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# MITIGATING THE IMPACTS OF DISASTERS: POLICY DIRECTIONS

ENHANCING **URBAN SAFETY AND SECURITY**  
GLOBAL REPORT ON HUMAN SETTLEMENTS 2007

ABRIDGED EDITION

VOLUME 3

# ENHANCING URBAN SAFETY AND SECURITY

GLOBAL REPORT ON HUMAN  
SETTLEMENTS 2007

Abridged Edition  
Volume 3

## Mitigating the Impacts of Disasters: Policy Directions

United Nations Human Settlements Programme



**UN-HABITAT**



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This publication is the third of three volumes of the Abridged Edition of *Enhancing Urban Safety and Security: Global Report on Human Settlements 2007*, viz:

- 1 *Reducing Urban Crime and Violence: Policy Directions*
- 2 *Enhancing Security of Tenure: Policy Directions*
- 3 *Mitigating the Impacts of Disasters: Policy Directions*

An electronic version of this publication and of the full *Enhancing Urban Safety and Security: Global Report on Human Settlements 2007* is available from <http://www.unhabitat.org/grhs/2007>

The list of selected references at the end of this volume contains only a few important publications on the sub-theme of disasters, as well as sources of quotations, boxes, tables and figures included in this volume. A complete list of references may be found in the full *Enhancing Urban Safety and Security: Global Report on Human Settlements 2007*.

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United Nations Human Settlements Programme (UN-Habitat)  
PO Box 30030, GPO Nairobi 00100, Kenya  
Tel: +254 20 762 3120  
Fax: +254 20 762 3477/4266/4267  
Web: [www.unhabitat.org](http://www.unhabitat.org)

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# CONTENTS

Introduction	iv
Key Findings and Messages	vi
Acknowledgements	ix
1 Understanding Urban Safety and Security	1
2 Disaster Risk: Conditions, Trends and Impacts	7
3 Policy Responses to Disaster Risk	17
4 Small-Scale Hazards: The Case of Road Traffic Accidents	28
5 Mitigating the Impacts of Disasters	35
Selected References	44

# INTRODUCTION

*Enhancing Urban Safety and Security: Global Report on Human Settlements 2007* (Global Report 2007) addresses three threats to the safety and security of towns and cities, viz: crime and violence; security of tenure and forced evictions; and natural and human-made disasters. This publication, which focuses on natural and human-made disasters, is the third of three volumes of the Abridged Edition of the Global Report 2007. The main purpose of this volume is to present, in summary form, the main findings of the Global Report 2007 on natural and human-made disasters and, on the basis of this, to suggest policy directions for mitigating the impacts of natural and human-made disasters on urban settlements.

Over the last three decades, natural and human-made disasters have claimed millions of lives and caused huge economic losses globally. Cities, where half of humanity currently resides and much of the world's assets are concentrated, are fast becoming the locus for much of this destruction and loss from disasters. Rapid urbanization, coupled with global environmental change, is turning an increasing number of human settlements into potential hotspots for disaster risk. The 2005 South Asian earthquake, in which 18,000 children died when their schools collapsed, and the Indian Ocean Tsunami in 2004 that wiped out many coastal settlements in Sri Lanka, India and Indonesia, illustrate the risk that has accumulated in towns and cities and that is released when disaster strikes.

This report examines the consequences of natural and human-made disasters for safety and security in cities, and the policy options for preventing and reducing damage caused by these events. Disasters are defined as those events where human capacity to withstand and cope with a natural or human-made hazard is overwhelmed. Most of the report focuses on large disasters that register direct impacts at the community level and above. However, the impacts of small-scale hazards, where direct impacts are limited to the individual or household levels, are illustrated through an examination of traffic accidents that result in over 1 million deaths worldwide each year, more than any large natural or human-made disaster type.

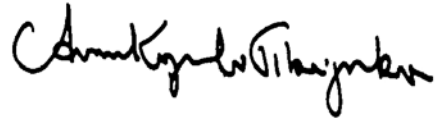
Cities are particularly vulnerable to the effects of natural and human-made disasters due to a complex set of inter-related processes, including a concentration of assets, wealth and people; the location and rapid growth of major urban centres in coastal areas; the often unwise modification of the urban built and natural environment through human actions; the expansion of residential areas for the poor into hazard-prone locations; and the failure of urban authorities to regulate building standards and implement effective land-use planning strategies. As cities grow, disaster risk often increases through the rising complexity and interdependence of urban infrastructure and services, greater population density and concentration of resources.

Yet, urban growth need not necessarily result in increased disaster risk. Indeed, disasters are not pure natural events or 'acts of God', but, rather, products of inappropriate and failed development. Thus, this report takes a risk reduction approach that calls for both small and large-scale disasters to be seen as problems of development, requiring not only investments in response and reconstruction, but also changes in development paths to reduce or minimize the occurrence and impacts of disasters *ex-ante*.

The multiple aspects of risk in urban areas associated with natural and human-made disasters are examined in the report. Accordingly, Chapter 1 presents a conceptual framework for understanding urban safety and security in general. Subsequently, Chapter 2 provides an overview of global trends in the incidence and impacts of natural and human-made disasters as well as those urban processes that contribute to the generation of risk. Building on this, Chapter 3 reviews existing policy approaches for reducing disaster risk and incorporating risk reduction within urban planning and management as well as within disaster response and reconstruction. Chapter 4 examines the trends — including policy trends — and impacts of road traffic accidents as an example of hazards threatening the safety and security of urban dwellers

on a day-to-day basis. Finally, Chapter 5 identifies future policy directions in disaster risk reduction at the city, national, regional and international levels. These include: improved risk mapping, disaster risk reduction legislation, strengthening of early warning systems, effective land-use planning, design of disaster resistant buildings and infrastructure, effective communication and emergency response systems, as well as strengthening of reconstruction capacity.

It is my hope that policy makers at central and local government levels, civil society organizations and all those involved in the formulation of policies and strategies for mitigating the impacts of natural and human-made disasters will find this publication useful.



**Anna Kajumulo Tibaijuka**

*Under-Secretary-General and Executive Director*

United Nations Human Settlements Programme (UN-Habitat)

# KEY FINDINGS AND MESSAGES

## KEY FINDINGS

Between 1974 and 2003, 6367 natural disasters occurred globally, causing the death of 2 million people and affecting 5.1 billion people. A total of 182 million people were made homeless, while reported economic damage amounted to US\$1.38 trillion. Since 1975, the number of natural disasters recorded globally has increased dramatically (fourfold), especially in Africa. An even higher tenfold increase in the incidence of human-made disasters has been observed between 1976 and 2000. Between 2000 and 2005, average mortality from human-made disasters was lower (30 per event) than deaths caused by natural disasters (225 per event). A total of 98 per cent of the 211 million people affected by natural disasters annually from 1991 to 2000 were in developing countries.

The catastrophic impact of disasters on individuals has been illustrated in recent years by the toll of death (220,000 people) and homelessness (1.5 million) from the Indian Ocean Tsunami of December 2004 and the Pakistan earthquake of October 2005, which killed 86,000 people and left millions homeless. Moreover, losses during disaster and reconstruction deepen existing socio-economic inequalities, thus creating vicious cycles of loss and vulnerability. Especially in poorer countries, women and children tend to be the most affected by disasters, as observed in the aftermath of the 2004 Indian Ocean Tsunami. The elderly and those with disabilities are often among the most vulnerable to natural and human-made hazards.

Economic losses associated with disasters have increased 14-fold since the 1950s and, during the last decade alone, disasters caused damage worth US\$67 billion per year, on average. Wealthier countries incur higher economic costs due to disasters, while poorer countries face greater loss of human life. By destroying critical urban infrastructure, disasters can set back development gains and undermine progress in meeting the Millennium Development Goals (MDGs). Cities connected to regional or global financial systems have the potential

to spread the negative consequences of disaster across the global economy, with huge systemic loss effects.

Large and megacities magnify risk since they concentrate human, physical and financial capital and are frequently also cultural and political centres. The potential for feedback between natural and human-made hazards in large cities presents a scenario for disaster on an unprecedented scale. Large urban economies that have sizeable foreign currency reserves, high proportions of insured assets, comprehensive social services and diversified production are more likely to absorb and spread the economic burden of disaster impacts. Smaller cities (less than 500,000 residents) that are home to over half of the world's urban population are also exposed to multiple risks, but often have less resilience to the economic consequences of disasters.

There has been a 50 per cent rise in extreme weather events associated with climate change from the 1950s to the 1990s, and the location of major urban centres in coastal areas exposed to hydro-meteorological hazards is a significant risk factor: 21 of the 33 cities which are projected to have a population of 8 million or more by 2015 are located in vulnerable coastal zones and are increasingly vulnerable to sea-level rise. Around 40 per cent of the world's population lives less than 100 kilometres from the coast within reach of severe coastal storms. In effect, close to 100 million people around the world live less than 1 metre above sea level. Thus, if sea levels rise by just 1 metre, many coastal megacities with populations of more than 10 million, such as Rio de Janeiro, New York, Mumbai, Dhaka, Tokyo, Lagos and Cairo, will be under threat.

Additional factors rendering cities particularly vulnerable include rapid and chaotic urbanization; the concentration of economic wealth in cities; environmental modifications through human actions; the expansion of slums (often into hazardous locations); and the failure of urban authorities to enforce building codes and land-use planning. The urban landscape, which is characterized by



close proximity of residential, commercial and industrial land uses, generates new cocktails of hazard that require multirisk management. The rapid supply of housing to meet rising demand without compliance with safe building codes is a principal cause of disaster loss in urban areas. Lack of resources and human skills — compounded by institutional cultures that allow corruption — distort regulation and enforcement of building codes.

Small-scale hazards, while less dramatic than major hazards, have serious aggregate impacts. This is illustrated by the incidence and impacts of road traffic accidents, which result in more deaths worldwide each year than any large natural or human-made disaster type. Traffic accidents cause extensive loss of human lives and livelihoods in urban areas, killing over 1 million people globally every year. At least 90 per cent of the deaths from traffic accidents occur in low and middle-income countries. Young males and unprotected road users are particularly vulnerable to injury or death from traffic accidents. Traffic accidents cause substantial economic costs, amounting to an estimated US\$18 billion worldwide every year. If no action is taken, traffic injuries are expected to become the third major cause of disease and injury in the world by 2020.

## KEY MESSAGES

Land-use planning is a particularly effective instrument that city authorities can employ to reduce disaster risk by regulating the expansion of human settlements and infrastructure. Evidence-based land-use planning at the city level requires accurate and up-to-date data. Technological innovation can help to fill part of this gap; but the global proliferation of slums also calls for more innovative and participatory land use planning procedures.

The design of disaster-resistant buildings and infrastructure can save many lives and assets in urban areas from natural and human-made disasters. The technological and engineering expertise to achieve this is available; but implementation is a major challenge. Interdisciplinary and inter-sectoral training, research and partnerships, especially with the private sector, can enhance implementation capacity at the city level. Interaction between different practitioners is essential to avoid professional separation and to foster the integration of risk reduction within urban development and planning efforts. Governance systems that facilitate local participation and

decentralized leadership are more effective, especially in the context of rapid and uncontrolled urbanization where capacities for oversight and enforcement are limited.

Governments need to improve risk, hazard and vulnerability assessment and monitoring capacity through increased investment, with support from the international community, where necessary. In addition to informing policy formulation, assessment data should feed into national initiatives that aim to build a culture of awareness and safety through public education and information programmes. Furthermore, risk knowledge should be communicated to relevant actors through effective early warning systems in order to enable timely and adequate responses to disasters.

It is especially important that disaster risk reduction is mainstreamed within national development and poverty reduction policies and planning. Examples of disaster risk reduction strategies that have been designed purposely to contribute to meeting individual MDG targets are available. National initiatives should move from managing risk through emergency relief and response towards a more proactive pre-disaster orientation.

Greater partnership between humanitarian and development actors is required during reconstruction in order to reconcile demands for rapid provision of basic services against the more time-consuming aim of ‘building back better’. Clear legislative and budgetary frameworks should also be in place to avoid uncoordinated and fragmented reconstruction activities by city governments, local actors, donors and humanitarian agencies.

Drawing on existing international frameworks for disaster risk reduction (e.g. the Hyogo Framework for Action, 2005–2015), national governments should continue putting in place disaster risk reduction legislation and policy; strengthening early warning systems; incorporating disaster risk education within national education curricula; and instituting inclusive and participatory governance and planning in order to strengthen the resilience of cities and communities.

International frameworks are important in focusing the attention of multilateral and bilateral donors, as well as international civil society actors, towards disaster risk reduction. They can also facilitate advocacy and guide the development of disaster risk reduction strategies at national and city levels, including through internationally coordinated early warning systems for hazards such as cyclones and tsunamis.



Furthermore, many governments — especially in developing countries — require assistance from the international community in the form of finance, data and information, and technical expertise to establish or

improve their disaster risk reduction systems. International assistance for disaster risk reduction should not focus on recovery and reconstruction efforts alone, but also on longer-term development objectives.

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## **Management Team: Global Report on Human Settlements Series**

Executive Director: Anna K. Tibaijuka  
Coordinating Director: Oyebanji O. Oyeyinka  
Chief Editor: Naison D. Mutizwa-Mangiza

## **Principal Authors**

Michael Cohen (external consultant);  
Naison D. Mutizwa-Mangiza; Mark Pelling (external consultant); Edlam Abera Yemeru

## **Substantive Support Team**

Benedict C. Arimah; Inge Jensen; Iouri Moisseev (external consultant)

## **Technical Support Team**

Nelly Kan'gethe; Philip Mukungu; Pamela Murage;  
Naomi Mutiso-Kyalo

## **UN-Habitat Advisers: Global Report on Human Settlements 2007**

Subramonia Ananthakrishnan; Cecilia Andersson;  
Juma Assiagio; Clarissa Augustinus; Nefise Bazoglu;  
Daniel Biau; Selman Erguden; Szilard Fricska; Sarah Gitau;  
Lucia Kiwala; Carmella Lanza; Dan Lewis; Erica Lind;  
Gora Mboup; Jan Meeuwissen; Frederico Neto;  
Toshiyasu Noda; Laura Petrella; Rasmus Precht;  
Lars Reutersward; Mariko Sato; Farouk Tebbal;  
Ulrik Westman; Brian Williams

## **International Advisers: Global Report on Human Settlements 2007**

Marisa Carmona; Nowarat Coowanitwong; Suocheng Dong;  
Alain Durand-Lasserve; Josef Hegedus; Paula Jiron;  
Vinay D. Lall; Jose Luis Lezama de la Torre;  
Om Prahash Mathur; Winnie Mitullah; Peter Newman;  
Peter Ngau; Tumsifu Jonas Nnkya; Carole Rakodi;  
Gustavo Riofrio; Mona Serageldin; Dina K. Sheyaheb;  
Richard Stren; Luidmilla Ya Tkachenko; Willem K. Van Vliet;  
Vladimer Vardosanidze; Patrick Wakely; Mustapha Zubairu

## **Publishing Team (Earthscan Ltd)**

Jonathan Sinclair Wilson; Hamish Ironside; Alison Kuznets;  
Andrea Service



## CHAPTER

# 1

# UNDERSTANDING URBAN SAFETY AND SECURITY

The theme of ‘urban safety and security’ encompasses a wide range of concerns and issues. These range from basic needs, such as food, health and shelter, through protection from crime and the impacts of technological and natural hazards, to collective security needs, such as protection from urban terrorism. However, only a few of these concerns and issues have been, and can be, addressed from a human settlements perspective, mainly through appropriate urban policies, planning, design and governance. For this reason, the Global Report on Human Settlements 2007 focuses on only three major threats to the safety and security of cities in respect of which the human settlements perspective has in recent years increasingly contributed useful solutions: crime and violence; insecurity of tenure and forced evictions; and natural and human-made disasters (which is the focus of this third of the three-volume abridged edition of the Global Report). These threats either stem from, or are often exacerbated by, the process of urban growth and from the interaction of social, economic and institutional behaviours within cities, as well as with natural environmental processes.

This chapter briefly presents a conceptual framework for understanding urban safety and security issues based on two concepts: at a more general level, the concept of *human security*, and at a more specific level, the concept of *vulnerability*.

