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Humanitarian Practice Network (HPN)
Overseas Development Institute
111 Westminster Bridge Road
London, SE1 7JD
United Kingdom

Tel: +44 (0)20 7922 0331/74
Fax: +44 (0)20 7922 0399
Email: hpn@odi.org.uk
Website: www.odihpn.org

Disaster risk reduction Mitigation and preparedness in development and emergency programming

John Twigg

Humanitarian Practice Network
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Overseas Development Institute
111 Westminster Bridge Road
London SE1 7JD
United Kingdom

Tel. +44 (0) 20 7922 0300
Fax. +44 (0) 20 7922 0399

HPN e-mail: hpn@odi.org.uk
HPN website: www.odihpn.org

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Good Practice Review

Disaster risk reduction
Mitigation and preparedness in development and emergency programming

Commissioned and published by the Humanitarian Practice Network at ODI

John Twigg

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Overseas Development Institute
111 Westminster Bridge Road
London, SE1 7JD
United Kingdom

Tel: +44 (0)20 7922 0331/74
Fax: +44 (0)20 7922 0399
Email: hpn@odi.org.uk
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About the author

John Twigg is an Honorary Research Fellow at the Benfield Hazard Research Centre, University of London, researching and writing on social and institutional aspects of risk reduction. His recent projects include research on NGO activities in disaster mitigation and preparedness, vulnerability analysis and sustainable livelihoods approaches, and corporate social responsibility and disaster reduction. He worked previously in the development NGO sector, in government and in a university. He co-ordinates the natural-hazards-disasters email discussion list and was a member of the UK National Coordination Committee for the UN International Decade for Natural Disaster Reduction.

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Contents

Acronyms and abbreviations

BBC	British Broadcasting Corporation
CBO	community-based organisation
CSR	corporate social responsibility
CVA	Capacities and Vulnerabilities Analysis
DFID	Department for International Development
FAO	UN Food and Agriculture Organisation
GDP	gross domestic product
GIS	geographical information system
IDNDR	International Decade for Natural Disaster Reduction
IFRC	International Federation of Red Cross and Red Crescent Societies
ISDR	International Strategy for Disaster Reduction
M&E	monitoring and evaluation
MFI	micro-finance institution
NGO	non-governmental organisation
PAHO	Pan-American Health Organization
PRA	participatory rural appraisal
PTD	participatory technology development
RRA	rapid rural appraisal
SEWA	Self Employed Women's Association
UNDP	United Nations Development Programme
VA	vulnerability analysis
VCA	Vulnerability and Capacity Assessment

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I dedicate this book to Judith, Sonia and Adam, who can now expect to see more of me.

John Twigg
London, March 2004

The author and publisher are grateful to the following for permission to reproduce images: The International Strategy for Disaster Reduction (Figure 1.1); Terra Publishing (Figure 2.1); Routledge (Figure 2.2); Lynne Rienner Publishers (Figure 4.1); and ITDG Publishing (Figures 11.3 and 15.1).

Carmen Schlosser kindly gave permission to use an unpublished diagram (Figure 16.1).

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Chapter 1
Introduction

1.1 Disaster reduction: a challenge for everyone

As this Good Practice Review was being drafted, a series of news stories demonstrated why such a book is needed.

On 23 May 2003, the BBC News website reported that at least 200 people had died from dehydration and sunstroke in a heat wave in the southern Indian state of Andhra Pradesh. Temperatures had soared to 47.2°C. The previous year, a heat wave had killed more than 1,000 people in the state and caused widespread drought. In the northern state of Rajasthan, which was suffering its fourth consecutive year of drought, all 32 districts were declared drought regions, and the state's Chief Minister asked the national government for $1.5bn of aid. Two weeks later, the government of Sri Lanka appealed for nearly $30m in international aid as monsoon rains caused the worst floods in the country's history. Two hundred and thirty-five people died, 108,000 families were affected, and 9,000 houses and 90 schools were destroyed. Hundreds of kilometres of power lines needed replacing.

Elsewhere in the world, other natural hazards were exacting their toll. In late April, a mountain hamlet in Guatemala was destroyed by a landslide. At least seven people were killed, a dozen were missing and 250 made homeless. Residents said they had been urged to evacuate the area some time before, because the mountainside was unstable, but they were so poor they could not afford to move. In early May, a 17-second earthquake flattened a school boarding house in Turkey, killing 83 children. On 21 May, earth tremors killed over 2,200 people and injured 10,000 in Algeria; the government authorised a $1.8bn rebuilding package.

There was encouraging news too. The BBC's correspondent in Cameroon reported that ten new seismographs costing over $300,000 had been installed on Mount Cameroon, an active volcano, to monitor its activity and give warning of future eruptions. Meanwhile, an NGO worker in Malawi was recording that the response to the country's food crisis had averted a major disaster. She described visiting a village whose harvest had been damaged by floods as well as drought. The villagers were concerned that their intensive farming practices were eroding the riverbanks, and so they had started a tree nursery, planting saplings along the banks to help bind the soil.

These examples illustrate two important points.

First, natural disasters – that is, disasters resulting from natural hazards such as cyclones, droughts, floods, earthquakes, landslides and volcanic eruptions – are widespread and numerous in developing and middle-income countries. They can cause great loss of life and immense damage to communities, infrastructure and national economies. Ethical, humanitarian considerations oblige us to act to protect human life and prevent suffering. Many researchers and aid institutions have identified natural disasters as a major threat to sustainable development (see Chapter 2).

