Program Office
SPREP	South Pacific Regional Environmental Programme, UNEP
SSP	Swayam Shiksam Prayong, India
SwissRE	Swiss Reinsurance Company
t	
TEFER	Turkish Emergency Flood and Earthquake Recovery
TDCPU	Turkana Drought Contingency Planning Unit, Kenya
TRM	Total Disaster Risk Management (RCC strategy)
TWAS	Third World Academy of Sciences, Italy
u	
UCR	Universidad de Costa Rica (University of Costa Rica)
UNA	Universidad Nacional, Heredia, Costa Rica (National University, Heredia, Costa Rica)
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNAN	Universidad Nacional de Nicaragua (National University of Nicaragua)
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNCHS	United Nations Centre for Human Settlements (now UN-HABITAT)
UNCRD	United Nations Center for Regional Development
UNCRD/DMPHO	United Nations Center for Regional Development/Disaster Management Planning Hyogo Office, Japan
UNCTAD	United Nations Conference on Trade and Development
UNDAC	United Nations Disaster Assessment and Coordination team
UNDAF	United Nations Development Assistance Framework
UNDCP	United Nations International Drug Control Programme
UNDG	United Nations Development Group
UNDHA-SPO	United Nations Department of Humanitarian Affairs-South Pacific Office
UNDP	United Nations Development Programme
UNDP-SPO	United Nations Development Programme-South Pacific Office
UNDRO	Office of the United Nations Disaster Relief Coordinator
UNEP	United Nations Environment Programme

UNEP/DEPI	United Nations Environment Programme/Division of Environmental Policy Implementation
UNEP/DEWA	United Nations Environment Programme/Division of Early Warning and Assessment
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFIP	United Nations Fund for International Partnerships
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UN-HABITAT	United Nations Human Settlements Programme (Previously UNCHS)
UNICEF	United Nations Children's Fund
UNISPACE	United Nations Conference on the Exploration and Peaceful Uses of Outer Space
UNIDO	United Nations Industrial Development Organization
UNIFEM	United Nations Fund for Women
UNITAR	United Nations Institute for Training and Research
UN-OCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNOPS	United Nations Office for Project Services
UNRWA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
UNSC	United Nations Staff College
UNSO	Office to Combat Desertification and Drought, UNDP (Now Drylands Development Centre)
UNU	United Nations University
UNV	United Nations Volunteers
UPU	Universal Postal Union
USAID	US Agency for International Development
USDE/OAS	Unit for Sustainable Development and Environment of the Organization of American States
USGS	United States Geological Survey
USSA	Uganda's Seismic Safety Association
UWI	University of the West Indies, Jamaica

VAG	Vulnerability Analysis Group
VAM	Vulnerability Assessment and Mapping, WFP
VAT	Vulnerability Assessment and Techniques
VCA	Vulnerability and Capacities Assessment
VEI	Volcanic Explosivity Index
VHF	Very High Frequency

WAICENT	World Agricultural Information Centre, FAO
WB	World Bank
WCP	World Climate Programme, WMO
WFP	World Food Programme, United Nations
WHO	World Health Organization, United Nations
WIPO	World Intellectual Property Organization, United Nations
WMO	World Meteorological Organization, United Nations
WOVO	World Organization of Volcano Observatories
WOVOdat	World Organization of Volcano Observatories' database
WRCU	Water Resources Coordination Unit, SADC, Southern Africa
WSSD	World Summit on Sustainable Development
WSSI	World Seismic Safety Initiative
WTO	World Trade Organization
WVR	World Vulnerability Report, UNDP
WWAP/WWDR	World Water Assessment Programme/World Water Development Report
WWF	World Wide Fund for Nature
WWRP	World Weather Research Programme, WMO
WWW	World Weather Watch, WMO

ZRA	Zambesi River Authority
ZENEB	Zentrum für Naturrisiken und Entwicklung, Germany (Centre for Natural Risks and Development)
ZFFHC	Zimbabwe Freedom from Hunger Campaigns

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The **International Strategy for Disaster Reduction (ISDR)** is a global framework established within the United Nations for the promotion of action to reduce social vulnerability and risks of natural hazards and related technological and environmental disasters.