Before turning to these conceptual issues, it is important to emphasize that the urban poor are dispropor-



**Urban crime is often seen as a police matter, but more can be done by others**

© Ace Stock Limited / Alamy

tionately victimized by the three threats to safety and security examined in the Global Report on Human Settlements 2007: crime and violence, insecurity of tenure, and natural and human-made disasters. This is against a background of rapid urbanization and the conse-

quent urbanization of poverty. The world's population has recently become more than half urban, with projected urban growth in developing countries in the order of 1.2 billion people between 2000 and 2020. This growth increases the pressure on the urban poor to earn incomes and to secure adequate shelter, basic infrastructure and essential social services, such as healthcare and education. Existing backlogs of services — as reflected in the 1 billion people already living in slums — are strong indicators of the weak capacity of both public and private institutions to provide such services.

Threats to urban safety and security, including crime and violence, must therefore be placed within a context of both opportunity and risk. The medieval saying that 'city air makes men free' can be complemented with the observation that urban life offers the prospect of greater economic welfare as well. This observation, however, must be tempered by the reality of growing numbers of urban residents living in poverty, lacking basic infrastructure and services, housing and employment, and living in conditions lacking safety and security.

This distribution of risk and vulnerability is an important and growing component of daily urban life. It is part of what has been referred to as the 'geography of risk and vulnerability' and is often linked to the presence of millions of urban residents in slums, which are environments in which much crime and violence occur, where tenure is least secure, and which are prone to disasters of many kinds.

## A HUMAN SECURITY PERSPECTIVE TO URBAN SAFETY AND SECURITY

Urban safety and security should be placed within the wider concern for human security, which has been increasingly recognized by the international community in recent years. This concern specifically focuses on the security of people, not states. The concept of human security was addressed in detail by the United Nations Commission on Human Security, co-chaired by former United Nations High Commissioner for Refugees (UNHCR) Sadako Ogata and Nobel Laureate and economist Amartya Sen. This commission issued its report in 2003 and addressed a wide range of dimensions of human security, including:



**Homelessness is one of the most serious outcomes of tenure insecurity**

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*... conflict and poverty, protecting people during violent conflict and post-conflict situations, defending people who are forced to move, overcoming economic insecurities, guaranteeing the availability and affordability of essential health care, and ensuring the elimination of illiteracy and educational deprivation and of schools that promote intolerance.*

This obviously broad coverage includes several important distinguishing features that are relevant to urban safety and security:

- Human security focuses on people and not states because the historical assumption that states would monopolize the rights and means to protect its citizens has been outdated by the more complex reality that states often fail to fulfil their obligations to provide security.
- The focus on people also places more emphasis on the role of the human rights of individuals in meeting these diverse security needs. There is thus a shift from the rights of states to the rights of individuals.
- Recognizing and enhancing the rights of individuals is a critical part of expanding the roles and responsibilities for security beyond simply the state itself.
- People-centred solutions must be identified and supported to address the range of menaces and risks that they encounter.

- Human security, therefore, goes beyond the security of borders to the lives of people and communities inside and across those borders.

The human security approach builds upon earlier United Nations ideas on basic needs, as discussed in the Copenhagen Declaration, adopted at the 2005 World Summit on Social Development, which noted that:

*... efforts should include the elimination of hunger and malnutrition; the provision of food security, education, employment and livelihood, primary health-care services, including reproductive health care, safe drinking water and sanitation, and adequate shelter; and participation in social and cultural life (Commitment 2.b).*

Another international legal framework that has served to enhance the human security approach is the International Covenant on Economic, Social and Cultural Rights (ICESCR), which highlights the need to:

*... recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food, clothing and housing, and to the continuous improvement of living conditions (Article 11.2).*

Article 2.1 of ICESCR deals with the progressive realization of these rights, and implies that governments are legally obliged, under international law, to take steps to improve living conditions.

From the perspective of human security, it is clear that threats to urban safety and security are associated with different types of human vulnerability. These can be divided into three broad categories: chronic vulnerabilities, which arise from basic needs, including food, shelter and health; contextual vulnerabilities, arising from the socio-economic and political processes and contexts of human life; and vulnerabilities arising from extreme events, such as natural and human-made hazards. Partly because of its human rights basis and its emphasis on basic needs, the human security perspective is increasingly influencing the work of United Nations agencies, including UN-Habitat (see Box 1).

#### **Box 1 Enhancing urban safety and human security in Asia through the United Nations Trust Fund for Human Security**

In March 1999, the Government of Japan and the United Nations Secretariat launched the United Nations Trust Fund for Human Security (UNTFHS), from which the Commission on Human Security prepared the Human Security Now report in 2003, as a contribution to the UN Secretary-General's plea for progress on the goals of 'freedom from want' and 'freedom from fear'. The main objective of the UNTFHS is to advance the operational impact of the human security concept, particularly in countries and regions where the insecurities of people are most manifest and critical, such as in areas affected by natural and human-made disasters.

Growing inequalities between the rich and the poor, as well as social, economic and political exclusion of large sectors of society, make the security paradigm increasingly complex. Human security has broadened to include such conditions as freedom from poverty, access to work, education and health. This, in turn, has necessitated a change in perspective, from state-centred security to people-centred security. To ensure human security as well as state security, particularly in conflict and post-conflict areas where institutions are often fragile and unstable, rebuilding communities becomes an absolute priority to promote peace and reconciliation.

With the rapid urbanization of the world's population, human security as protecting 'the vital core of all human lives in ways that enhance human freedoms and human fulfilment' increasingly means providing the conditions of livelihood and dignity in urban areas. Living conditions are crucial for human security, since an inadequate dwelling, insecurity of tenure and insufficient access to basic services all have a strong negative impact on the lives of the urban population, particularly the urban poor. Spatial discrimination and social exclusion limit or undermine the rights to the city and to citizenship.

In this context, UN-Habitat is coordinating three UNTFHS programmes in Afghanistan, Northeast Sri Lanka and Phnom Penh, the capital city of Cambodia, all focusing on informal settlements upgrading. On the assumption that community empowerment is crucial for the reconstruction of war affected societies, all programmes have adopted the 'community action planning' method — a community-based consultative planning process — and have established community development councils as the most effective approach to improving living conditions and human security in informal settlements.

Source: Balbo and Guadagnoli, 2007



## VULNERABILITY, RISK AND RESILIENCE

Vulnerability, as an analytical framework, has during recent years been increasingly used in a number of disciplines, including economics (especially in the study of poverty, sustainable livelihoods and food security), sociology and social anthropology, disaster management, environmental science, and health and nutrition. In these disciplines, vulnerability is often reduced to three fundamental ‘risk chain’ elements — namely, *risk*, *response* and *outcome*, while the last two elements, in particular, are determined by the extent of *resilience* at various levels (i.e. individual, household, community, city and national levels).

Vulnerability may be defined as the probability of an individual, a household or a community falling below a minimum level of welfare (e.g. poverty line), or the probability of suffering physical and socio-economic consequences (such as homelessness or physical injury) as a result of risky events and processes (such as forced eviction, crime or flood) and their inability to effectively cope with such risky events and processes.

Distinctions can be made between physical vulnerability (vulnerability in the built environment) and social vulnerability (vulnerability experienced by people and their social, economic and political systems). Together, these constitute human vulnerability.

*Risk* refers to a known or unknown probability of distribution of events — for example, natural hazards such as floods or earthquakes. The extent to which risks affect vulnerability is dependent upon their size and spread (magnitude), as well as their frequency and duration.

*Risk response* refers to the ways in which individuals, households, communities and cities respond to, or

manage, risk. Risk management may be in the form of *ex ante* or *ex post* actions — that is, preventive action taken *before* the risky event, and action taken to deal with experienced losses *after* the risky event, respectively. *Ex ante* actions taken in advance in order to mitigate the undesirable consequences of risky events may include purchase of personal or home insurance to provide compensation in case of theft, injury or damage to property; building strong social networks able to cope with risky events or hazards; and effective land-use planning and design of buildings and infrastructure able to withstand natural hazards such as floods, tropical storms and earthquakes. *Ex post* actions may include evacuating people from affected areas; selling household assets in order to deal with sudden loss of income; providing public-sector safety nets, such as food-for-work programmes; or reconstructing damaged buildings and infrastructure.

From the point of view of policy making, the challenge with respect to risk response is to find ways of addressing the constraints faced by individuals, households, communities and cities in managing risk. These constraints may be related to poor information, lack of finance or assets, inability to assess risk, ineffective public institutions and poor social networks. All of these constraints are among the determinants of *resilience*.

*Resilience* has been defined as the capacity of an individual, household or community to adjust to threats, to avoid or mitigate harm, as well as to recover from risky events or shocks. Resilience is partly dependent upon the effectiveness of risk response, as well as the capability to respond in the future. Pathways towards greater resilience have to address issues of institutional effectiveness, application of international human rights law and involvement of civil society.

*Outcome* is the actual loss, or damage, experienced by individuals, households and communities due to the occurrence of a risky event or risky process — for example, physical injury, death and loss of assets resulting from crime and violence; falling below a given poverty line and loss of income as a result of forced eviction from informal housing or from premises in which informal enterprises are based; as well as damage to buildings and infrastructure resulting from natural or human-made hazards. The outcome of a risky event is determined by both the nature of the risk as well as the degree of effectiveness of the response of individuals, households, communities and cities to risky events.



**Flooding due to heavy rain is a major concern in many cities**

One of the most important socio-economic determinants of vulnerability is poverty. It has even been suggested that, because of their close correspondence, poverty should be used as an indicator of vulnerability. As pointed out earlier, the urban poor are generally more exposed to risky events (such as crime, forced eviction or disasters) than the rich, partly because of their geographical location. With respect to disasters, the urban poor are more vulnerable than the rich because they are often located on sites prone to floods, landslides and pollution. The urban poor also have relatively limited access to assets, thus limiting their ability to respond to risky events or to manage risk (e.g. through insurance). Because the poor are politically powerless, it is unlikely that they will receive the necessary social services following disasters or other risky events. In addition, the urban poor are more vulnerable to the undesirable outcomes of risky events because they are already closer to or below the threshold levels of these outcomes, for example income poverty or tenure insecurity.

Another very important determinant of vulnerability is the capacity of institutions. This influences the *response* and *outcome* elements in the *risk chain* discussed above — in terms of effectiveness and severity, respectively. For the purposes of the conceptual framework currently under discussion, the term *institution* refers to any structured pattern of behaviour, including informal institutions or

behaviours, which communities and households may use to maintain their equilibrium in the face of dynamic conditions such as crime and violence, forced evictions, or disasters.

Vulnerability may be used as a general framework for conceptualizing and analysing the causal relationships between risk, responses and outcomes of risky events and processes, as in much of the work on sustainable livelihoods and also as used in this report. It is a useful framework for understanding the nature of risk and risky events, the impacts or outcomes of risky events, as well as responses to risky events at various levels, including the household, community, city and national levels.

Within the context of this report, risk refers to both risky events (such as natural and human-made hazards), as well as risky socio-economic processes (such as crime, violence and the kind of social exclusion that leads to tenure insecurity and forced eviction). Outcomes of risky events and processes are the undesirable consequences of crime and violence (such as loss of assets, injury and death), of tenure insecurity and forced eviction (such as homelessness and loss of livelihoods), as well as of natural and human-made disasters (such as injury, death and damage to property and infrastructure).

Table 1 is a schematic representation of how the concept of vulnerability is used in this report as an analytical framework.

Threat to urban safety and security	Risk	Response	Outcome
Crime and violence	Specific risky events are the various types of crime and violence, such as burglary, assault, rape, homicide and terrorist attacks.	Responses may include more effective criminal justice systems, improved surveillance, community policing, better design of public/open spaces and transport systems, improved employment for youth, development of gated communities, and provision of private security services.	Key outcomes include loss of assets, injury, death, damage to property, emotional/psychological suffering or stress, fear, and reduced urban investment.
Tenure insecurity and forced eviction	Specific risky event is forced eviction, while risky socio-economic processes and factors include poverty, social exclusion, discriminatory inheritance laws, ineffective land policies, as well as lack of planning and protection of human rights.	Examples of risk responses at the individual and household levels include informal savings and social networks, and political organization to resist forced eviction and to advocate for protection of human rights. At the institutional level, responses include more effective land policies and urban planning, as well as housing rights legislation.	Outcomes include homelessness, loss of assets, loss of income and sources of livelihood. May also include physical injury or death if eviction process is violent.
Natural and human-made/technological disasters	Specific risky events (or hazards) include floods, earthquakes, hurricanes, volcanic eruptions, technological disasters and war.	Examples of major responses include <i>ex ante</i> measures such as more effective spatial design of cities and the design of individual buildings, as well as home insurance; and <i>ex post</i> measures such as emergency response systems, reconstruction of buildings and infrastructure, as well as rehabilitation of institutions in war-torn countries.	Key outcomes may include physical injury, loss of income and assets, damage to buildings and infrastructure, as well as emotional/psychological stress.

Table 1

### Vulnerability as a conceptual framework: Risk, response and outcome

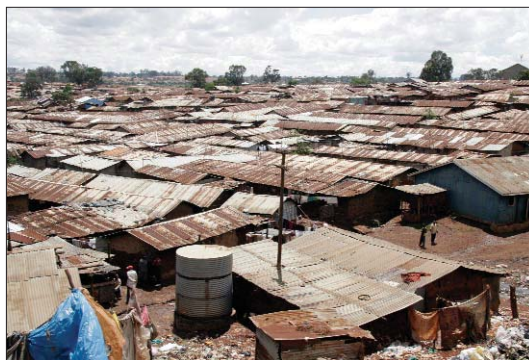
## THE ROLE OF URBAN POLICY, PLANNING, DESIGN AND GOVERNANCE IN ENHANCING URBAN SAFETY AND SECURITY

From the perspective of each of the three broad threats to urban safety and security addressed in the Global Report on Human Settlements 2007, there is an evident need to improve preparedness, to reduce risks and vulnerabilities, to increase the capacity for response through improved resilience, and to take advantage of the opportunities for positive urban reform and social change during the process of recovery. It should be asked, however: what is the role of the human settlements perspective (i.e. urban policy, planning, design and governance) in guiding these steps towards positive change?

Urban policy is understood as all those explicit decisions intended to shape the physical, spatial, economic, social, political, cultural, environmental and institutional form of cities. In terms of improving urban safety and security, urban policy is translated into urban planning, design, programmes and operating procedures and measures that can directly affect both the physical environment and social behaviour.

Planning is the assembly and analysis of information, the formulation of objectives and goals, the development of specific interventions, including those intended to improve urban safety and security, and the organizational processes needed to bring them to fruition. Planning takes the decisions of urban policy makers and transforms them into strategy and measures for action.

Urban design involves the design of buildings, groups of buildings, spaces and landscapes in towns and cities, in order to create a sustainable, safe and aesthetically pleasing built environment. It is limited to the detailed physical structure and arrangement of buildings and other types of physical development within space. This



**Levels of security and safety are lowest in slums and effective planning is desperately needed**

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includes the use of building codes, for example to mandate earthquake-proof or flood-proof buildings. It may also entail the design of transport systems in ways that improve safety for women, or of streets in relation to buildings in order to minimize crime opportunities through improved visibility. Urban design is narrower than urban planning, and is often seen as part of the latter.

Both the processes of urban policy, as broadly defined, and planning are integral parts of the governance process. Governance is more than government, whether in the form of institutions or of public authorities: it is an all-encompassing process by which official and non-official actors contribute to management of conflict, establishment of norms, the protection of the common interest, and the pursuit of the common welfare. The participation of communities in crime prevention or in emergency response to natural hazards is among the most important urban governance issues identified in this report.

A significant contribution of this Global Report is its identification of the means or approaches, with many examples, through which urban policy, planning, design and governance are increasingly contributing towards the enhancement of urban safety and security, including in the area of disaster risk reduction.

# DISASTER RISK: CONDITIONS, TRENDS AND IMPACTS

This chapter provides an overview of global trends in the incidence and impacts of natural and human-made disasters. It reviews factors generating urban disaster risk as well as the multiple impacts of disasters worldwide and across cities. While it is clear that cities are particularly vulnerable to the effects of natural and human-made disasters, inequalities in the distribution of urban disaster risk and loss are evident at the global, national and city levels.

## DISASTER RISK: CONDITIONS, TRENDS AND IMPACTS

Disasters in urban areas are experienced when life support systems fail in the face of pressure from hazards, resulting in loss of life, damage to property and the undermining of livelihoods. As noted earlier, they are not natural events or 'acts of God', but products of failed development. For the majority of people at risk, loss to disaster is determined more by processes and experiences of urban development and governance than by the physical processes that shape natural or human-made hazards.