Second, there is much that can be done to protect vulnerable communities against disasters. The good news stories from Cameroon and Malawi exemplify the range of different approaches to disaster reduction, from scientific and high-tech to community-managed with local resources. This book presents many other examples.

1.2 The risk management approach

The literature on hazards and disasters is full of technical terms. Two – mitigation and preparedness – are commonly used to categorise the main methods of protecting communities against hazards and disasters. They appear in the title of this book for that reason. 'Mitigation' is any action to minimise the impact of a potential disaster; 'preparedness' refers to specific measures taken before a disaster strikes, usually to issue warnings, take precautions and facilitate a rapid response.

These and other key terms, such as disaster, hazard and vulnerability, are explained more fully in Chapter 2. However, this Review sidesteps the technical jargon as far as possible because many people working in aid and development find it off-putting. A related problem is that use of the emotive word 'disaster' automatically conjures up images of emergency relief and often leads to disaster reduction work being viewed solely as an aspect of humanitarian aid, when it should also be a central component of development programmes.

The basic principle underlying this Good Practice Review is that programming should adopt a risk management approach – a systematic approach to identifying, assessing and reducing risks of all kinds associated with hazards and human activities. Risk management should be an integral part of the way organisations do their work, not an add-on or a one-off action. The modern risk management approach recognises that a wide range of geological, meteorological, environmental, technological and socio-political hazards threaten

society – individually and in complex interaction. Risks are located at the point where hazards, communities and environments interact, and so effective risk management must address all of these aspects. Hence disasters are no longer seen only as unfortunate one-off events to be responded to, but also as deep-rooted and longer-term problems that must be planned for.

Historically, disaster mitigation and preparedness have tended to fall into the gap between development cooperation and humanitarian assistance. In one sense the distinction between relief and development is artificial in that risk is not a distinct sector. It should be everyone's business and, as this review shows, an extensive range of options and approaches is available. Project planners and managers should take a very broad view of the options available to them, and they should be imaginative in their approach.

Nevertheless, the principles and activities of humanitarian agencies differ from those of development agencies in some important respects. The primary goals of humanitarian action are distinctive: to protect life, where this is threatened on a large scale, and to reduce excessive human suffering. Some elements of risk management fit more naturally into one sphere or another – for example, disaster preparedness is closely linked to emergency response, whereas longer-term mitigation approaches tend to have much in common with development processes. Greater coherence between developmental and humanitarian interventions is essential, but this must be based on a realistic assessment of the purpose and limits of the different agendas.

1.3 Readership

This Good Practice Review is intended for practitioners: principally project planners and managers working at sub-national and local levels, mostly in NGOs but also in local government and community-based organisations (CBOs). It is also aimed both at people working on long-term development programmes and those involved in emergency management. The book is for those working with vulnerable people, wherever they may be, and before, during and after disasters.