Its main purpose is to facilitate, in an inter-agency effort, that Governments and communities in disaster-prone areas integrate the management of risk into their development policies, programmes and projects. The long-term goal is to enable communities to become resilient to disasters saving lives as well as social, economic, and environmental assets.

By working through a network of international organizations, scientific and expert institutions, civil society, private sector interests and government officials, the ISDR aims to increase public awareness about disaster reduction, to motivate commitment from public authorities, and to stimulate inter-disciplinary and inter-sectoral partnerships that can improve the scientific knowledge on natural hazards and the causes of disasters.

The Strategy was launched in January 2000, through United Nations General Assembly with the support of two international mechanisms:

- an Inter-Agency Secretariat, in Geneva, Switzerland, and
- an Inter-Agency Task Force on Disaster Reduction, that represents:
 - *UN agencies, organizations and programmes:* FAO, ITU, UNDP, UNEP, UNESCO, UN/HABITAT, WFP, WHO, WMO, and World Bank;
 - *Regional entities:* African Union, Asian Disaster Preparedness Center (ADPC), Asian Disaster Reduction Center (ADRC), Interstate Council of the Commonwealth of Independent States, Council of Europe, Ibero-American Association of Civil Defence and Civil Protection, Organization of American States/Inter American Committee for the Reduction of Natural Disasters (OAS/IACNDR), South Pacific Applied Geoscience Commission (SOPAC), and.
 - *Civil Society Organizations:* Drought Monitoring Centre (DMC), Kenya; Global Fire Monitoring Centre (GFMC), Freiburg, Germany; International Council for Science (ICSU); International Federation of Red Cross and Red Crescent Societies (IFRC), and Munich Reinsurance Company, Germany.

For additional information about ISDR, see pages 19-20 of this volume and visit the website at www.unisdr.org.



“In recent years the world has witnessed an interminable succession of disasters -- floods, storms, earthquakes, landslides, volcanic eruptions and wildfires that have many thousands of claimed lives, caused material losses in the tens of billions of dollars, and inflicted a terrible toll on developing countries in particular, where disasters divert attention and resources needed desperately to escape poverty.

..... Living with risk shows that we are far from helpless in the face of natural hazards. Early warning and risk reduction measures have been important factors in helping to reduce significantly the number of people who lose their lives to disasters. New planning and forecasting tools are helping to mitigate the devastation regularly wrought by floods. We can and must build a world of resilient communities and nations. I hope that this publication reaches the widest possible readership and rouses the international community to do its utmost to better equip people everywhere for life in our hazard-filled planet.”

Kofi A. Annan, Secretary-General of the United Nations.

Earthquakes are inevitable, but death in an earthquake is not. Floods are a fact of life, but they need not wash away health, hope and livelihoods. *Living with risk- a global review of disaster reduction initiatives* is a publication to guide and inspire practitioners in disaster and environmental management, and sustainable development, coordinated by the Inter-Agency Secretariat of the International Strategy for Disaster Reduction of the United Nations. It focuses on the lessons from the past on how to reduce risk and vulnerability to hazards and on the challenges of tomorrow.

Disaster and risk reduction need to become essential parts of sustainable development. That is because vulnerability to natural, technological and ecological hazards are driven by social, economic and environmental activity. Natural hazards threaten everybody. But to live with them is also an imperative that involves everybody, from villagers to heads of state, from bankers and lawyers to farmers and foresters, from meteorologists to media chiefs. The annual toll of climate related disasters has doubled in five years, and increased impacts are expected from climate change. Human pressure on the environment has never been greater. *Living with risk* outlines the challenges ahead in a race against time.

The ISDR Secretariat welcomes comments and sharing of experiences, which will be reflected in coming issues of this global review.

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