A disaster is understood here to be the outcome of a vulnerable individual or society exposed to human-made or natural hazards. In this context, natural hazards include earthquakes, hurricanes, tsunamis, tornadoes, landslides, floods, volcanic eruptions and windstorms, while human-

made hazards encompass industrial explosions and chemical releases. However, the conceptual distinction between disasters associated with natural and human-made hazards is increasingly becoming blurred, as many human actions and practices exacerbate natural hazards.

## THE SCALE OF DISASTERS

Most cities experience both large and small disasters, but the latter are seldom systematically recorded and are often ignored, even by the local news media. As such, there is no agreed-upon definition, such as the scale of human or economic loss, for what makes a disaster small or large. In practice, the scale ascribed to a disaster is context dependent. Human vulnerability also plays a large role in determining the scale of disaster. Small disasters can be turned into large disasters where high vulnerability means many people are at risk, emergency response is inadequate and critical infrastructure is fragile.

Both small and large disasters can reduce the resilience of people or households to subsequent shocks and stresses. Recurrent small disasters can pave the way for large disasters by progressively lowering society's thresholds of resilience. In turn, large disasters may undermine the capacity of individuals or emergency services to resist even everyday hazards, potentially making small disasters more frequent.

Everyday hazards may be hard to avoid for those at risk and, indeed, become an intrinsic part of livelihood and

survival strategies, thus mistakenly being accepted as an expected part of life. Strategies for dealing with risk and loss from large disasters often focus on emergency response and reconstruction — not in addressing underlying failures in development that lead to human vulnerability. It is argued here that small and large disasters need to be seen as problems of development, requiring changes in development paths as well as in disaster response and reconstruction.

## URBANIZATION AND DISASTER RISK

In the new urban millennium, natural and human-made disasters are likely to have their greatest impact in cities where half of humanity is expected to reside. The last decade has seen an unprecedented number of disasters unfold worldwide, causing extensive damage both in terms of mortality and economic losses. At the same time, the world is becoming predominantly urban, with the total urban population expected to reach 5 billion by 2030,

while rural populations will begin to contract from 2015 onwards. Although no simple causal link between urban growth and reported worldwide disaster occurrence can be made, it is clear that the number of recorded disasters is increasing as the number of people living in cities increases (see Figure 1).

Disaster loss is especially high in cities due to the concentration of economic assets, cultural heritage, infrastructure, services and basic life-support systems, industries and other potentially hazardous establishments therein. The location of major urban centres in coastal areas exposed to hydro-meteorological hazards and in geologically active zones is an additional risk factor.

Within cities, the growing numbers of the urban poor, especially the 1 billion slum dwellers worldwide who reside in hazardous locations, are perhaps most vulnerable to the impacts of disasters. An account of the urban costs of flooding in Mozambique illustrates the complexity of factors exacerbating urban disaster risks, including urban poverty and exclusion (see Box 2).

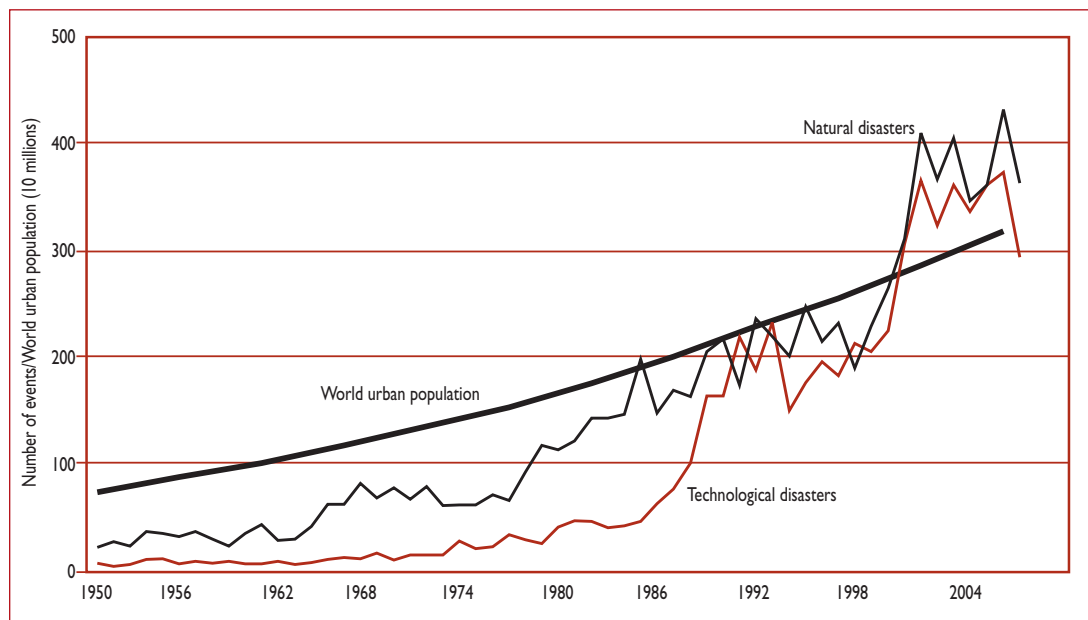


Figure 1

### Recorded disaster events and world urban population (1950–2004)

Data Sources: EM-DAT, CRED database, University of Louvain; United Nations, 2005

## INCIDENCE OF NATURAL AND HUMAN-MADE DISASTERS

Since 1975, there has been a fourfold increase in the number of recorded natural disasters globally. Each of the three years with the highest number of recorded disasters has been during the current decade. The rate of increase in natural disaster events has been highest for Africa, where a threefold increase has been experienced in the last decade alone. Human-made disasters increased tenfold from 1975 to 2006, with the greatest rate of increase being in Asia and Africa.

### Natural disasters

Worldwide, loss to hydrological hazard (floods, landslides and hurricanes) is most widespread, affecting human settlements in China, Southeast Asia and Central America, and in a band from Eastern Europe through Central and Eastern Asia. Loss to geological hazard (earthquakes and volcanic eruptions) is most concentrated in Central Asia and the Mediterranean and Pacific Rim states (e.g. Japan, the United States of America and Central America). The Americas show variable loss, with low levels of loss in North America.

Loss from natural disaster is, however, distributed differently across world regions, depending upon what is considered to be at risk. In terms of absolute mortality and

economic loss as a proportion of gross domestic product (GDP), regions dominated by low- and middle-income countries such as sub-Saharan Africa and Southeast Asia record high losses. High-income regions such as North America and Europe lose the highest value of economic assets in natural disasters.

### Human-made disasters

Human-made disasters typically cause less direct loss of life than natural disasters. Between 2000 and 2005, the mean number of deaths worldwide per incident was found to be 30 and 225 for human-made and natural disasters respectively. However, the impact of human-made disasters can be felt in the ecosystem and in human health many years after an event, and this loss is seldom recorded in official statistics. An example is the 1984 Bhopal industrial disaster in Madhya Pradesh (India) whose effects are still being felt today.

Between 1997 and 2006, most human-made disasters and the highest numbers of people killed were found in Asia and Africa. During this period, these two regions also had high death rates per event while the Americas and Europe recorded the lowest mean number of deaths per event. Europe was most affected by economic loss, which at over US\$10 billion was greater than the economic loss suffered by any other world region. High levels of capital investment in Europe result in high economic loss from disasters but mortality in the region remains low.

#### Box 2 The urban impacts of Mozambique's great flood

In February 2000, floods in Mozambique killed at least 700 people, displaced 650,000 and affected 4.5 million. Arguably, it was Mozambique's small but growing urban populations who were hardest hit, with more than 70 per cent of all flood-related deaths occurring in urban areas.

The urban poor within Maputo, Matola, Xai-Xai and Chokwe suffered the most from the 2000 flood. In urban areas of Mozambique, exorbitant pricing and highly politicized land distribution force many poor residents to live in informal settlements and unregulated slums, known as *barrios*, located in undesirable and hazardous sites such as in ravines, slopes susceptible to landslides and low-lying areas prone to flooding. In addition, the majority of *barrios* are constructed with locally accessible materials that collapse easily beneath torrential rains and get washed away in flooding. The lack of drainage infrastructure in Maputo has also meant that seasonal one-day rain events can result in flooding that lasts for days, and rain over the course of several days can cause flooding that will not subside for a month.

Evaluations following the 2000 flood revealed that within the urban areas affected, flooding and rains had damaged the physical infrastructure and production capabilities of over 1000 shops and wholesalers. The flood also caused extensive damage to major industries, including those in Maputo, the hub of Mozambique's industrial production.





**Flooding is one of the most frequent natural disasters affecting cities in developing countries**

© TopFoto / Dinodia

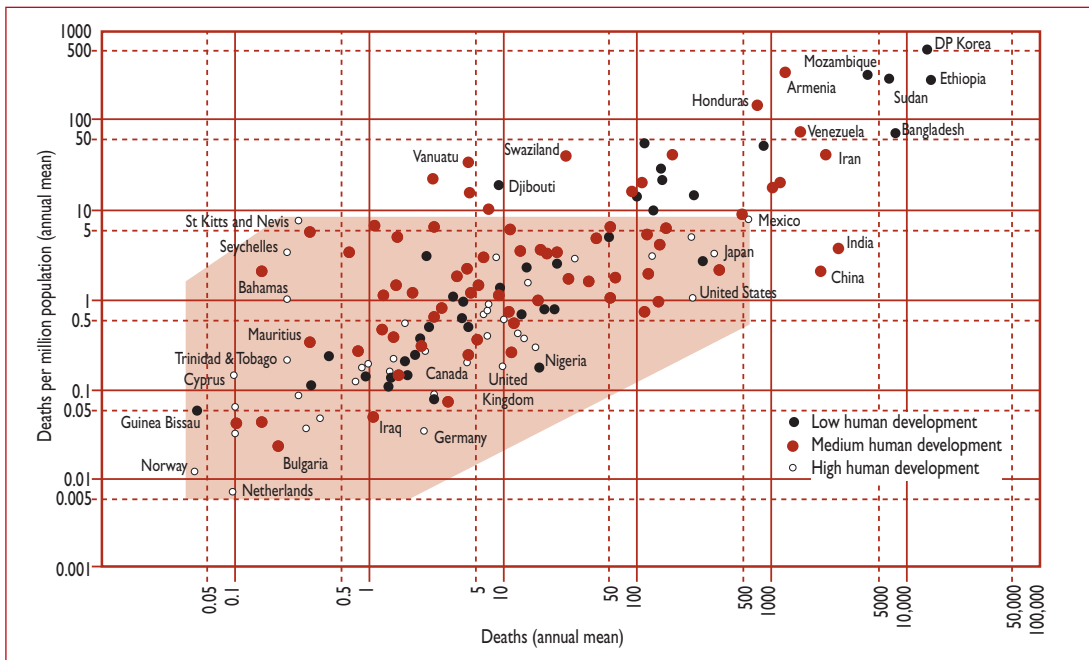
## National development and disaster loss

Development can both reduce and generate risk for society and determine who in society carries the greatest burden of risk from natural and human-made hazards. Accordingly, a recent study by the United Nations Development Programme (UNDP) showed that countries with a high Human Development Index (HDI) experience low absolute and proportional disaster mortality rates (see Figure 2).

## City-level comparisons of disaster risk

Disaster risk and impacts are further differentiated by levels of development and risk reduction investments at the city level. Munich Re's Natural Hazards Risk Index for Megacities is one of the few studies of the global distribution of disaster risk at the city level.

Munich Re's Index shows that the greatest risk has accumulated in the cities of richer countries, although the evaluation focuses on insurance risk potential vis-à-vis physical and commercial assets. When considering the



**Figure 2**

## National development status and natural disaster mortality (1980–2000)

Source: UNDP, 2004

Note: HDI ranking for Afghanistan, Democratic People's Republic of Korea, Iraq, Liberia and Yugoslavia are from UNDP Human Development report 1996, all others from UNDP Human Development Report 2002.

vulnerability of cities in terms of the sum of different types of natural hazard to which they are exposed, the data shows that high risk is associated with Manila, Tokyo, Kolkata, Osaka–Kobe–Kyoto, Jakarta and Dhaka, all cities in excess of 10 million inhabitants and with exposure to at least two different kinds of natural hazard. Munich Re's data also points to those cities where a large natural disaster is likely to have negative consequences for the national economy. Dhaka, with 60 per cent of national GDP produced within the city, and with high exposure to earthquakes, tropical storms and storm surges, is a case in point.

## DISASTER IMPACTS

Although the review of natural and human-made disasters goes some way in indicating their destructive power, it can only show tip-of-the-iceberg losses. Gaps in data and contradictory statements make comprehensive assessment of disaster impacts difficult and mean that loss is often underestimated. For instance, psychological and livelihood impacts are seldom recorded, with the majority of disaster impact data focusing on mortality and economic loss. Macro-economic loss estimates cannot easily capture the secondary and knock-on consequences of disaster for economic production and trade. Disasters affecting small urban settlements and small-scale disasters in large cities are also often overlooked, despite evidence suggesting that, in aggregate, small-scale disasters in cities may be associated with at least as much suffering and loss as the large-scale disasters that make front page news.

### Economic effects of disasters

The economic costs of natural and human-made disasters over the past few decades have been phenomenal. Economic losses from natural disasters, for instance, have increased 15-fold since the 1950s. In a matter of two decades between 1974 and 2003, economic damage worth US\$1.38 trillion was caused worldwide by natural disasters. Economic losses are regionally differentiated, with the Americas and Asia incurring the highest losses from natural disasters and Europe experiencing greatest loss from human-made disasters.

There is also growing potential for cities connected to regional or global financial systems to spread the negative consequences of a disaster across the global



**Women are more affected by natural disasters than men, especially in poorer countries**

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economy, with huge systemic loss effects. More catastrophic would be a disaster (or series of disasters) that damages the global trading infrastructure. It is for this reason that financial institutions and businesses invest heavily in back-up systems.

At the city level, powerful players can move indirect economic losses around the urban economy. For example, in Kobe (Japan) following the 1995 earthquake, major producers were able to protect themselves by shifting to new subcontractors within a few days. This strategy passed risk on to the subcontractors who had to cope with a double burden of disaster impacts and lost contracts.

For urban residents, economic effects may not be felt for some time as businesses restructure, although in the short term, unemployment or livelihood disruption is to be expected and may be prolonged. In the event that their assets are damaged or destroyed, low-income urban households are forced to spend savings or borrow in order to re-establish their livelihoods.

### Social and political impacts of disaster

Vulnerability to disaster impacts is shaped by gender, age, disability and political systems. Where inequality has generated disproportionate vulnerability for a specific social group, higher losses during disaster and reconstruction serve to deepen inequality, thus creating vicious cycles of loss and vulnerability. For instance, women and children tend to be most affected by disasters, especially in poorer countries. In addition to differential death and injury rates from the direct impacts of natural and human-

made hazards, women are at risk from indirect impacts such as legal discrimination during reconstruction. Similarly, the young, the elderly and those with disabilities are often among the most vulnerable to natural and human-made hazards.

Political systems also affect disaster risk and impacts. Recent evidence illustrates that political interference following a disaster is commonplace in the form of lack of acknowledgement of the disaster by the government, government's political interference with the response process, and corruption in relief distribution. In extreme cases, disasters can serve as catalysts for political change by shedding light on underlying inequality, corruption and incompetence that fuel popular unrest; but they can also close political space.

Beyond the national level, political relations at the local level will be tested by disaster events and also by risk reduction and reconstruction interventions. If disaster risk reduction is to be effective in changing the root causes of risk, then change in local social and political relations — between gender, economic class, caste, and ethnic and religious groups — is a legitimate target for action.

## Cultural impacts of disaster

Urban areas concentrate cultural assets, including architecturally significant buildings and urban landscapes, but also artworks housed in museums and galleries. Many World Heritage Sites are located in earthquake-risk hotspots in Central America and Central Asia and flood-risk areas in Central Europe. Thus, urban disaster poses a serious risk of damage to valuable cultural assets and heritage.

When places of cultural importance are damaged or destroyed by disaster, the impacts go far beyond economic value. Cultural heritage can provide disaster-affected communities with a much needed sense of continuity and identity during reconstruction, as well as a future resource for economic development. Yet, given the urgency of addressing basic needs, emergency response and rehabilitation activities may be insensitive to cultural heritage and social traditions.

## URBAN PROCESSES GENERATING DISASTER RISK

### Growth and diversity in urban areas

Rapid urban growth, coupled with geomorphology, hydrology, politics, demography and economics, can create and exacerbate landscapes of disaster risk in a variety of ways (see Box 3). Urban settlements are becoming larger and more numerous through a combination of natural population growth and in-migration. Where urban expansion is uncontrolled, it can exacerbate vulnerability to disasters. Even where urban expansion is planned, disaster risk can be generated if hazards are overlooked. At a larger scale, rapid expansion of urban corridors, such as that along China's coast, can reconfigure risk profiles at the regional level.