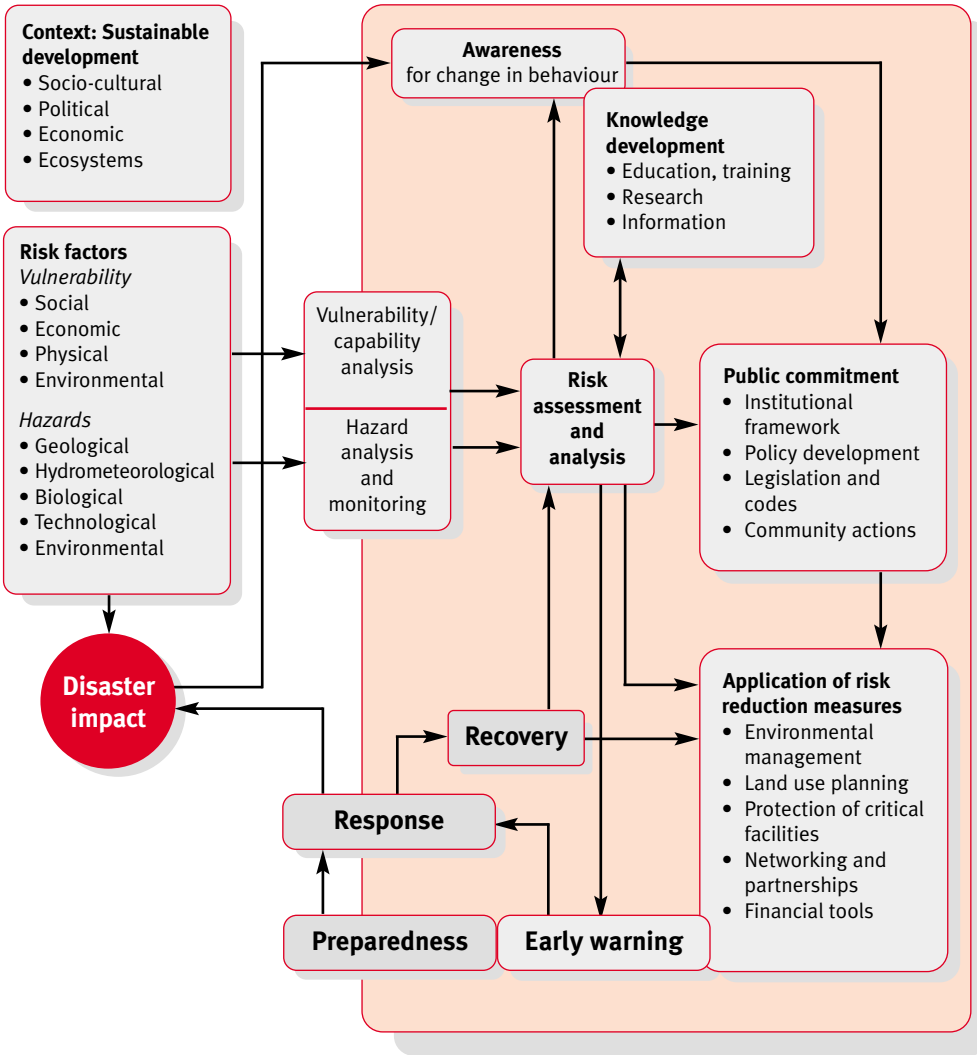
1.4 Aims and scope

This Review aims to help project planners and managers to:

- appreciate the significance of hazards (primarily natural hazards) and the risks associated with them;

Figure 1.1

A framework for disaster risk reduction



Living with Risk: A Global View of Disaster Reduction Initiatives (Geneva: UN International Strategy for Disaster Reduction, 2002), p. 23.

Case Study 1.1
An integrated approach to local risk management

The Lower Lempa River Valley in El Salvador covers 850 square kilometres and has a population of 30,000–40,000 people, living in nearly 90 villages and small towns. It is fertile and agriculturally productive. Seasonal flooding is a regular feature, but few reports of disastrous floods were recorded before the 1990s. Since the end of hostilities between the government and the Farabundo Marti National Liberation Front (FMLN) in 1992, land in the area has been given over to ex-combatants, and many poor families have been relocated there. Many of the new inhabitants are from urban centres and were put in flood-prone areas. Institutional and political divisions led to quite different approaches to environmental management being adopted on opposite banks of the river.

In 2000, a project began to coordinate disaster risk reduction and sustainable development in the valley. Its starting-point was that disaster risk could only be addressed holistically, in the context of the everyday insecurity experienced by over 70% of the local population who lived below the poverty line.

A broad-based diagnosis of the situation, with extensive community participation, led to a portfolio of project proposals that addressed disaster and development needs. It included:

- improved woodland management as a natural buffer to floods and for sustainable economic exploitation;
- a training programme on risk management for local organisations and communities;
- strengthening local early-warning systems;
- land planning and community reorganisation, including improved access to public services and work places and for emergency operations;
- construction of safer housing and relocation of people living in particularly hazardous areas; and
- clean water supply systems and hygiene projects.

A. Lavell, 'The Lower Lempa River Valley, El Salvador: From Risk to Sustainability. Experience with a Risk Reduction and Development Project', in G. Bankoff, G. Frerks and D. Hilhorst (eds), *Mapping Vulnerability: Disasters, Development and People* (London: Earthscan, 2003).

- appreciate the need for risk management in project planning and implementation, and the value of such efforts;
- recognise the main issues that must be understood and addressed when carrying out risk reduction or disaster mitigation and preparedness initiatives; and
- understand – at least in broad terms – how to address these issues in practice, throughout the project cycle.

It is easy to be intimidated by the scale and extent of the problem, and the variety of counter-risk approaches that can be taken. But lasting protection against disasters will not be reached overnight. It is a long-term goal to be attained through a continuous process of improvement. Community resilience to hazards can be built up incrementally over time, as long as the basic approach is sound.

This Review is above all a practical document. However, it is not a manual. Its emphasis is on the *process* of planning and implementing risk reduction initiatives. It focuses on key issues and decision points and how to address them. Readers are referred to more detailed technical manuals and studies where appropriate. It has been difficult to present a balanced coverage of such a broad and diverse subject, and there are inevitable gaps. Nevertheless, the book is evidence-based. The descriptions and discussions are supported by case studies, which aim to give a sense of the range and diversity of practical approaches that can be used.

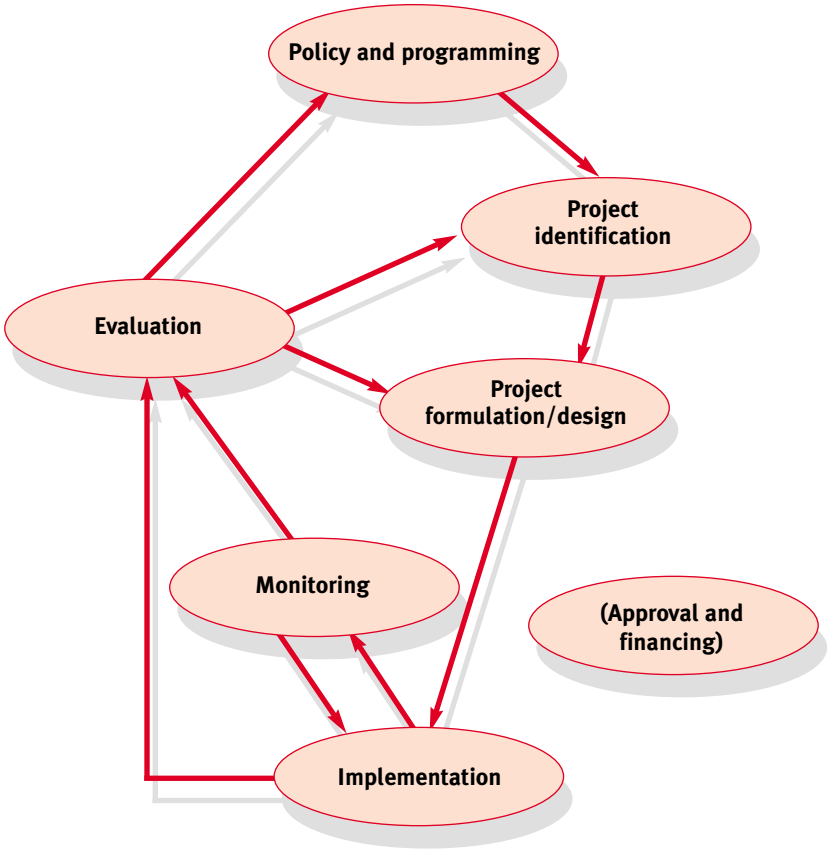
1.5 Contents and structure

The approach taken in the following chapters is based upon the 'project cycle', highlighting issues that appear at stages in the cycle and giving guidance on how to deal with them. Hence, there are chapters on planning (3 and 4), implementation (5–17) and monitoring and evaluation (18).

Every operating manual seems to have its own formulation of the 'project cycle', but most contain the following four main features, outlined here in simplified form (the cycle is shown diagrammatically in Figure 1.2).

- *Policy-making and general programming*. An organisation's policies and strategies (thematic or geographical), country plans and the like, which guide the general direction of its work and approach taken.
- *Project planning*. Identifying needs, defining approaches, setting objectives and designing a scheme of work, obtaining formal approvals and resources to carry out the work.

Figure 1.2
The project cycle



- *Implementation*. Carrying out the planned activities over a set period of time to achieve the desired outputs, monitoring activities and results, and making appropriate modifications to the project.
- *Evaluation*. Analysis of the outputs and impact of the project during its lifetime, when it finishes and – ideally – some time after it has finished; feeding the findings of the evaluation into future projects and into general policy and programming guidelines.

A similar cyclical approach is used in the risk management process, although the terminology and focus are different from that of development programming. It can be seen as a five-stage process:[1]

1 Establish the context (strategic, organisational, other).
2 Identify potential risks.
3 Analyse the risks by assessing the likelihood and impact of an event.
4 Set priorities for addressing the risks (which can include a decision not to address some risks).
5 Treat the risks (identify, plan and implement activities).

Stages 1–4 are equivalent to project identification; stage 5 comprises both project formation and implementation. Monitoring, review and feedback comprise an additional element that operates throughout the project cycle.

The approach adopted in this Review does present some problems, however. The first is that real-life initiatives never fit neat 'project cycle' concepts. For the sake of analytical clarity, this Review has adopted a schematic approach, while recognising the limitations. Second, one could go further and argue that, because risk reduction is an ongoing process, it should not be artificially 'projectised'. This is a sound argument, and the following chapters illustrate problems that project-based approaches can cause. However, the aim is to present an approach that will be readily understood by people working in all fields of development or humanitarian work. Viewing risk reduction as a goal or ongoing process means that organisations can make the standard project cycle approach progressively more 'risk-aware' or 'risk-oriented' over time. This pragmatic approach is particularly helpful when it comes to incorporating mitigation features into development planning.

Notes

1 Standards Association of Australia, *Risk Management. AS/NZS 4360: 1999* (Strathfield: Standards Association of Australia, 1999), p. 11.

Chapter 2
Disasters explained

2.1 Disasters and sustainable development

In the words of Didier Cherpitel, Secretary General of the International Federation of Red Cross and Red Crescent Societies (IFRC):

> *Disasters are first and foremost a major threat to development, and specifically to the development of the poorest and most marginalized people in the world. Disasters seek out the poor and ensure they stay poor.*[1]

Disasters resulting from natural hazards killed on average more than 60,000 people each year between 1992 and 2001. Over the same period, they directly affected on average 200m people each year (through damage to homes, property, crops and livestock and local infrastructure). The number affected indirectly (for example by rising prices or job losses caused by adverse economic consequences) is incalculable. The average annual economic loss worldwide from natural disasters between 1992 and 2001 amounted to $69bn. All of these are conservative estimates.

Developing countries are hit hardest by natural disasters. Between 1992 and 2001, 96% of deaths from natural disasters were in countries classified by the UN Development Programme (UNDP) as of medium and low human development. Over the same period, 98% of those directly affected lived in these countries. In absolute terms, most of the economic losses are felt in wealthier countries: 63% of economic loss between 1992 and 2001 was in countries of high human development, owing to the concentration of wealth in these countries. However, the economic impact on developing countries is also severe, and in relative terms usually much higher. Hurricane Mitch in 1998 was said to have put Honduras' economic development back 20 years (see Case Study 2.1). In Peru, El Niño-related storm damage to public infrastructure alone caused damage valued at $2.6bn in 1998 – equivalent to 5% of the country's GDP. Losses from major earthquakes in 1999 cost Turkey $20bn, and losses from landslides in Venezuela in the same year cost $10bn – equivalent to over 10% of each country's GDP.[2]

The imbalance in impact between developed and developing countries is due partly to geography. Many developing countries are highly hazard-prone. The

Case Study 2.1
Honduras and Hurricane Mitch

Hurricane Mitch has been described as the Western Hemisphere's worst-ever disaster. The exceptionally heavy rainfall it brought over a 48-hour period in October 1998 caused flash floods and landslides across Central America, leaving 10,000 people dead and nearly 20,000 missing. Over 2.5m people were in need of emergency aid.