Large cities and megacities, in particular, create huge concentrations of people and physical and financial assets, and are frequently also cultural and political centres. They generate the potential for substantial losses from single large disaster events, creating new challenges for risk management. However, not all large urban centres have similar vulnerability profiles as this depends on the economic base, political institutions and disaster management capacity of each city.



**Unsafe building construction in cities exacerbates loss from earthquakes**

© TopFoto / Caro

**Box 3 Rapid urbanization and environmental hazard in Dhaka, Bangladesh**

Dhaka has a population of 11.6 million people, and this is rising fast. The city is built on alluvial terraces and is exposed to flooding from rivers, direct rainfall, coastal flooding and earthquakes. Initial expansion to the north of the city captured higher ground above flood levels or on earth-filled lower-lying sites.

The city has been expanding into areas at risk, especially since 1971, resulting in the conversion of marshes and farmlands into urban use. Recently, expansion has continued northwards over low-lying land. Inequality is extreme in the city, with the richest 2 per cent of the residents occupying 20 per cent of the city's land. Some 30 per cent of the city's population fall below the poverty line and live in increasingly marginalized and hazardous slums and squatter settlements.

Industrial risk has increased as industrial zones that were originally on the outskirts of the city have been swallowed by sprawling residential areas. These residential zones fall outside of land-use planning and regulations. Fire is a problem in these areas and in densely populated slum districts.

*Source: Huq, 1999*

Small cities of less than 500,000 are home to the large majority of the world's urban dwellers, with the total population of small urban areas exposed to environmental risk exceeding the total at-risk population resident in megacities. Small cities may be especially susceptible to complete destruction in a single event such as the 1985 volcanic eruption and mudflow in Amaro (Colombia) which killed most of the city's 25,000 inhabitants.

### **Modifying the hazard environment**

Consumption of natural assets (trees for fuel, groundwater, sand and gravel) and the overexploitation of natural services (water systems and air as sinks for sewage or industrial waste) modify the urban environment and generate new hazards. For instance, flood risk has been made worse in urban areas through the silting of natural water courses and the lowering of water tables, followed by salt intrusion or land subsidence.

The urban landscape itself is changing the context of natural and human-made disasters. Inadequately built multi-storey construction has been a cause of extensive loss of human life and assets in many urban disasters, and skyscrapers have also been sites for devastating fires. The close proximity of residential, commercial and industrial land uses in a city can also generate new cocktails of hazard. The growth of slums whose residents' livelihoods are tied to solid waste dumps in cities such as Manila is an additional risk factor.

### **The impact of climate change**

Climate change has far-reaching consequences for the incidence and impacts of disasters in cities. Rising global temperatures and the resultant changes in weather patterns and sea levels have direct impacts on cities. In particular, cities located along the world's coastlines will face an increased number of extreme weather events such as tropical cyclones, flooding and heat waves. Indeed, around 40 per cent of the world's population lives less than 100 kilometres from the coast, within reach of severe coastal storms.

Climate change also has less dramatic and direct effects on cities. In sub-Saharan Africa, climate change and the consequent extreme climatic variations have been found to trigger rural-to-urban migration, thereby fuelling rapid and often uncontrolled urban growth. In turn, this exacerbates other disaster risk factors such as the spread of settlements into easily accessible yet hazardous locations and unsafe building practices.

While cities remain vulnerable to the effects of climate change, they are also key contributors to global warming. Cities generate carbon emissions that cause climate change with emission levels often being higher in many cities of developed countries than in developing country cities.

### **The vulnerability of urban slums**

Some 1 billion people lived in urban slums in 2006, and if current trends continue, it is predicted that this will rise to 1.4 billion by 2020. Slums are characterized by inade-

quate and insecure living conditions that generate hazards; but they are also home to many people with few resources and, thus, high vulnerability. The urban poor often choose to face environmental hazards and increase their chances of earning a living rather than live in a more environmentally secure location that offers limited livelihood opportunities (see Box 4). Income generation is a more immediate concern for the urban poor than disaster risk. For example, in Bogota (Colombia) 60 per cent of the population live on steep slopes subject to landslides while in Calcutta (India) 66 percent of the inhabitants live in squatter settlements at risk of flooding and cyclones.

Many slum dwellers have fewer assets and supporting institutions than those living in formalized residential areas and are consequently highly vulnerable to harm from natural and human-made hazards, as well as from other risks associated with crime, violence and insecurity of tenure. Moreover, lack of secure tenure among slum dwellers reduces their willingness to upgrade their dwellings and therefore mitigate local environmental hazard.

### Building control and land-use planning

A key determinant of the physical vulnerability of buildings and infrastructure in urban areas is the enforcement of building and land-use planning regulations. In the absence of such controls, or a lack of observance of the same, unsafe construction and land-use practices will

flourish, generating vulnerability to disaster risk.

Although there are few urban settlements that are not covered by building codes, city authorities may be unable to implement and enforce those codes. Indeed, the rapid supply of housing to meet rising demand without compliance with safe building codes is a principal cause of disaster loss in urban areas.

Municipal authorities charged with overseeing construction standards are unable to fulfil this duty for several reasons. Lack of resources and human skills are key constraints. In middle- and low-income countries experiencing rapid urbanization, the capacity of town planning departments to measure, let alone manage, the expansion of urban land use is seriously inhibited. Resource scarcity can be further compounded by institutional cultures that allow corruption to distort regulation and enforcement. In some developed countries such as the UK, where 15 per cent of urban land is known to be at risk from flooding, land-use planning has not succeeded in separating people from sources of potential human-made or natural hazards.

### International development policy and urban disaster risk

The achievement of the MDGs will be hindered if disaster risk reduction is not made more prominent in urban planning. Disasters that hit urban areas destroy critical infrastructure and set back development gains, potentially undermining progress in meeting the MDGs. The most

#### Box 4 Living with risk in the favelas of Rio de Janeiro, Brazil

Rio de Janeiro is home to over 10 million people, of which nearly one third live in slums known as *favelas*. Rocinha, one of Rio de Janeiro's richest and most developed *favelas*, is home to between 100,000 and 150,000 people.

Rocinha's population is home to various social groups, and certain areas of the *favela* are more expensive to live in than others. Neighbourhoods located further up the mountain are generally poorer and more prone to disaster because of the difficulty of building on a nearly vertical mountain slope. One of these neighbourhoods is Roupa Suja, the top of which is located right below a vertical wall of rock and considered a Zona de Risco — or risk area — by the Rio de Janeiro city government. Technically, residents are prohibited from building and living in this area; but many are so poor that they have no alternative place to build.

Several people die every year in mudslides caused by heavy rains in Rio's *favelas*. Deforestation at the edge of Rocinha, as it expands into the national forest of Tijuca, has worsened this risk. Rio's municipal government, as well as residents themselves, have built aqueducts to channel the water away from homes; but these do not protect all areas of the *favela*. The danger of falling rocks is perhaps greater than that of rain. Since the homes at the top of the *favela* are directly beneath a vertical overhang, rocks break off due to erosion and fall on the homes below. Faced each day with multiple types of risk — from natural hazards, violence and disease — the residents of Roupa Suja's Zona de Risco lead a precarious and difficult life.

Source: Carter, 2006





**Climate change may expose coastal cities to an increased number of extreme weather events**

© Eye Ubiquitous / Alamy

urban focused of these, target 11 of MDG 7, aims at significantly improving the lives of at least 100 million slum dwellers by 2020. Efforts to improve the lives of slum dwellers should very seriously take natural and human-made disaster risk into account.

Moreover, disaster risk reduction should be integrated into longer-term development and poverty reduction strategies. Yet, at the national level, the consequences of Poverty Reduction Strategies for natural disaster reduction have hardly been examined. A recent study found that few national plans mentioned disaster risk reduction beyond the need for early warning. Furthermore, the bulk of national government funds and international aid for disasters is channelled towards reconstruction rather than much-needed long-term improvement of resilience.

## COMPARATIVE ANALYSIS OF GLOBAL TRENDS

A comparative analysis of urban disaster incidence and impact globally illustrates variations across and within world regions. Regional diversity is also evident in disaster prevention and mitigation capacity and strategies.

### Africa

Flooding is the most frequent natural disaster in Africa and results in the highest mortality. Economic loss to disasters

is low for Africa, compared to other world regions, but is high as a proportion of GDP. The poverty of countries in this region severely limits household coping capacity and the capacity of governments to build resilience and undertake risk reduction. The lack of regional governance for risk reduction is a serious limiting factor preventing South–South learning across the region. Limited capacity to regulate industry also means urban settlements in this region have among the highest rates of industrial disaster worldwide. Widespread poverty and vulnerability make this region highly susceptible to the local impacts of global environmental change. Vulnerability is exacerbated by conflict, chronic disease and weak governance.

### Americas

Across all regions, the Americas experience the greatest economic loss from natural disasters. Windstorms (including hurricanes and tornadoes) are the most frequent type of disaster, affect the greatest number of people and cause the highest total economic losses. Differences in disaster risk and loss are however evident within the region.

North America is a wealthy and highly urbanized region. Neo-liberal policies, particularly in the US and more recently in Mexico, have scaled down state responsibilities for risk reduction and response and placed greater emphasis on the role of private citizens and companies. Technical capacity for disaster risk reduction in the region is very high.

South America is highly urbanized and predominantly middle income. Financial and political instability have undermined resilience at all scales. Technical capacity is high and, in some countries, this is matched by strong civil society action to build physical and social resilience.

Central America and the Caribbean comprise the poorest subregion in the Americas. Urbanization levels are high and cities are characterized by high levels of poverty and inequality. Past political tensions have made for strained civil society–state relations; but there is capacity for coordinated top-down and bottom-up risk reduction.

### Asia

Asia is the most disaster-prone region. The high population density means that mortality and the number of people affected is highest in this region for most disaster types. This region contains many countries with the



highest levels of exposure to natural and industrial hazards, but also with great experience of risk management. Capacity for building resilience is limited by governance, with tensions between civil society and state actors found across the region. Political tensions, weaknesses in governance, economic inequality and rising levels of chronic illness are the chief barriers to resilience.

## **Europe**

The role played by relatively high levels of economic development and political stability in shifting the impact of disasters from human to physical assets can be seen most clearly in this region. Accordingly, economic loss from disasters is high in this region compared to loss of human life. Most of Europe is high-income and highly urbanized. Risk profiles for this region are split between the east and west. Western Europe has strong states and civil societies providing good capacity for resilience. It is also a region with relatively low levels of hazard exposure. Eastern Europe is more variable, with examples of strong states but weak civil society, and with governance challenges that limit regulation of industrial activity and capacity for top-down programmes aimed at vulnerability reduction. This region is also economically poorer than Western Europe.

## **Oceania**

Oceania records the lowest incidence of disasters for any region and hazard type, with the exception of volcanic

eruption. The region has the lowest economic losses and absolute number of people killed and affected by all disaster types. Within the region, disasters are most commonly associated with windstorms, and these result in the greatest economic losses. The region is of mixed economic status, but with high levels of urbanization. Many of the countries in the region are small island developing states facing particular governance challenges within a context of limited human resources. Larger countries, especially New Zealand and Australia, have strong states and civil societies, as well as robust economies.

## **CONCLUDING REMARKS**

This chapter has highlighted the growing incidence and impacts of disasters. Large cities and megacities concentrate and magnify risk but smaller cities (less than 500,000 residents) that are home to just over half of the world's urban population are also exposed to multiple risks. Within cities, the economically poor, politically marginalized and socially isolated (often women) are consistently the most vulnerable. It is also evident that urbanization processes modify the hazard profile of cities both directly and indirectly. At the same time, urban planning is seriously ineffective in many cities, especially within developing countries. New techniques in urban planning that can extend formal practices into informal housing are needed. Meeting the MDGs is dependent upon this.

# POLICY RESPONSES TO DISASTER RISK

This chapter reviews existing policy approaches for reducing disaster risk and incorporating risk reduction within urban planning and management as well as within disaster response and reconstruction. In doing so, it assesses the policy responses of a variety of actors to disasters, both natural and human-made.

## DISASTER RISK ASSESSMENT

Risk assessment contributes to disaster risk reduction by informing policy priorities and decisions on resource expenditure. Yet, the rapid growth of urban areas has, in many cases, far outstripped national and local capacities for formal data collection or planning services. Thus, a major challenge for responding to disaster risk is to assess human vulnerability, hazard and risk in a way that can enable action from national, international and local actors.

Hazard and risk assessments employ a range of techniques, from quantitative analysis built around scenario modelling and mapping to qualitative, non-technical approaches, depending upon the kinds of data that need to be generated.

### Hazard mapping

Hazard assessment involves an analysis of the likelihood of occurrence of natural or human-made hazards in a specific

future time period, including their intensity and area of impact. One approach is hazard mapping, or the use of maps to depict the spatial location, size and frequency of hazards. At the global scale, natural hazard mapping is well advanced for volcanic, earthquake, flood, wind and landslide hazards. Many countries also have national hazard maps, particularly of geophysical hazards. While global- and national-scale hazard maps can help to identify national legislative or policy planning priorities, planning at the city level requires more detailed information.

Although the advent of geographic information systems (GIS), coupled with satellite imagery, have revolutionized natural hazard mapping, the requisite financial investment in hardware and human resources is often beyond reach for poorer urban authorities. Partnerships between technical advisory bodies and national centres for disaster management offer a potential mechanism for technology and skill transfer. An example is the Government of India-UNDP Urban Earthquake Vulnerability Reduction Project (see Box 5).

Mapping human-made hazard has been facilitated in recent years by national directories, many of which are now open to the public. However, where information on human-made hazards is commercially valuable it is not released to the public. Local authority land-use planning maps also contain information on the location of hazardous industrial activities. Yet, the acquisition of data on hazards generated within the informal sector is problematic.

## Risk assessments for individual cities

There is limited comparative data on natural disaster risk and impacts at the city level. Initiatives that have made major contributions in this regard include the Natural Hazards Risk Index for Megacities by Munich Re and the Earthquake Disaster Risk Index used by GeoHazards International (GHI). In 2000/2001, GHI developed and applied an Earthquake Lethality Estimation Method which assesses the relative severity of earthquake risk, the sources of risk within each city, and the relative effectiveness of potential mitigation options.

A key challenge for risk assessment at the city level is including indicators for social vulnerability. This requires relevant data on population and social indicators, which may not be available. Moreover, comparison of disaster risk between districts within a city has rarely been undertaken.

## Assessing human-made hazard risk

Human-made hazard risk assessments tend to be driven by a hazards focus and employ GIS software. Vulnerability is sometimes indicated through population distribution, which reflects the limited availability of geo-referenced social data. GIS mapping may thus not capture social variables which influence individual exposure and susceptibility to human-made hazards. In the case of industrial hazards also, GIS mapping of social vulnerability is faced with a number of challenges. In even the richest countries, there may be a lack of comprehensive hazards databases. In some countries, industrial hazard is hidden behind commercial secrecy.

## Participatory risk assessments

Participatory risk assessment draws on the tradition of participatory approaches which utilize qualitative methods that produce data owned by the subjects of the research and contribute to local empowerment through the research process. Participatory risk assessment thus enables local actors to reflect on hazards, vulnerabilities and capacities influencing their lives. Generally, the extent to which risk assessment is participatory can be determined based on its procedural, methodological and ideological characteristics. While identifying social, political and economic root causes of vulnerability is an

important first step, participatory risk assessment can be counterproductive if it does not point to ways to raise resources.

## Challenges of urban risk assessments

The following overlapping aspects of risk in urban areas make risk assessments complex.

- *The multiple hazards to which people are simultaneously exposed.* Some hazards may be more visible than others at any one moment.
- *The multiple sectors that are at risk.* Each urban sector will have different exposure to risk and capacities and resources for coping and recovery.
- *The multiple scales at which risk is felt and responded to.* It is challenging to include all of these scales in the analysis of impacts and capacity.
- *The multiple assets to be accounted for in measuring vulnerability and capacity.* Some assets will be contingent upon the utilization of others and rarely are different types of assets commensurate.
- *The multiple stakeholders with roles to play in shaping risk.* It is particularly difficult to pin down the influence of stakeholders' actions where these are part of everyday development processes.
- *The multiple phases that disaster cycles pass through.* Perceptions of risk and actions to build capacity and resilience may look very different before and after disaster and during periods of everyday development.

Additional challenges for risk assessment include the inaccessibility of risk assessment technologies, narrow focus of assessments on built assets and rapid pace of physical and social change in slums.

## Perceptions of risk

Perceptions of risk play an important part in disaster risk reduction. They influence the ways in which risk is measured and the willingness of citizens and authorities to undertake actions to manage risk. Planners and policy makers often employ expert risk analysis to justify hazard mitigation policies; yet, expert and lay risk assessments do not always concur. This can undermine policy legitimization and compliance.

Perceptions influence the relative importance given

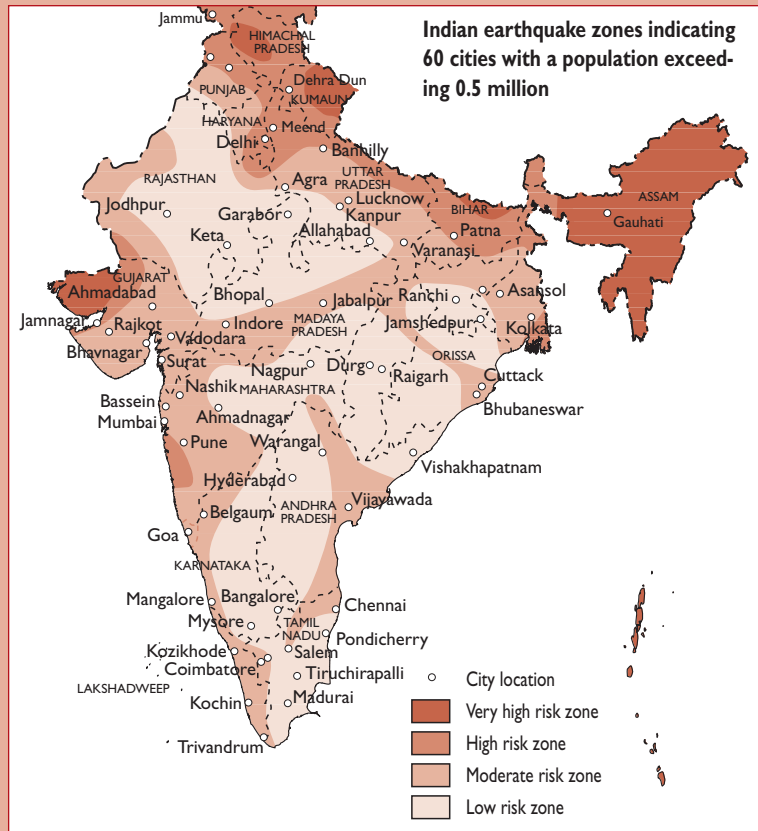
**Box 5 India's national hazard map: A foundation for coordinated disaster risk reduction**

An example of cooperation in disaster risk reduction between an international organization and a national government is the Government of India–United Nations Development Programme (UNDP) Disaster Risk Management Programme. A key subcomponent of this programme is the Urban Earthquake Vulnerability Reduction Project, implemented between 2003 and 2007. The project aims to raise awareness of earthquake risk in urban areas among decision makers and the public and to improve disaster preparedness.

Several of India's populous cities, including the capital, New Delhi, are located in zones of high seismic risk. National data on seismic hazard has been used to identify 38 cities with populations of 500,000 or more that have become the focus for the project. The map on the right was developed by the project and shows four levels of seismic risk and 60 cities from which the 38 partner cities were selected.

Key expected outcomes of the project, among others, include enhanced disaster risk management capacity, effective administrative and institutional frameworks for earthquake risk management in the most exposed urban centres, and development of emergency, preparedness and recovery plans for those urban centres. The project also intends to build local capacity for risk assessment, preparedness and response.

Source: adapted from UNDP India, [www.undp.org.in/index.php?option=com\\_content&task=view&id=784&Itemid=264](http://www.undp.org.in/index.php?option=com_content&task=view&id=784&Itemid=264)



to natural or human-made hazards, compared to other competing needs and opportunities. In turn, the importance ascribed to disaster risks determines subsequent efforts to avoid or limit the impacts of those hazards. For instance, in the US, hurricane risk is a useful predictor of preparation, evaluation and adjustment actions taken by households. The ability of a household or individual to act on perceived risk is additionally constrained by their coping and adaptive capacity as well as by urban governance institutions.

## STRENGTHENING LOCAL DISASTER RESILIENCE

Local disaster resilience refers to the capacity of local actors to minimize the incidence and impacts of disasters, and to undertake recovery and reconstruction activities once disasters occur. In places where hazard and loss are tangible, disaster risk reduction or reconstruction can be opportunities for improving the solidarity, inclusiveness, human skills and confidence of local groups and their

**Box 6 Using the law to fight technological risk in Durban, South Africa**

South Durban Community in South Africa is a highly polluted area where 200,000 largely vulnerable and disadvantaged residents live side by side with heavy industries. In 2002, successful legal action was taken by the community to prevent the development of a paper incinerator by a paper manufacturing company. This legal case was taken up by the community after the provincial government granted permission to the company to construct an incinerator without following proper procedures. The community lodged an appeal in the Durban High Court on 11 October 2002, restraining the Minister of Agriculture and Environmental Affairs, KwaZulu-Natal Province, from approving the incinerator. The minister was interdicted pending the finalization of a judicial review.

The legal recourse was taken on the grounds that government granted an oral exemption to the company from conducting a full environmental impact assessment (EIA). It was argued that this exemption was invalid, according to statutory requirements, and that the failure to appoint an independent consultant, conduct a full IEA and examine the necessary alternatives was in breach of existing legislation. The community also pointed out that a proper interpretation of the EIA showed that sulphur dioxide emissions from the company's incinerator would exceed World Health Organization (WHO) standards and national guidelines of 1998. This, the community noted, was against their constitutional right to live in a healthy environment.

The verbal exemption from conducting an EIA given to the company was overruled by a high court judge and the company's proposal had to be processed again, taking into account the necessary EIA requirements.

Sources: South Durban Community Environmental Alliance, 2003a, 2003b

leaders. It is possible to pursue social, legislative and economic pathways for building local resilience.

## Social pathways

Local stocks of social capital — norms and habits of behaviour that support reciprocity and collective action — are resources that can be used to build capacity in the face of multiple development challenges, including disaster risk. Building local networks of support and reciprocity can increase self-reliance among households and neighbourhoods and in this way enhance disaster resilience. A great diversity of local associations, including kinship, religious and gender- or youth- based groups, as well as groups organized around particular interests, such as sports, environmental or social improvement can contribute to disaster risk reduction through building support networks.

While community solidarity can be an asset for disaster risk reduction, communities are not inherently harmonious entities. Rather, they are heterogeneous and are often cross-cut by internal competition, information asymmetries and socio-economic inequality. This can undermine community-level risk reduction projects, leading to interventions exacerbating inequalities and undermining collective resilience. Community level partners in disaster risk reduction must also be cautious

not to assume that community leaders represent the best interests of local residents.

## Legal approaches

The Universal Declaration of Human Rights already supports the right to personal security and a basic standard of living during periods of unforeseen livelihood disruption. The human rights agenda offers a potentially powerful tool for local actors to argue for increased pre-disaster investment and post-disaster compensation. It offers a moral imperative that could mobilize local political will.

Nationally, an increasing number of governments are putting in place disaster risk reduction legislation. While such legislation often does not provide targets for action, it does establish responsible agencies for risk reduction, typically in local and regional government. Where legal systems are robust, legislation has proven a strong weapon to strengthen communities at risk from technological and industrial hazards (Box 6). Where the law allows it and culpability can be proven, group actions brought by survivors of toxic releases against companies or the state can amount to significant sums and act as a deterrent on other companies.

## Economic approaches

Microfinance has significant potential to build community resilience to disasters. The extension of small loans through microcredit enhances the incomes and assets of urban households and communities, thereby reducing their poverty. In turn, this helps to reduce vulnerability to disasters and develops greater coping capacity. Post-disaster loans and micro-insurance can also help poor urban households recover more quickly. Yet, it is only recently that microcredit and micro-insurance have been used for building community resilience to disaster risk.

To date, microfinance institutions have been involved mostly with post-disaster recovery activities. There is a need, however, for microfinance to be perceived as a potential tool to better prepare communities before natural hazards strike. In particular, the scope for micro-insurance to act as an affordable mechanism for extending risk-sharing into low-income communities has recently received much attention.

## Challenges of building local capacity for risk reduction

There is an uneasy tension between the empowering of local actors to confront local causes of risk and the offloading of state or private-sector responsibilities. Decentralization of urban governance has seen many municipalities struggling with a gap between responsibilities that have been devolved from central government and the resources, which have, in many instances, not been made available.

It is also important not to lose sight of the deeper historical and structural root causes of disaster risk in the national and global political economy. Community-based approaches can mask deeper social and economic structures and physical processes that are the root causes of inequality, vulnerability and hazard.

There may also be tension between local and external priorities. Building local capacity is difficult in contexts where disaster risk reduction is not perceived to be a priority by local actors. In areas where disasters are infrequent or have had only a limited impact, it is quite rational for those on a low income, with little time to spare and subject to many hazards — from police harassment and street crime to the threat or reality of homelessness — not to want to participate in disaster risk reduction initia-

tives as a priority. Piggybacking disaster risk reduction onto activities already accepted as a local priority, involving a wide range of actors and adopting a staged approach could help to reconcile local and external concerns.

## LAND-USE PLANNING

Land-use planning is perhaps the most fundamental tool for mainstreaming disaster risk reduction into urban development processes. It provides a framework within which risk mapping and community resilience building can be undertaken in partnership with local actors. Familiar planning tools such as zoning, community participation, GIS, and information and education programmes are all integral to mainstreaming risk reduction within local comprehensive land-use planning.

Mainstreaming risk reduction within strategies that underpin land-use planning is challenging, particularly for authorities with limited human and economic resources and political influence. Perhaps most challenging of all is the aim of including all urban stakeholders in the shaping of planning policy and development decisions, with a rigorous, independent and transparent procedure for overcoming conflicting interests.

Planning to manage risk systems in their entirety further complicates land-use planning. Human settlements of all sizes are situated within larger interdependent socio-ecological systems expressed, for example, through migration and economic exchange between rural and urban areas or across urban centres. Thus, urban risk management needs to consider not only the internal, but also the external environment.



**Land-use planning is important for mainstreaming disaster risk reduction in urban areas**

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## Land-use planning in informal settlements and slums

As noted earlier, some 1 billion people, or one in every three city dwellers in the world, live in an informal settlement or slum. Such areas are typically cramped, with industrial and residential land uses in close proximity (sometimes in the same building) and exposed to natural hazard through their location on hill slopes or low-lying land subject to waterlogging and flooding. Within a context of rapid urban population growth and physical expansion of cities, planners are often unable to keep up with mapping new settlements, let alone planning land use for them.

Where there is political commitment and resources are made available, slums can be successfully brought into formal planning programmes. The provision of basic services and security of tenure in informal settlements can have many positive consequences, including the reduction of vulnerability to disaster. Households that can access basic needs are not only healthier, but often have more time and, as a consequence, money and energy available for investment in household and, collectively, community improvement.

An emerging alternative to the extension of formal planning into informal settlements at risk is to work with community associations to develop local land-use plans that can be linked with the formal planning system. These plans are owned and researched by local communities and

have limited legal standing, but provide a mechanism for those left outside of the formal planning process to identify land-use challenges to disaster resilience. The challenge to this approach remains the extent to which community plans can be welcomed by and integrated with formal planning systems. A careful balance also needs to be made between the strategic emphasis of city-level land-use planning and the more local concerns of community plans.

## BUILDING CODES, REGULATION AND DISASTER-RESISTANT CONSTRUCTION

Most countries have building codes aimed at ensuring that construction meets a minimum standard of disaster resilience. The greatest challenge is enforcing adherence to building codes during construction. Failure to comply with codes is a root cause of vulnerability in buildings. Too often, ulterior incentives make it more attractive for administrators, architects, builders, contractors and even house owners to circumvent construction standards. In Turkey, much of the loss of life associated with the Marmara Earthquake in 1999 has been attributed to the ineffective regulation of construction. In cities of lower-income countries, but increasingly also in large cities of middle-income countries, the high proportion of citizens forced to reside in informal settlements where activities operate outside the formal planning and regulatory systems is particularly challenging for building control.

A number of international initiatives have begun to build frameworks for information exchange and learning in technical aspects of safe construction. For instance, an internet-based encyclopaedia of housing construction is being prepared by the Earthquake Engineering Research Institute in the US and by the International Association of Earthquake Engineering in Japan. Training those working in the construction industry in safe construction techniques can reduce structural vulnerability in cities. That there is much to learn from vernacular building design and practices is also increasingly recognized.



**Disaster management techniques can minimize risks arising from flooding and other natural hazards**

## PROTECTING CRITICAL INFRASTRUCTURE AND SERVICES

Protecting critical infrastructure and services against all conceivable sources of harm is prohibitively expensive, especially so for countries and cities with small economies. Resilience targets can be used in planning to act as goalposts when determining a minimum level of capacity to be protected in the case of a disaster. These are rough guidelines; but they enhance transparency in priority setting.

Critical infrastructure and services share a reliance on networks that allow for the movement of information and commodities. These networks are fundamental in ensuring the health and safety of the population and the functioning of the urban economy. They are interdependent, so that a failure in one system can lead to repercussions in associated systems. The links that unite life-support networks and convey vulnerability can also be a source of resilience, offering alternative routes for information flow and feedback in the system or for overlapping functions and spare capacity.

Risk to critical infrastructure and service networks in cities of developing countries is exacerbated by the complexity of their evolution and maintenance. Design is often piecemeal, the product of individual infrastructure development projects, with resulting networks being eclectic and varying in age, form and operational criteria. This is complicated further by informal-sector provision of critical services, such as potable water and policing. The coordinated identification of network vulnerability and subsequent risk mitigation with informal-sector actors outside of regulatory control is challenging.

## EARLY WARNING

Early warning is a cornerstone of disaster risk management. Despite this, few cities have early warning systems or even hold data on past hazards and disaster events. There are four interdependent components of early warning systems: risk knowledge; monitoring and warning; communication; and response capacity. The capacity of an entire system is threatened if any one of these components is weak. The weakest elements of warning systems concern warning dissemination and preparedness to act.

Root causes appear to be inadequate political commitment, weak coordination among the various actors, and lack of public awareness and public participation in the development and operation of early warning systems.

### Risk knowledge and warning

Risk assessment is based on the tracking of information on hazards at a range of scales, from local to global, depending upon the character of the hazard and the nature of the city's vulnerabilities. However, shifting social contexts as well as environmental changes can make historical comparisons of risk over time difficult. An additional challenge for the monitoring of technological risk is the secrecy of industrial interests (public as well as private).



Guidelines on actions to be taken in the event of a natural hazard can minimize loss of human life

## Risk communication

Early warnings may fail to reach those who must take action, and may not be understood or address their concerns. Translating scientific information on approaching hazard into a language that results in action continues to challenge risk managers. There are many examples where risk identification has not led to timely warning and action due to a lack of clear lines and methods of communication. Trust between those giving and receiving information is also essential for effective early warning.

Maintaining early warning communication systems in smaller, isolated and informal settlements with low density of communication infrastructure is especially difficult. One way around this is to build early warning communication systems on top of everyday communication networks. People-centred approaches to risk communication and planning for appropriate response to early warnings have also proved effective in many contexts. The advantages of a people-centred early warning were illustrated in the municipality of La Masica, Honduras during Hurricane Mitch (1998). The municipality had in place a relatively low-cost early warning system which operated independently of outside information flows or resources, thus increasing its robustness during times of emergency. Despite flooding and economic damage caused by the nearby River Lean during the Hurricane, none of the municipality's 25,000 residents was killed.

## Response capacity

More difficult in cities is the coordination of action in response to alerts and early warnings. Pre-planning and clear communication with the public are needed to prevent inappropriate action or panic. In congested cities with overburdened transport networks, evacuation can be challenging. Cuba has one of the best track records on urban evacuation with a well managed and frequently practised evacuation strategy as part of its risk reduction system (see Box 7).

## FINANCING URBAN RISK MANAGEMENT

City authorities seldom generate sufficient funds to meet all their development and risk reduction needs. Thus, they face the twin challenge of attracting finance and balancing the conditionalities that come with this support against local priorities and strategies for disaster risk management. Inefficient or inadequate fiscal decentralization further reduces the financial capacity of local governments. This is especially the case in poorer or rapidly expanding cities where the proportion of residents and organizations who contribute to the city revenue can be low.