Honduras, the second-poorest country in the Western Hemisphere, was hit hardest. The US Geological Survey estimated that the hurricane triggered over a million landslips and mudslides. Almost 6,000 people were killed and 11,000 declared missing. A million people – one-sixth of the population – were made temporarily homeless. More than 35,000 houses were destroyed and another 50,000 badly damaged. A year after the hurricane, 26,000 people were still living in camps, and another 100,000 with friends and relatives or in makeshift shelters.

Seventy per cent of the country's productive infrastructure was damaged or destroyed; over 90 major bridges were wrecked. The government initially estimated the cost of reconstruction at $5bn. Damage to the agricultural sector was severe, creating food shortages and destroying vital export crops: 25% of coffee plantations and 50% of banana plantations were lost. The two main banana-producing companies laid off 25,000 workers for 12 months, claiming the crop would not recover until 2000. Peasant farmers on marginal lands on hillsides and along river banks were among the worst affected (60% of Honduran farmers have access to only 6% of the country's arable land, mostly of poor quality) because the rain and landslides took topsoil away, and the flooding rivers deposited large amounts of sand on the fields.

M. Rodgers, *In Debt to Disaster: What Happened to Honduras After Hurricane Mitch* (London: Christian Aid, 1999), http://www.christian-aid.org.uk/reports/indebt/indebt.html.

Philippines, for example, suffers from volcanic eruptions, earthquakes, floods, landslides, cyclones (typhoons) and, in some places, drought. The Indian state of Gujarat, which was struck by a severe earthquake in January 2001, had already been in the grip of drought for several years, and had recently been affected by a major cyclone, bubonic plague and civil unrest. But physical

geography is far from a complete explanation. The resilience of a country's economy, society and institutions must also be taken into account. The US, for instance, is also very hazard-prone: like the Philippines it faces earthquakes, volcanoes, droughts, floods, landslides and hurricanes – and also suffers from frequent tornadoes, wildfires and snowstorms. These hazards sometimes cause considerable damage and affect many people, but the country as a whole is able to protect itself against disasters and recover from them effectively.

The human and economic cost of disasters has risen steeply over the past few decades. The number of people affected in the 1990s was nearly three times greater than during the 1970s. Economic losses in the 1990s were nearly five times higher *in real terms* than in the 1970s. Global warming, which is likely to create many more 'extreme' weather events such as storms and droughts, as well as flooding, could push economic losses up to more than $300bn a year within decades.[3] The increasing concentration of the world's population in towns and cities, many in hazardous locations such as earthquake zones, could lead to many more major urban disasters (see Chapter 14).

Beyond the headline-grabbing major events and global and national disaster statistics lie individual communities and families whose lives have been ruined. In November 1993, the sea flooded 3,200 acres of farmland on the coast of Gujarat. Salt water stood on the land for 15 hours, killing wheat and cotton crops and wrecking the livelihoods of 800 families. Farmers reckoned they would have to migrate in search of work for several years until the land recovered. There were also other social consequences: 'Nobody wants to give a daughter [in marriage] to a young man from this area', said one villager.[4] 'We lost everything we had worked for during our lives,' said a Mozambican woman after the floods in 2000, 'we do not know when and where to start.'[5] Moreover, standard disaster statistics underestimate the impact of natural hazards on society because the impact of many harmful events falls below the threshold of what constitutes a 'disaster'. Yet the cumulative impact of such events may be considerable (see Box 2.1).

2.2 Terms and concepts

While this Review tries to avoid jargon wherever possible, there is no getting around some basic terms and concepts. The terms fall into two groups:

1. *Disaster terminology:* terms concerning the nature and elements of disasters.
2. *Disaster management terminology:* terms for different components of disaster management.

Box 2.1
'Everyday disasters'

A 'disaster' is normally defined as damage and disruption that exceeds the affected society's capacity to cope (see Chapter 2.2). Databases define disasters according to levels of casualties and losses. The EM-DAT database managed by the Centre for Research on the Epidemiology of Disasters (CRED), the most authoritative source of data on disasters' impact worldwide, requires at least one of the following four criteria to be met for an event to be recorded as a disaster:

- ten or more people reported killed
- 100 reported affected
- a call for international assistance
- and/or a declaration of a state of emergency

There is a growing body of research from Latin America showing that the cumulative impact of what are sometimes referred to as 'everyday disasters' – small, local events triggered by natural hazards that do not usually require external humanitarian assistance – may in some countries be greater than that of the much smaller number of larger events that are formally recorded as disasters. For example, data from Guatemala on all hazard events during the period 1988–98 (excluding Hurricane Mitch) records 1,666 individual events leading to 1,393 deaths and 395,961 people affected. Over the same period (and including Mitch), the EM-DAT database recorded only 19 disaster events in Guatemala, leading to 859 deaths and affecting 192,830 people.