National governments finance urban infrastructure works through project grants or line financing through ministries with responsibility for infrastructure in the urban sector. However, national disaster budgets tend to

### Box 7 Lessons in risk reduction from Cuba

Cuba's integrated system of disaster risk management has succeeded in saving many lives and has built resilience beyond the level that might be expected from the country's economic status. Between 1996 and 2002, six hurricanes hit Cuba, causing 16 deaths in Cuba out of the total of 665 deaths they collectively caused in the region. What is Cuba doing right?

Central to Cuba's successful risk reduction is the government's stated priority that its fundamental commitment during a hurricane is to save lives. The country's risk reduction system is based on a national civil defence structure which uses subnational government bodies for disaster preparedness and response, effective lifeline structures, a culture of safety built through education and awareness campaigns and community mobilization and building of social capital.

In addition, Cuba's model also owes a lot to its unique system of government and its socio-economic model, which has consistently addressed risk reduction through policies of social and economic equity and poverty reduction. These policies have produced 'multiplier effects' that enhance risk reduction in many ways. For instance, 100 per cent literacy of the adult population and access to electricity by 95 per cent of the households facilitate the sharing of disaster related information. Children are also exposed to disaster preparedness in school curricula. An adequate road system in the country facilitates speedy evacuation. Finally, the intricate web of social, professional and political organizations in the country provides organizational structures that can be quickly mobilized in disaster times.

Local authority role	Relief	Reconstruction
Assessment for planning	Undertake a rapid impact assessment to help judge the scale of response and rehabilitation to be undertaken.	Monitor human and economic impacts as they unfold. A dynamic approach to impact assessment is particularly important to be able to track inflationary consequences of reconstruction materials and any shortages in food supplies.
Coordination	Coordinate administrative and technical aspects of disaster emergency response with emergency services, the armed forces, the Red Cross/Red Crescent and other civil society groups. This work should involve liaison with managers of critical infrastructure and services.	Bring together stakeholders to plan the transition from emergency to reconstruction and from reconstruction to development. Consider to what extent development pathways led to the accumulation of risk and eventual disaster event, and the opportunities for building risk reduction into reconstruction, rehabilitation and post-disaster development.
Liaise with national and international agencies	Determine if national and international assistance is required for emergency response.	Determine if national and international assistance is required for reconstruction and rehabilitation.
Monitor progress	Monitor and review the performance of emergency services.	Monitor and review the performance of reconstruction services.
Seek finance	Facilitate access to finance through access to local and national emergency funds.	Facilitate access to finance through emergency funds and private insurance. Enable private remittance flows.
Review performance	Document decision making for future analysis and learning.	Review the performance of pre-disaster policy and organization for risk reduction, early warning, disaster response and reconstruction. Document and evaluate the programmes.
Public information	Keep the public informed at all times.	Keep the public informed at all times.

Table 2

### Local authority actions during disaster relief and reconstruction

prioritize relief and emergency responses. Prevention and mitigation are less attractive as funding choices. Like national governments, bilateral and multilateral donors, including international development banks, have a history of supporting disaster reconstruction. Disasters have been treated as interruptions in development rather than as risks integral to development. Recent initiatives indicate a reappraisal and recognition of the value of investing in risk reduction.

## DISASTER RESPONSE AND RECONSTRUCTION

The roles played by local authorities and others, including local people and international agencies, during response and reconstruction phases of disaster, are examined below. In particular, the aim is to review the challenges to 'build-back better' during these phases.

### The role of local authorities

Municipal authorities and local government are well placed to coordinate emergency response and reconstruction (see Table 2). They can link response and reconstruction to pre-disaster development goals and,

indeed, can provide a forum for pre-disaster development goals to be reappraised in light of the disaster event. However, during large events, where response and reconstruction involve international actors, it can be hard to retain control over coordination, especially for local authorities with limited capacity.

Loss of coordination through swamping from international agencies, or as a result of the diversity of small groups, can erode local self-reliance and hinder the integration of development within reconstruction. Pre-disaster planning that includes organizational structures to manage joint action and, as far as possible, to decentralize decision making to sectoral, regional and community levels is the best way to avoid loss of strategic control.

### Disaster response

Effective disaster response rests on having a prepared and rehearsed plan with clearly identified responsibilities. The stakeholders involved in response are broadly similar for natural and human-made disasters. Initial response is usually from neighbours and community organizations, emergency services and civil defence. Emergency response can overlap with development, so that, increasingly, development actors (including those with experience in urban





**Local residents often provide valuable assistance in search and rescue efforts following a disaster**

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planning and construction), along with international agencies such as UN-Habitat, become involved.

In those cities and parts of cities where municipal resources are limited, self-organized and community-based response plans can save many lives. More broadly, the state has responsibility for maintaining the rule of law and protecting property and people from looting and violent crime during disasters. There may be a role for civil society groups or international observers to oversee such activities or work in partnership with security agencies, such as the army, police or civil defence.

Of particular concern is that some people are more at risk than others of being left out of relief and response programmes. Women, children and orphans, the elderly and those who are marginalized because of language, culture or social class are especially liable to not having their entitlements met during relief and response.

## **Building-back-better agenda**

The building-back-better agenda crystallizes the aim of building development into post-disaster work so that vulnerability is reduced and life chances are enhanced as a result. The tension between speed of delivery and the desire for inclusive and participatory decision making is a theme that runs throughout the integration of development into response and reconstruction. Established cultures of response privilege speed and efficiency in delivery; but this has meant that an opportunity has been lost for furthering development aims through post-disaster action.

It is proving difficult to integrate the right balance of humanitarian and development actors and ideas; but progress is being made. In Kashmir, following the South Asian earthquake in 2005, shelter reconstruction included not only cash for work, where survivors were paid to clear land, but also cash for shelter. Also, the rush to build before the coming winter was made sustainable through designs that could be upgraded to more permanent structures over time. Through these two mechanisms, reconstruction became developmental.

Capitalizing on the opportunity that disaster presents to build back better requires pre-disaster planning. For example, from the perspective of human settlements, the granting of secure tenure before a disaster occurs makes the distribution of recovery support more transparent and efficient. The rationalization of planning and building regulations and administrative approaches that reach the poor will not only reduce loss, but act as benchmarks for reconstruction building. Without the enforcement of such guidelines, risk will be built into new construction.

## **Reconstruction for risk reduction**

Strong local government is needed to oversee reconstruction and to help control profiteering over land held for resettlement. Reconstruction is a period when urban land rights are often contested or fought over by competing interests. It is not uncommon for those with only usufruct or customary rights, or for the poor or tenants, to lose claims over high value land, and for this to be transferred to speculators and developers in the process of reconstruction.

The overall aim of building back better is to use reconstruction as an opportunity to improve the economic, physical and social infrastructure, and to support the asset bases of individuals and households at risk. Reconstruction becomes a project for improving survivors' life chances and resilience, not returning them to pre-disaster levels. If reconstruction programmes are to build back better, they must take into account the needs of families and be sensitive to gender, age and culturally specific needs and norms. The basic need for shelter should not be used as an excuse for overly rapid and socially unsustainable housing reconstruction.

## **CONCLUDING REMARKS**

The components of urban risk policy outlined in this chapter are mutually reinforcing. Successful early warning relies upon risk assessment and strong local communities for information transfer and action. Risk assessment feeds directly into land-use planning decisions. These and the other activities outlined in this chapter offer opportunities to build back better when they are considered in reconstruction, as well as in preparedness for disaster. They are key pathways for meeting developmental activities with the humanitarian imperatives of relief and reconstruction.



# SMALL-SCALE HAZARDS: THE CASE OF ROAD TRAFFIC ACCIDENTS

A number of less frequent and smaller-scale hazards influence safety and security in urban areas but are often not recorded. The significance of small-scale hazards in urban areas is particularly illustrated in this report by the incidence and impacts of road traffic accidents. This chapter examines the trends and impacts of road traffic accidents in urban areas, given that, in aggregate, they cause more loss of human life and economic productivity than larger-scale natural and human-made disasters.

## INCIDENCE AND IMPACTS OF TRAFFIC ACCIDENTS: GLOBAL TRENDS

Traffic accidents, which are reviewed here from a human settlements perspective, include incidents involving road-based motorized and non-motorized vehicles of various capacities. Traffic accidents range from major events resulting in high loss of human life to everyday incidents whose impacts are only felt at the individual or household level. They pose a serious threat to the safety and well-being of urban households on a daily basis by generating economically and socially unsustainable outcomes. It is thus important to review traffic accidents as a key hazard threatening the safety and security of urban inhabitants.

### Impacts on human lives

Losses to traffic accidents are commonplace and needlessly deadly aspects of urban life. The scale of impact of traffic accidents at the aggregate level is disturbingly large. The WHO estimates that 1.2 million people are killed in road crashes each year, and as many as 50 million are injured. Projections indicate that these figures will increase by about 65 per cent over the next 20 years unless there is new commitment to enhance prevention. These predicted trends vary by region, such that by 2020 high-income countries are expected to experience a 30 per cent decline in fatalities from traffic accidents, while low- and middle-income countries will record a phenomenal increase of 80 per cent.



**Traffic accidents kill millions of people each year globally**

World region	Mortality per 100,000 individuals	
	Low- and middle-income countries	High-income countries
Africa	28.3	–
The Americas	16.2	14.8
Asia (Southeast Asia)	18.6	–
Asia (Eastern Mediterranean)	26.4	19.0
Europe	17.4	11.0
Western Pacific	18.5	12.0

Table 3

**Traffic accident mortality rates by world region, 2002**

Source: WHO, 2004

Currently, a disproportionate 90 per cent of the deaths from traffic accidents worldwide occur in low- and middle-income countries. Africa and Asia have the highest mortality rates resulting from traffic accidents, with high-income countries in Europe and the Western Pacific having the lowest mortality rates (see Table 3).

Mortality rates are high in low- and middle-income countries despite their relatively low levels of vehicle ownership and use. The higher number of cars in richer countries means that potential hazard is high; but risk has been reduced through road traffic planning, the education of different road users and emergency response teams. This observation clearly shows the potential for risk management to reduce loss from traffic accidents.

**Economic impacts**

Economic costs of traffic accidents are difficult to calculate, given that there are many indirect impacts to consider. The WHO estimates that the total economic cost of traffic accidents is 1 per cent of gross national product (GNP) for low-income countries, 1.5 per cent in middle-income countries and 2 per cent in high-income countries. Low- and middle-income countries lose US\$65 billion a year in traffic accidents, more than they receive in development assistance.

Traffic accidents, like other hazards, can tip households into poverty or collapse. Loss of an economically productive member can impoverish households, especially in countries where there is limited or no state support for medical treatment or social security for those unable to work due to accidents. The psychological and financial

burden of caring for a previously economically active family member can be even more destabilizing for the household economy.

## VULNERABILITY AND CAUSES OF ROAD TRAFFIC ACCIDENTS

Road traffic accidents result from a combination of structural, physical and behavioural factors (see Box 8). While the exposure of road users to traffic accidents is shaped by physical aspects of the road environment, individual behaviour, awareness of safety regulations and travel habits also determine vulnerability to traffic accident risks. In addition, the safety and design features of vehicles shape the likelihood of being involved in a traffic accident, as well as the severity of the impact.

Vulnerability to injury and death from traffic accidents also varies according to the mode of transporta-



**Increased use of private cars exacerbates road congestion in cities**

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**Box 8 Risk factors determining incidence and severity of traffic accidents**

Factors that contribute to the risk of occurrence of a road crash include:

**Exposure:** amount of travel undertaken, defined as the number of trips, the distance travelled, or time in the road environment.

**Behavioural factors:** human behaviour, including the extent of knowledge and understanding of traffic systems, driver experience, skill and attitudes to risk, and the relationship between risk and factors, such as speed choice and alcohol consumption.

**Vehicle factors:** vehicle design and safety features, such as braking systems, lighting and tyre quality.

**Road environment:** road safety engineering and traffic management make a direct contribution to reducing crash risk. Road design affects road user behaviour and crash risk through the speed that drivers will perceive as appropriate, through detailed design factors such as curves, gradients and road markings, and through failure to provide facilities for vulnerable road users.

The likelihood of injury occurring is determined by the above factors, but also:

**Vulnerable road users:** road users such as pedestrians, cyclists and motorized two-wheeler riders are especially vulnerable to injury worldwide.

**Use of safety devices:** these include seat belts and helmet use.

**Post-crash medical care:** the outcome of a road crash for the victims, in terms of their chance of survival and long-term prognosis, is affected by the level of available medical care.

Source: Commission for Global Road Safety, 2006

tion used as well as gender and age. In societies with high levels of vehicle motorization, vehicle users are most vulnerable to accidents. In middle- and low-income countries, vulnerability is highest for unprotected road users — pedestrians, cyclists and motorcyclists. For example, in Nairobi, between 1977 and 1994, 64 per cent of the road users killed in traffic crashes were pedestrians. Studies also show that road traffic mortality rates are higher among men than women in all world regions, regardless of income level, and also across all age groups. In 2002, 73 per cent of all people who died from road traffic accidents were men. The youth are also highly vulnerable to traffic accidents as emphasized during the 2007 United Nations Global Road Safety Week (23–29 April).

## URBANIZATION AND TRAFFIC ACCIDENTS

Urban areas are the main locus of traffic accidents, given the concentration there of vehicles, transport infrastructure and people. Uncontrolled and unplanned urban

growth can increase the likelihood of occurrence of traffic accidents. This is especially the case in many developing country cities where rapid urbanization and the consequent explosion of motorized vehicles, unplanned settlements and human populations seriously threaten road safety. In Europe, urban growth, characterized by geographical dispersal of the territory within which inhabitants carry out their daily activities and greater use of private cars, is thought to increase the risk of traffic accidents, given the diversity of road uses and increase in travel, traffic flows and crossings of these flows.

Across the globe, there is an evident rise in the use of motorized forms of transportation in urban areas, although at differing paces (see Box 9). In particular, with greater affluence, private vehicle ownership and use have increased in cities around the world. Increased motorization is accompanied by a number of negative externalities, including traffic accidents, congestion and declining use of public transportation.

Urban poverty and vulnerability to injury from traffic accidents are linked. Although the urban poor have environmentally friendly travel habits through a dependence upon non-motorized and public modes of

**Box 9 Increasing use of the automobile: The case of São Paulo, Brazil**

The São Paulo Metropolitan Area has a population of 17 million people. It has experienced not only rapid urban growth over the last few decades, but also a sixfold increase in its motorized vehicle population between 1970 and 1996. A study of transportation and traffic accidents in the area (for the period of 1967 to 1997) illustrates how increasing use of automobiles is causing a range of negative externalities, such as traffic accidents, congestion and pollution, to skyrocket. The sharp rise in the use of private transportation has been accompanied by a concomitant decrease in the use of public transportation. Results from the study also show increased individualization of motorized mobility such that between 1987 and 1997 alone 75 per cent of all additional trips were made by car.

Factors thought to have contributed to the increasingly unsustainable changes in the area's transport systems include widespread conflict and lack of coordination between institutions concerned with decisions on land use, transport and traffic at both the federal and local levels. The transformation of the roadway system to accommodate automobile use is also thought to have increased the vulnerability of pedestrians and non-motorized transportation modes to traffic accidents. Moreover, a lack of integration between modes of public transportation and the poor and deteriorating quality of public modes of transportation have further compromised safety.

Source: Vasconcellos, 2005

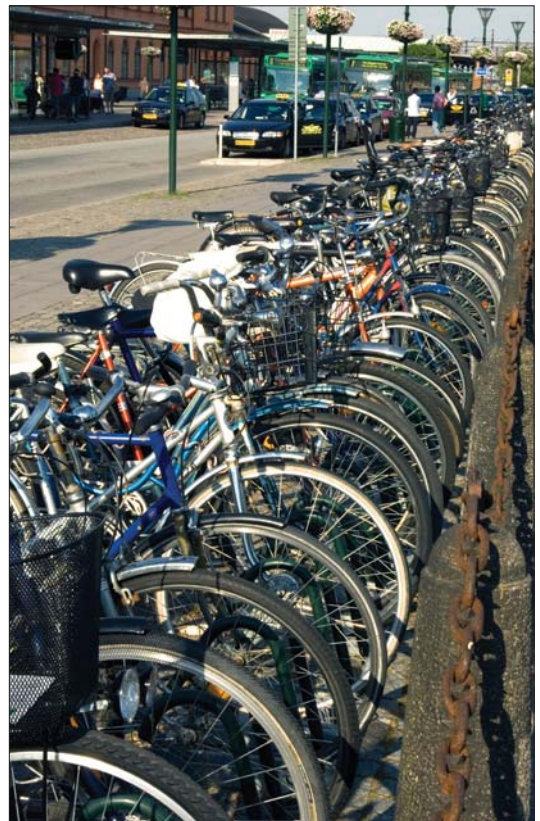
transportation, they are the main victims of road traffic accidents. Urban transport systems influence patterns of vulnerability in that they can force the poor into choosing high-risk transport options. Indeed, in cities where public transport has become unreliable, expensive or does not serve areas of rapidly expanding settlements, privately owned minibuses, trucks or cars have filled the transport gap, often without adequate regulation and consideration of safety measures.

## PREVENTING AND MITIGATING LOSS FROM TRAFFIC ACCIDENTS

Traffic accidents and subsequent loss are the products of human behaviour, but also of urban planning and design, both of which are amenable to development policy. Thus, efforts to prevent and mitigate the impact of traffic accidents need to address the multiple risk factors underlying those accidents (see Box 10).

### Promoting public and non-motorized transportation

Improving the quality and functioning of public transport can enhance road safety and thereby reduce traffic accidents. Mass forms of transportation not only reduce negative externalities of greater motorization, but are able



**Bicycles offer an environmentally friendly and cost-effective form of transportation in cities**

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to deliver high-quality mass transportation at a cost that is affordable to most municipalities, including those of low-income countries. One example is the bus rapid transit system which is growing in popularity globally, especially in Asia, South America and Europe.

Yet, transport planning too often overlooks the needs of the majority of urban residents for whom non-motorized and public transport may be the norm. Instead, planning models itself on a vision of the city that is firmly tied to the motorcar, such that the needs of pedestrians and cyclists come second to those of motorized transport.

For a large majority of the urban poor in developing countries, public transportation and non-motorized transport are the only affordable means of travel. For instance, in India, buses account for 90 per cent of all transport in cities. However, the state of public transportation systems in developing countries, often poorly constructed and maintained and heavily burdened by excessive overloading, is itself a risk factor contributing to the rising incidence of traffic accidents.

## Safer transport infrastructure

Road infrastructure design — in terms of road networks, mix of types of traffic and types of safety measures — determines the likelihood of traffic accidents occurring in urban areas. Road design and facilities influence driver behaviour through amenities such as curves, gradients, road markings and the provision of facilities for vulnerable road users. Speed bumps on a major highway in Ghana (Accra–Kumasi) for example reduced crashes by 35 per

cent, fatalities by 55 per cent and injuries by 76 per cent.

Rationalizing road space allocation by accommodating commonly used forms of transportation, such as two- and three-wheeled vehicles and non-motorized transport, may help to reduce traffic accidents. In particular, road designs need to take into account the needs of pedestrians, bicyclists and public transport vehicles so as to reduce risks for all road users.

## Land-use planning

Integrated land-use and transport planning may also contribute to reducing traffic accidents by minimizing the number and length of journeys taken. Where safe workplaces and residential and recreational land uses are in close proximity, non-motorized transport or short journeys by car and bus are more likely. This also has a knock-on effect in reducing atmospheric pollution and greenhouse gas emissions and provides a framework for community-building. Singapore, for example, has successfully cut car journeys and alleviated severe traffic congestion through an integrated land-use and transport policy.

## Promoting safe behaviour

Promoting behavioural changes can reduce people's exposure to traffic hazards. This involves, among others, interventions seeking to enhance driver skills and training, to reduce impaired driving and to promote the use of safety equipment. Driver training and licensing are impor-

### Box 10 Reducing road traffic injuries: The experience of high-income countries

Fatalities from road traffic accidents rose rapidly in high-income countries during the 1950s and 1960s, following rapid motorization, eventually peaking in the 1970s. Since the 1980s and 1990s, injuries have been reduced in many of these countries by as much as 50 per cent, despite continued traffic growth. This has been attributed to a shift from focusing on 'behaviour' alone to safety systems such as good road and vehicle design and traffic management. A combination of measures has been taken by high-income countries to reduce road injuries, including:

- **Safe road users:** enforcement of laws to moderate the behaviour of drivers, such as speed limits, drink-driving laws, seat belt-use laws and helmet-use laws, have been very effective.
- **Safer vehicles:** improvements in vehicle design have increased the chances of survival in motor vehicle crashes.
- **Safer road infrastructure:** engineering measures such as signs, lane separation, pedestrian crossings and traffic-calming measures have helped to reduce road traffic casualties.

Source: Commission for Global Road Safety, 2006

tant forms of promoting safe behaviour. Education and legislation are both instrumental in increasing the use of safety equipment in vehicles.

A recent global review indicates the role of impairment leading to dangerous driving as a cause of traffic accidents. Driver impairment may be the result of a number of factors, such as alcohol or drug consumption, injury, infirmity, fatigue, the natural ageing process and distractions such as mobile phone use, or a combination of these factors. A study in Colombia found that 34 per cent of driver fatalities are associated with alcohol. In Sweden, the detection of illicit drugs among fatally injured drivers rose significantly between 2000 and 2002.

Legislation prohibiting drinking and driving is included in most countries' traffic laws; but enforcement is lacking and public awareness is poor. Political will is needed if the scope of education, legislation and enforcement is to reach beyond drink-driving to include other causes of impairment, such as fatigue, and new causes of distraction, such as mobile phone use.

### Accident response and recovery

First responses are critical in reducing loss from traffic accidents. Trained first-aiders not only save lives, but also prevent unnecessary injury sustained through inappropriate action taken following an accident. Such capacity to respond to traffic accident injury and to minimize bodily harm varies according to levels of economic development. Death before arrival at the hospital can be as high as 80 per cent among traffic accident victims in low and middle-income countries. As with disaster preparedness work, the piggybacking of transport first-aid skills onto more established public service or civil society delivery programmes is cost-effective.

### Traffic management

Basic traffic regulations and signage to manage traffic are essential instruments for enhancing road safety. Enforcement of such regulations however remains a key challenge in cities worldwide. The effectiveness of traffic regulation enforcement in promoting road safety has been documented in several low- and middle-income countries.



**Enforcing traffic regulations remains a challenge in many cities**

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Evidence suggests that partnerships between community groups, civil society and organizations and the police can help in enforcing traffic regulations. More broadly, four different kinds of community involvement in road traffic policing have been identified:

- partnerships between community groups and local authorities to help identify road hazards;
- volunteer traffic wardens and school patrols;
- formal partnerships between the police and citizen groups (here, citizens partner police in road traffic monitoring exercises);
- higher political attention to advocacy for road safety.



## **Building institutions and awareness for road safety**

Sensitizing road users as well as relevant decision makers about the causes and consequences of traffic accidents and relevant risk reduction strategies is essential for improving road safety. Once available, information on traffic accidents needs to be communicated to relevant actors through appropriate and effective media. Engaging multiple stakeholders is particularly essential in raising awareness and institutionalizing road safety among all road users, but especially among drivers of motorized vehicles.

Implementation of road safety measures and policies requires institutional capacity and resources, which may be absent in poorer cities and countries. Moreover, problems of coordination between different governmental bodies at various levels and with private-sector operators of transport services pose a serious challenge for cities of developing countries.

## **Improving traffic accident data collection**

Traffic deaths and injuries remain largely invisible to society and policy makers because they are mostly scattered individual events with low impact. This is exacerbated by a lack of capacity to collect and compile traffic accident data, especially in developing countries.

More work is needed to help understand the full economic costs of road crashes and to assess performance of policies aimed at reducing traffic accident risk. Policy assessments could combine accident statistics with other performance indicators, especially those that can be targeted at improving vulnerable road user safety.

## **INTERNATIONAL COOPERATION IN ROAD SAFETY PROMOTION**

A major advancement in the road safety agenda over the last decade has been the growing number of United Nations, multilateral and bilateral donor organizations that

have developed road safety policies. In October 2005, the United Nations adopted a historic resolution on ‘Improving global road safety’ in recognition of the limited capabilities of developing countries and countries with economies in transition to address road safety concerns and the need for international cooperation. This led to a call for a Global Road Safety Week, the first of which was held in April 2007 in order to raise awareness of road safety concerns. Furthermore, the WHO was mandated to coordinate road safety issues across United Nations agencies and with other international partners through the United Nations Road Safety Collaboration. Since its establishment, this initiative has been active in the areas of data collection and research, technical support provision, advocacy and policy, and resource mobilization.

A number of other initiatives illustrate the attention that road traffic accidents are receiving internationally. For instance, the World Bank’s Global Road Safety Facility, launched in November 2005, intends to generate increased funding and technical assistance for initiatives aimed at reducing deaths and injuries in low- and middle-income countries. Such international support and cooperation remain vital for the reduction of road traffic accidents, especially in developing countries.

## **CONCLUDING REMARKS**

Traffic accidents are the most significant cause of injury and death associated with small-scale hazards in urban areas. Global trends indicate that the incidence and impacts of traffic accidents will increase by 2020 if no action is taken. High-income countries will experience a decline in road traffic accident fatalities, while other regions will experience a phenomenal increase in mortality from road traffic accidents. The magnitude of loss both in terms of human life and economic assets is substantial although this varies greatly across countries, cities and within cities. Given that a variety of interrelated factors determine the incidence and severity of traffic accidents, risk reduction requires action on a number of fronts combining legislation, enforcement and public education.

# MITIGATING THE IMPACTS OF DISASTERS

This chapter examines future policy directions in disaster risk reduction. It reviews policies that can contribute towards effective disaster preparedness and prevention and improved processes of relief, recovery and reconstruction post-disaster. Policies and practices at the city, national, regional and international levels are identified, and the factors underlying their success examined.

## INTERNATIONAL FRAMEWORKS FOR ACTION

Increasing numbers of people and resources based in urban locations, and growing numbers of people affected by disasters, have led to the integration of the disaster risk reduction agenda in major international frameworks of action.

### The Millennium Development Goals (MDGs)

The MDGs provide an international framework for development work that extends to disaster management. Disaster risk reduction cuts across each of the eight MDGs, but is not identified as a separate target for action. This has reduced the visibility of risk reduction to some

degree. However, the importance of integrating risk reduction in safeguarding gains from disaster loss has become increasingly apparent.

During 2001, a road map for the implementation of the United Nations Millennium Declaration highlighted the importance of disaster risk reduction. In 2005, a review of progress towards meeting the MDGs indicated that disasters are a serious impediment to meeting the MDGs. It thus called for the mainstreaming of risk reduction strategies within MDG-based poverty reduction strategies.

### The Habitat Agenda

The 1996 Istanbul Declaration on Human Settlements endorses ‘the universal goals of ensuring adequate shelter for all and making human settlements safer, healthier and more liveable, equitable, sustainable and productive’. The Habitat Agenda is the sister document to the Istanbul Declaration and the main political document directing international work on urban development. The integrated approach to urbanization presented in the Habitat Agenda is entirely compatible with disaster risk reduction. The Habitat Agenda includes disaster risk reduction among its commitments for action (see Box 11) and outlines several recommendations covering various aspects of risk reduction.

**Box 11 The Habitat Agenda: International commitments for action to reduce urban disaster risk**

The following commitments directly address disaster risk reduction. Many other commitments for action impact indirectly upon vulnerability and risk through targeting urban poverty, infrastructure and service provision, pollution, land-use planning and urban governance.

**Commitment 40 (I):**

*Promoting shelter and supporting basic services and facilities for education and health for the homeless, displaced persons, indigenous people, women and children who are survivors of family violence, persons with disabilities, older persons, victims of natural and man-made disasters and people belonging to vulnerable and disadvantaged groups, including temporary shelter and basic services for refugees.*

**Commitment 43 (z):**

*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.*

## The Hyogo Framework for Action, 2005–2015

International action for disaster risk reduction is given further direction by the Hyogo Framework for Action, 2005–2015: Building the Resilience of Nations and Communities to Disaster. The framework identifies five general priorities for action including national and local level prioritization of disaster risk reduction, strengthening of early warning systems, building a culture of safety and resilience, reduction of risk factors built into development and enhancing preparedness and response.

The Hyogo Framework recognizes unplanned urbanization as a key factor driving increasing global vulnerability and losses to natural and human-made disasters. Plans for implementing the Hyogo Framework have been agreed and explicitly acknowledge the need to break the negative spiral of poverty, accelerated urbanization, environmental degradation and disaster. A survey of progress in this regard in 2006 indicates that some good progress has already been made. A total of 60 governments have designated focal points with responsibility for implementing the framework and 40 countries have reported concrete disaster risk reduction activities.

## Integrating disaster risk reduction into urban development

Progress is being made in bringing together urban development, disaster risk reduction and humanitarian action. For instance, UN-Habitat, the leading United Nations agency for human settlements issues, has developed a conceptual Framework for Sustainable Relief and Reconstruction. The Framework identifies future opportunities for working with the international community, local authorities and communities in integrating disaster risk reduction and urban development.

Yet, key challenges to a more integrated and sustainable approach persist, perpetuated by institutional structures at all levels. Failure to integrate risk reduction and urban development has been attributed to overly specialized training, which serves to compartmentalize disaster management and urban planning, rather than foster a culture of interdisciplinarity. At the national level, legal structures for risk reduction and urban planning are frequently separate, absent or lack national–municipal collaboration. Potential for developing more integrated, interdisciplinary risk reduction projects is further limited by donors' separate budget lines for development and emergency relief.



**Technological innovation has greatly improved disaster mapping and analysis**

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Ways beyond the impasse in communication between disaster management and urban development professionals are opening up; but more work is needed. International organizations, as well as national and local governments, can develop internal mechanisms to foster interaction between these practitioner communities.

## RISK REDUCTION THROUGH LAND-USE PLANNING

Effective land-use planning requires evidence-based and transparent decision making. Strong governance systems, legal instruments and capacity for oversight and enforcement are also necessary to support implementation of land-use planning. Inclusive governance systems which include local voices and support decentralized leadership are more effective for land-use planning than overly centralized regimes, especially where rapid urbanization has stretched enforcement capacity.

Land-use planning for risk reduction is faced with a number of challenges, including the proliferation of slums, inheritance of risks resulting from past planning decisions, risk factors in the city's hinterland and global level risk factors. Innovations in the areas of data collection, management and analysis, decision-support tools and institutional reform may improve the effectiveness of land-use planning.

### Data collection, management and analysis

Data on hazards, risks and vulnerability improves the evidence base for effective land-use planning. In particular, for long-term analysis of trends in vulnerability and impacts, regular and consistent data collection systems are required. Technological innovation is providing new opportunities for the collection and use of such data. In recent years, advances in GIS have greatly enhanced physical hazard mapping and analysis.

Yet, the integration of socio-economic and environmental variables within GIS models, risk maps and analysis remains a challenge. Data collection systems managed by local municipalities may enable better integration of socio-economic and environmental data into GIS and risk models. Participatory GIS (P-GIS), which seeks to involve communities in the production of spatial hazards data, may also be useful in this regard. The application of P-GIS has however been limited in cities of middle- and low-income countries due to scarce human resources and technical capacity.

### Cost-benefit analysis

Cost-benefit analysis can aid land-use decision making for risk reduction. Where cost-benefit analysis has been undertaken, it has illustrated empirically the cost-effectiveness of investing in risk reduction. For instance, the World Bank and US Geological Survey calculated that economic losses worldwide from disasters during the 1990s could have been reduced by US\$20 billion if US\$40 million had been invested in mitigation and preparedness. In China, investments of US\$3.15 billion in flood control measures over 40 years are believed to have averted potential losses of US\$12 billion. Yet, cost-benefit analysis is still not routinely used to determine the comparative advantage of investing in disaster prevention, preparedness and mitigation infrastructure investments.

The variable frequency and severity of natural and human-made hazard events and any associated human disasters present a challenge to cost-benefit analysis. Cost-benefit analysis also requires putting a monetary value on all costs and benefits, including human life and injuries. This is a challenge for any comparative assessment between places with different land uses — for example, in attempting to measure relative returns from an investment that increases security in a business

district or a low-income housing area. Moreover, methods for valuing human life and other intangibles such as environmental quality are hotly contested. Part of the solution to this is not to use cost-benefit analysis as a stand-alone tool to determine decisions, but rather to provide supporting evidence for decision making alongside other non-economic inputs.