G. Gellert, *Algunas lecturas de riesgo y vulnerabilidad en Guatemala, utilizando la herramienta DesInventar* (Guatemala: FLACSO, 1999); CRED, EM-DAT International Disaster Database Website, http://www.cred.be/emdat/intro.html.

Researchers and practitioners do not use these terms consistently and many definitions are academic and hence over-elaborate. This Review follows common usage, but technical language is sometimes turned into more everyday language – at the risk of oversimplification. Other terms are explained later, as and where necessary.

2.2.1 Disaster terminology

- *Hazard*. A potential threat to humans and their welfare. Hazards can be natural (such as earthquakes and droughts) or induced by human

processes (such as industrial accidents). Some people use the term 'environmental hazards'. Box 2.2 categorises hazards in more detail.
- *Risk*. The likelihood of a specific hazard occurring and its probable consequences for people and property.
- *Vulnerability*. The extent to which a person, group or socio-economic structure is likely to be affected by a hazard (related to their capacity to anticipate it, cope with it, resist it and recover from its impact: see Chapter 2.3). Note that scientists and engineers often use the term in a more narrow sense, referring to physical structures.
- Disaster. What occurs when the impact of a hazard on a section of society (causing death, injury, loss of property or economic losses) overwhelms that society's ability to cope. Box 2.3 identifies different categories of disaster.

2.2.2 Disaster management terminology

- *Mitigation*. Any action taken to minimise the extent of a disaster or potential disaster. Mitigation can take place before, during or after a disaster, but the term is most often used to refer to actions against potential disasters. Mitigation measures are both physical or structural (such as flood defences or strengthening buildings) and non-structural (such as training in disaster management, regulating land use and public education).
- *Preparedness*. Specific measures taken before disasters strike, usually to forecast or warn against them, take precautions when they threaten and arrange for the appropriate response (such as organising evacuation and stockpiling food supplies). Preparedness falls within the broader field of mitigation.
- *Prevention*. Activities to ensure that the adverse impact of hazards and related disasters is avoided. As this is unrealistic in most cases, the term is not widely used nowadays.

The more general term 'disaster reduction' or 'disaster risk reduction' is often used, to mean the broad development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout society, through prevention, mitigation and preparedness.

'Disaster management' is also often used in a general sense, covering the implementation of preparedness, mitigation, emergency response and relief and recovery measures.

2.2.3 The disaster cycle

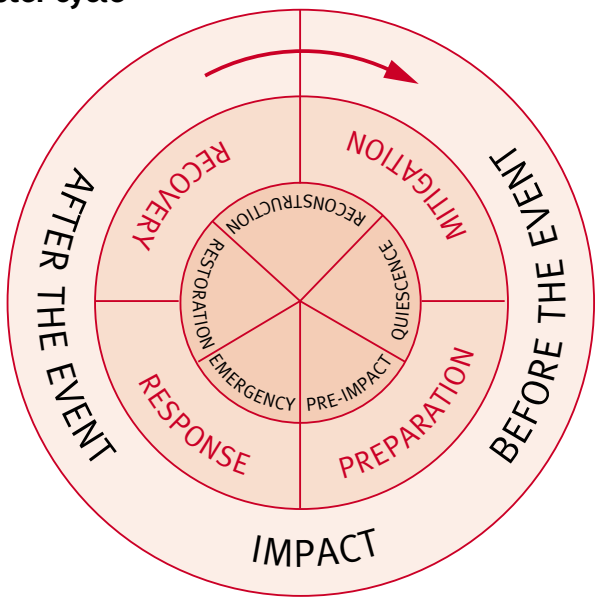
Many manuals and training courses present the idea of a disaster 'cycle' to illustrate where the different elements of disaster management (including

relief and recovery) link with one another (see Figure 2.1). This is an over-simplification, as the components do not fit together neatly or in exact sequence in the way shown in most diagrams: there can be substantial overlap. Nevertheless, a diagrammatic presentation may be helpful.

2.3 Vulnerability: disasters and development processes

The traditional view of disasters held that they were temporary interruptions of a linear development process that was leading to ever-improving standards of living. The task of humanitarian aid, therefore, was to patch things up so that the process of development could start up again. Emergency relief would be followed by rehabilitation, leading in turn to renewed development work.

Figure 2.1
The disaster cycle



D. Alexander, *Principles of Emergency Planning and Management* (Harpenden: Terra Publishing, 2002), p. 6.

Box 2.2

Types of hazard: natural, technological, environmental

Hazard

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

Natural hazards

Natural processes or phenomena occuring in the biosphere that may constitute a damaging event.
Natural hazards can be classified by origin: geological, hydrometeorological or biological.

Origin	Phenomena/Examples
Geological hazards Natural earth processes or phenomena in the biosphere, which include geological, neotectonic, geophysical, geomorphological, geotechnical and hydrogeological nature	• Earthquakes, tsunamis; • Volcanic activity and emissions; • Mass movements i.e.: landslides, rockslides, rockfall, liquefaction, submarine slides; • Subsidence, surface collapse, geological fault activity.
Hydrometeorological hazards Natural processes or phenomena of atmospheric, hydrological or oceanographic nature	• Floods, debris and mud flows; • Tropical cyclones, storm surges, thunder/hailstorms, rain and wind storms, blizzards and other severe storms; • Drought, desertification, wildland fires, heat waves, sand or dust storms; • Permafrost, snow avalanches.
Biological hazards Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bio active substances	Outbreaks of epidemic diseases, plant or animal contagion and extensive infestations.

Technological hazards

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

Environmental degradation

Processes induced by human behaviour and activities (sometimes combined with natural hazards), that damage the natural resource base or adversely alter natural processes or ecosystems. Potential effects are varied and may contibute to an increase in vulnerability and the frequency and intensity of natural hazards.
Some examples: land degradation, deforestation, desertification, wildland fires, loss of biodiversity, land, water and air pollution, climate change, sea level rise, ozone depletion.

Living with Risk: A Global View of Disaster Reduction Initiatives
(Geneva: UN International Strategy for Disaster Reduction), p. 44.

The 1980s and 1990s showed that development has its failures, as well as its successes. A closer look at natural disasters has undermined the belief that victims' lives can soon return to normal. Moreover, the development process itself can make people vulnerable to natural hazards. Human vulnerability is becoming increasingly prominent in aid and development thinking.

The phrase 'natural disaster', which is widely used by specialists and generalists alike, often causes confusion and has been the subject of debate. Strictly speaking, there is no such thing as a natural *disaster*: there are only natural *hazards*. The difference between a hazard and a disaster is an important one. A disaster takes place when a society or community is affected by a hazard (it is usually defined as an event that overwhelms a society's capacity to cope). In other words, the impact of the disaster is heavily influenced by the degree of the community's *vulnerability* to the hazard.

This vulnerability is not natural. It is the human dimension of disasters, the result of the whole range of economic, social, cultural, institutional, political and even psychological factors that shape people's lives, and create the environment that they live in. Extensive research over the past 30 years has shown that, in general, it is the weaker groups in society that suffer worst from disasters: the poor (especially), the very young and the very old, women, the disabled, and those who are marginalised by race or caste (see Chapter 6). Those who are already at an economic or social disadvantage tend to be more likely to suffer during disasters. This question of society's resilience and vulnerability is very important for understanding the impact of disasters, and making choices about how to intervene.

Vulnerability is more than just poverty, but the poor tend to be most vulnerable. This is perhaps most apparent in the economic pressures that force people to live in cheap but dangerous locations, such as flood plains and unstable hillsides. An earthquake in 1976, which killed 1,200 people and made 90,000 homeless in Guatemala City, was popularly called a 'class quake' because most of the victims lived in slum areas; many of their homes were in dangerous ravines that were the only places they could afford to live in. The rich, in better constructed houses and safer locations, were affected far less.[6]

Another very visible cause of vulnerability is environmental degradation. In 1995, a World Bank publication estimated that 80% of the poor in Latin America, 60% of the poor in Asia and 50% of the poor in Africa lived on 'marginal lands that are characterized by poor productivity and high vulnerability to natural degradation and natural disasters'.[7] The human impact on the

Box 2.3
Types of disaster and emergency

Disasters and emergencies are sometimes grouped into six main categories:

- *Natural, rapid-onset*. These are triggered by natural hazards such as earthquakes, cyclones, floods, landslides, avalanches, volcanic eruptions and certain types of disease epidemics. They occur suddenly, often with very little warning.
- *Technological, rapid-onset*. These are the result of industrial accidents (for example a chemical or oil spill or a nuclear accident), major transport accidents, or disruption to other technological systems. They also occur suddenly, with little warning.
- *Slow-onset*. This term is used mostly to refer to food shortage or famine triggered by drought or pest attacks on crops, where the crisis builds up over several weeks or months. It can also cover disasters caused by environmental degradation or pollution (see Chapter 15).
- *Complex political emergencies*. Natural hazards, especially drought, may be a factor here, but a complex political emergency is characterised by protracted political instability and often high levels of violence.
- *Permanent emergencies*. These are the result of widespread structural poverty that requires more or less permanent welfare, but can be made worse by natural hazards.
- *Mass population displacements*. Displacement can be a cause or a consequence of other types of emergency.

Adapted from B. Byrne and S. Baden, *Gender, Emergencies and Humanitarian Assistance* (Brussels: European Commission, 1995), p. 5.

natural environment heightens the risk of disaster in many ways. For example, cutting down trees causes soil erosion and landslides that in turn can silt up rivers and cause flooding downstream. Building on flood plains reduces the amount of ground surface that can absorb rainfall, and so rain water runs off much faster into rivers, putting pressure on river banks and thereby increasing the likelihood of flooding. Overgrazing and over-cultivation can lead to soils becoming exhausted, or to erosion and landslides.

Case Study 2.2
Causes of the 2002 food crisis in Southern Africa

By the middle of 2002, it was clear that a major food crisis was likely to occur in Southern Africa. Nearly 13m people in six countries were considered at risk of extreme food shortages or even starvation before the next main harvest was due, in April/May 2003. A massive regional and international aid effort was begun to provide food aid. The crisis had no single cause across the region, or in individual countries. A complex mix of factors was at work and the relative influence of these was hotly debated during the next few months.