## **Institutional reform**

Appropriate institutional arrangements define the relationships, responsibilities and power of stakeholders in disaster and its management. Many cities have a solid base of legislation for urban risk management, including legislation to enforce land-use planning, construction standards and industrial risk management. The challenge is to implement and enforce legislation. It is at the level of national legislation for disaster management policy and planning where there is most scope for clarifying legislation that can support city level planning.

The movement from managing risk through emergency relief and response towards a more proactive pre-disaster orientation requires institutional change. Urban- and national-level legislative reform has usefully engaged with international forums for risk reduction. The Habitat Agenda, which promotes the need to improve the quality of human settlements through solidarity, cooperation and partnerships, and the United Nations International Strategy for Disaster Reduction (ISDR), which can act to provide information on good practice or facilitate South-South learning, are examples of this. Regional cooperation can be similarly useful in promoting successful reform and implementation of risk reduction in urban planning. The Asian Urban Disaster Mitigation Programme and the African Urban Risk Analysis Network have been instrumental in sharing information on risk reduction and building communities of practice for urban professionals working on risk reduction in their respective regions.

## **DESIGNING DISASTER-RESISTANT BUILDINGS AND INFRASTRUCTURE**

Technological and engineering expertise is available in most cities to design buildings and infrastructure for disas-

ter-proofing. Professional bodies have begun to develop guidelines for good practice in designing disaster-resilient critical infrastructure and this offers a great potential for information exchange and refinements, in practice, to reduce risk.

## **Aid agencies and construction oversight**

Multilateral and bilateral development aid agencies can influence the location, timing and content of investments in infrastructure through their stated policy priorities. However, these agencies often do not have their own guidelines or engineering standards and procedures with which to ensure that investments are disaster-resistant. Rather, this service is decentralized and local standards and practices are used. Donors usually view the responsibility for construction standards as resting with governments. This lack of oversight in construction through social investment funds suggests an area for future policy consideration.

## **Retrofitting**

Retrofitting can offer a way of improving the resilience of a city's buildings. However, despite the small marginal costs of retrofitting in most instances, where works are perceived by owners to be unduly disruptive, they are unlikely to be entered into voluntarily. Similarly, if costs of retrofitting are considered to be high in relation to perceived risk, voluntary action will be limited. Where building owners are not prepared to retrofit buildings, tenants have little power and are often denied rights to invest in the upgrading of the property they rent.

## **Indigenous buildings**

Non-engineered or indigenous structures are dominant in many cities around the world. In many disasters, it is the non-engineered or indigenous buildings that are most damaged and that kill the most people. Indigenous styles are not of themselves inherently dangerous. Under rapid urbanization, however, the majority of such structures have not been built to adequate safety standards.

Additional knowledge is a necessary component of a comprehensive strategy for improving the quality of indigenous buildings, most of which are constructed outside the formal housing and planning systems. In

addition to a lack of knowledge, indigenous housing is made unsafe by a lack of financial resources and the number of competing demands on household budgets, many of which require more immediate attention than disaster risk-proofing.

## **Training**

Universities and technical institutes have long been at the forefront of disaster risk reduction through research and teaching on design aspects for disaster-resilient cities. But more can be done. There are opportunities for integrating disaster awareness within curricula, even for non-specialist degrees. This is a mechanism for fostering awareness of disaster risk reduction as a cross-cutting concern for all seeking careers in urban development, engineering design, project management, housing and urban planning.

## **Climate change, buildings and infrastructure design**

Climate change is expected to affect urban populations through rising sea levels, increased hazard from tropical cyclones, flooding, landslides, heat and cold spells, as well as challenges of urban water quality and storage. Such changing physical parameters necessitate adaptation in building and infrastructure design. To be successful, adaptations must be consistent with economic development, environmentally and socially sustainable over time, and equitable. However, uncertainty in forecasting and a tendency for conservative estimates of future change make it difficult to identify design targets for adaptation.

# **STRENGTHENING EARLY WARNING SYSTEMS**

The greatest challenge for effective early warning is to link existing technical capacity with people-centred approaches which ensure that early warnings are communicated and acted on in a timely manner.

## **Integrating ‘top-down’ and ‘bottom-up’ approaches**

Connecting technical expertise to people at risk requires that early warning systems are built from the bottom up (sensitive to the contexts in which they will be useful), as

well as from the top down (being accurate and effective with their use of information). The fusion of top-down scientific and bottom-up people-centred approaches can maximize the trust that those at risk place in the system. Not only the message but also the messenger needs to be trusted for people to take action.

## **The challenge of cities**

Urban settlements offer opportunities as well as challenges for early warning. The density of settlement and strength of social relations in cities indicate that early warning and preparedness will diffuse quickly. This observation is more difficult to maintain in cities that are home to diverse migrant communities, or where social class and demographic factors can cause some to be isolated from mainstream society. Linguistic barriers, poverty and lifestyle habits also mean that access to messages communicated through the mainstream media is limited.

Cities often face multiple hazards and present a complex distribution of vulnerabilities and capacities. This presents a challenge for early warning, which has developed as a linear science where single hazard types are monitored. The integration of multiple hazard monitoring systems is a current challenge for urban disaster risk managers.

## **Knowledge for action**

Experience shows that, following a warning, in order for action to be effective, knowledge on what preparedness actions to take is needed by people at risk and emergency services. Public information campaigns can seek to address the needs of the general population and have dedicated strategies for reaching less accessible social groups — for example, by presenting material in multiple languages. Successful public information campaigns also often include working with key community groups to disseminate messages, and to build, in advance, the cooperative relationships that are the bedrock of an effective disaster response. The media can also be very helpful in educating the public on disaster preparedness and recovery programmes after disaster strikes.

Participatory risk mapping can enhance action in the face of disaster by enabling local actors to acquire and share information with one another and external actors to help identify where vulnerable people, such as the frail or



isolated elderly, live. Moreover, participatory risk mapping can be used to identify local resources, including evacuation routes and buildings that can be converted into public shelters.

## IMPROVING EMERGENCY RESPONSE AND RECONSTRUCTION

Urban areas offer specific challenges for emergency response and recovery, including the existence of settlements outside the formal and legal system, inadequate public services and high risk of secondary disasters. Synchronizing response efforts between different urban sectors, especially critical services, remains problematic, although innovative approaches are already in place in some places (see Box 12). Emergency response in cities can be enhanced through the mobilization of redundant resources such as medical stock, temporary accommodation, equipment, and mobile water and sanitation units.

In terms of post-disaster recovery, building back better to reduce risk and integrate development within reconstruction is absolutely necessary, but remains a significant challenge. Future improvements in both recovery and reconstruction might come from approaches that build on local and national capacities, and which experi-

ment with more decentralized planning and programming that builds on pre-disaster risk reduction.

### Speed and sustainability in shelter provision

A long-standing tension in reconstruction is between the demands of delivering basic needs, including shelter, quickly, and the desire for sustainability, which requires greater participation and a longer time commitment. The disconnection between shelter reconstruction and development is perhaps also partly a reason for the many instances where temporary shelter is not replaced and becomes, *de facto*, permanent. In Santo Domingo (the Dominican Republic), public confidence in the ability of the state to adequately deliver reconstruction following Hurricane Georges in 1998 was severely undermined by the knowledge that many still remained in 'temporary' housing built after Hurricane David struck in 1979.

An awareness of the opportunity for shelter provision to contribute to longer-term development has stimulated some reappraisal by humanitarian and development agencies of the processes through which shelter is provided. It is important that, as far as possible, people whose homes have been lost or damaged are allowed to participate in shelter provision programmes in the post-disaster period. This saves costs, provides a mechanism for

#### Box 12 Integrated Urban Emergency Response Centre, Nanning, China

Nanning City is located in southwest China, with a population of 1.7 million and a built area of 170 square kilometres. The city has experienced rapid urbanization over the last decade, with its population growing by 172 per cent. This has been accompanied by increased threats to safety and security, including from natural and human-made disasters. The old emergency response system, characterized by fragmented agencies, was poorly adapted to the changing environment of the city. Thus, the city established an Emergency Response Centre, a successful example of an integrated emergency response system.

The Centre, the first of its kind in China, started to provide emergency services in November 2001 by integrating telephone calls for the police, fire and ambulance services. It also responds to traffic accident incidents and provides a Mayor's Hot Line. Other emergency response systems are also in place for flood, earthquake, water, electricity and gas supplies. To prevent emergencies and disasters, and to minimize their impact, the Centre has prepared numerous prevention and emergency response programmes for natural disasters, public health, management of dangerous chemicals, housing safety, school safety and public space safety. This Centre, consisting of 15 subunits, has numerous technical capabilities, including the immediate identification of the exact location of incoming emergency calls as well as required rescue resources. It also has the capacity to set up temporary command stations at emergency sites.

The Centre has improved the overall efficiency and coverage of emergency responses in the city, particularly rescue services. The experience of the Centre shows that a municipal government can successfully mobilize stakeholders and use modern technologies to create a safer living environment for its residents.

transferring new or improved construction skills and can bolster the local economy. Moreover, the participation of beneficiaries in shelter reconstruction enhances the appropriateness of housing. Flexibility in design is also necessary to allow structures to be adapted to meet a variety of cultural needs and expectations.

Where settlements have suffered great damage or been shown, through disaster, to be at unacceptable levels of hazard exposure, settlement planning and, in extreme cases, relocation will still be required. This opens a rare opportunity for progressive land use and strengthening of tenure security, including the extension of basic services for those people who may previously have lived on the margins of urban life. However, it is commonplace for landownership to be disputed in the aftermath of a disaster, which is made worse by a lack of documentation or the destruction of local public offices that held records.

### Insurance and urban reconstruction

Putting financial mechanisms in place before a disaster strikes can enable a more speedy and independent recovery. Innovations in financial aspects of risk management have been most active around the potential for insurance and risk offsetting through hedge funds at the national and international levels, and through the potential offered by micro-insurance at the household and individual levels.



**Ensuring the long-term sustainability of shelter is a key challenge for disaster reconstruction**

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The uptake of risk transfer understandably remains low in developing countries, as insurance demand generally rises with per capita income (up to a certain level). Even in developed countries, insurance cover for loss from disasters may be restricted, as illustrated in the aftermath of the Kobe earthquake in 1995 (see Box 13). Recently, however, a number of novel schemes have been implemented or are under implementation. These include, at the macro level, private–public insurance partnerships administered together with national governments, international financial institutions and the private sector, and risk transfer for public liabilities.

#### Box 13 Insurance policies and disaster loss in Kobe, Japan

In 1995, the Kobe earthquake in Japan caused over US\$100 billion in damage and resulted in the destruction of 150,000 buildings. Insured losses, however, were limited to around US\$6 billion. The absence of a comprehensive insurance cover in this wealthy country is a consequence of the restrictive provisions of the national insurance sector and several key features of Japanese insurance policies:

- Basic homeowners' fire insurance policies do not cover fires resulting from earthquakes.
- Owners may purchase a limited earthquake rider, with the indemnity covering 30 to 50 per cent of the structure's replacement value, up to a maximum of US\$100,000.
- Claims were categorized into three groups: total loss, half loss and less than half. If damage was categorized as half loss, payout would be 15 to 20 per cent of the replacement value.
- Contents were not covered unless they were totally destroyed.

In addition to the specificities of these insurance policies, only 7 per cent of homeowners nationally have such earthquake riders, and at the time of the earthquake in Kobe, coverage was less than 3 per cent of homeowners. During reconstruction, lack of insurance may well have contributed to the economic pressures that led some homeowners, especially the poor and elderly, to join many renters in moving from high-value city centre property. The result was a movement of property from vulnerable groups into the speculation sector, with potential impacts on land use and values that could, in turn, reduce land and housing access and equity in the city.

Micro-insurance can assist poorer urban residents to meet their immediate needs during and after a disaster through emergency loans or the release of savings. It can also support clients in reconstruction through helping businesses where productive assets or stock have been lost, or for repairs to be done on homes. However, post-disaster loans are riskier than those provided in stable times, thus requiring greater focus by the lenders on clients' cash flow, collateral, credit history and personal character.

### **Revisiting governance for relief and reconstruction**

In the last 25 years, coordination has become a prominent feature of multilateral assistance during and after emergencies. Contemporary relief and reconstruction operations are large in scope and include numerous agencies responding to a broad range of needs. While the United Nations system and large international non-governmental organizations have developed coordination architecture, codes and practice, a multitude of small and sometimes temporary civil society actors lie outside of these arrangements and lines of accountability.

For coordination to be successful, an underlying tension between two directions of accountability for intermediary humanitarian actors needs to be resolved. First, and most important, is downward accountability to the survivors of disaster. Second is accountability to donors or the government agencies, private companies or individuals who provide funds for specific work to be undertaken. Tensions set up by these necessary lines of accountability



**Clear structures of operation and accountability are necessary for successful disaster relief**

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contribute towards gaps, overlaps and competition between agencies on the ground. This leads to losses in the efficiency and equity of programmes and can undermine local governance structures.

If reconstruction and development are to be genuinely linked, then those involved in reconstruction need to think hard about who sets the agenda, and about how best their actions can contribute to local and national visions and plans for development.

## **THE ROLE OF PARTICIPATORY AND INCLUSIVE STRATEGIES AND POLICIES**

Building resilience into urban development is a challenge that requires the application of participatory and inclusive strategies. The task of participatory and inclusive strategies is to identify what every actor and asset in the city can contribute to shape and implement sound disaster risk management. Awareness-raising through education and the participation of the private sector may also enhance the inclusiveness of disaster management within urban development planning.

### **Inclusive planning**

Inclusive planning opens space for the incorporation of local actors within disaster preparedness, relief and reconstruction projects. It enables multiple stakeholders to be brought together to generate more open and transparent planning processes. Local conflicts following a disaster, such as those over land rights, can also be mediated through the use of inclusive approaches. Inclusive planning can also enable the identification of local resources for disaster preparedness, response and reconstruction. Moreover, inclusive planning can be instrumental in citizen empowerment by opening political debate about wider questions of justice, morality and rights in risk management decision making.

Although inclusive planning is often criticized for requiring more time and resources, it can increase time and cost-effectiveness through transparent decision making which reduces conflict and facilitates access to local knowledge. Inclusive planning is also thought to focus on inherently local initiatives which contribute in a

limited way to larger structural concerns. However, deliberative techniques can enable participation to feed into policy decisions.

### Education for awareness-raising and self-reliance

Education provides a key resource to make risk reduction strategies more inclusive. In the 2006–2007 period, the ISDR's 'World Campaign on Disaster Risk Reduction' aimed to lobby for the integration of disaster risk reduction in school curricula of high-risk countries. Indeed, a very recent review of the potential of education systems to raise awareness and skills for disaster risk reduction reports that many school curricula already focus on hazards through earth science, and also practise preparedness and drills; but few schools integrate the two and few develop their own local curriculum to reflect local risk contexts.

Informal education also offers a key opportunity for empowering those at risk, not only children, but adults too. Informal education can be promoted alongside formal services, where these exist, to target vulnerable groups who may be excluded from formal education through poverty or social inequality. Two successful pathways are to develop community and popular media programmes. Opportunities for combining popular media with local activities perhaps offer the greatest scope for informal education to reduce risk.

### Including the private sector

The private sector is a major actor in shaping the opportunities and risks of urban life. Public–private partnerships and foreign direct investment have increased the stake and responsibility of international capital in urban infrastructure provision and economic development. Despite this growing influence, there is little evidence of a proactive engagement with disaster risk reduction among private sector organizations that goes beyond charity donations for recovery.

The business case for involvement in disaster risk reduction is largely built upon corporate social responsibility. The most active industrial sector is insurance, with



**Inclusion of disaster-related issues in school curricula raises risk-reduction awareness and skills**

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a growing number of companies going beyond offering advice to providing financial incentives and training for safe construction and disaster response. There are also a small number of global engineering and urban planning companies that have provided services as part of a corporate social responsibility package during reconstruction.

Strategies for encouraging corporate social responsibility for risk reduction might include partnerships between business and humanitarian actors. Where this relationship already exists, there is some evidence that business has recognized the strategic value of supporting risk reduction.

## CONCLUDING REMARKS

This chapter has examined core pathways through which resilience to disaster risk is, and can be, strengthened in cities. For all aspects of disaster risk reduction, inclusive and participatory strategies and policies can offer scope for building empowerment, self-reliance and accountability among those who make decisions, strengthening the resilience of communities and cities. There are many examples of partnerships, including local or national government and civil society; but the private sector also has much to offer. This potential has not yet been realized in urban risk reduction, with corporate social responsibility being limited to emergency relief.

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