The most obvious problem was the weather. There had been a prolonged drought, causing widespread crop failure. This was exacerbated here and there by unseasonal flooding that destroyed growing crops. The price of the main staple food, maize, shot up – by 300% or more in some places – putting it beyond the reach of many poor people. But the underlying factors were at least as important. Poverty, widespread in the region, was particularly significant. Even in a normal year, 40–50% of households use up the food they have produced four or five months before the next harvest: for the rest of the time, they have to buy food and use other coping strategies such as reducing the number of meals. The drought affected production not only of food crops but also of cash crops, thereby reducing purchasing power. It was also argued that high levels of HIV/AIDS in the region were weakening people's capacity to farm their land effectively, as many in the most productive age group were infected.

There was much debate about the impact of economic liberalisation policies on seed and food supplies, and about the role of international financial institutions in imposing such policies. Without some state intervention in the food market (through price controls and subsidies for production and agricultural inputs) to provide a safety net, it appeared that poor people were much more vulnerable to shocks such as erratic weather. Malawi, one of the countries worst affected, had sold off its grain reserve on the advice of the International Monetary Fund (though it was not clear what it had done with the money). In several countries poor governance – misguided agricultural policies, limited administrative capacity, corruption and bias towards particular groups – was also blamed.

Crisis in Southern Africa, Briefing Paper 23; *Death on the Doorstep of the Summit*, Briefing Paper 29, Oxfam, 2002.

The underlying factors contributing to vulnerability are less immediately visible. For example, one needs to consider not just the fact that people live in flimsy houses in hazardous locations, but *why* they live there, which could be the product of such forces as:

- poverty (itself the result of local, national and even global economic forces);
- population growth;
- displacement due to economic development (for example loss of smallholdings to commercial agriculture);
- migration to towns and cities (which has a variety of socio-economic causes);
- legal/political issues, such as lack of land rights;
- discrimination;
- government macro-economic and other policies; and
- other political features, such as the failure of government and civil society institutions to protect citizens.

The chain of causality, from root causes to local dangers, can be both long and complex, but by tracking it one can identify a 'progression' of vulnerability that builds up pressures on communities. These pressures can be released by taking measures to reduce vulnerability all along the causal chain (see Figure 2.2).

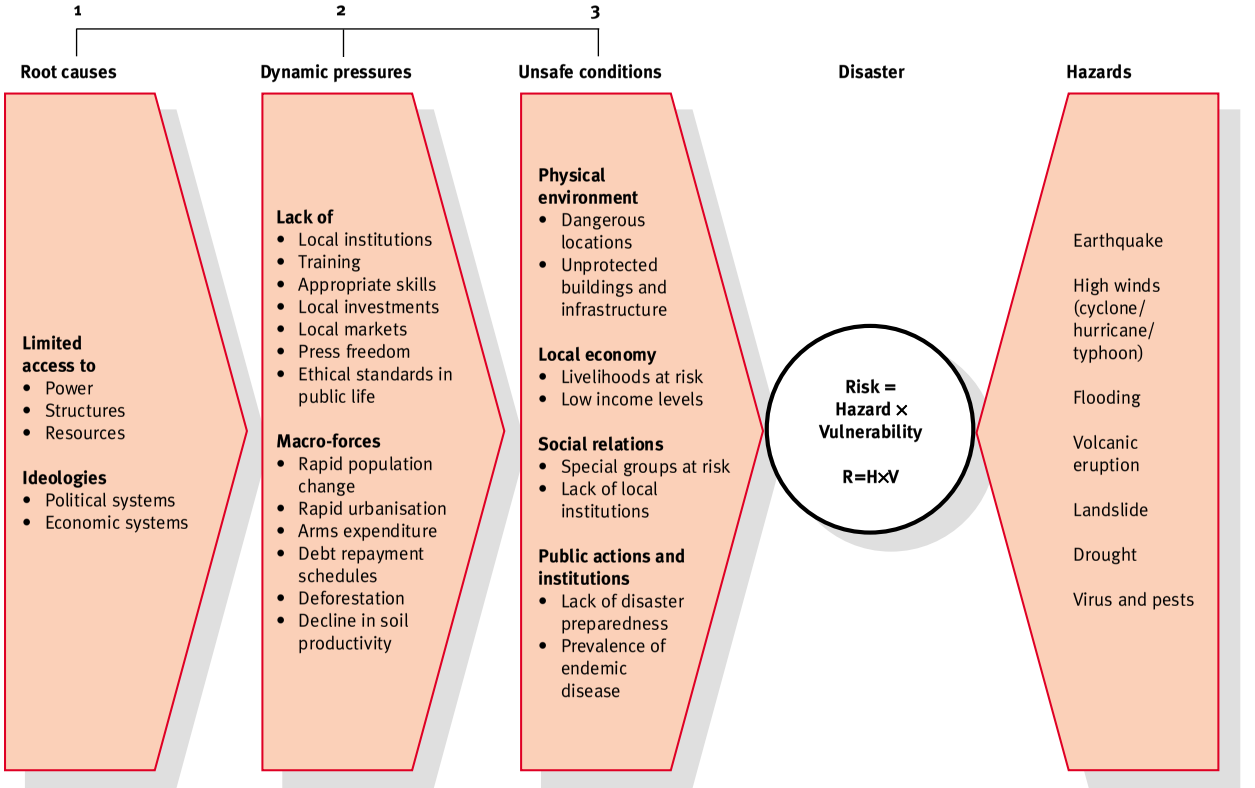
Even well-intended development programmes can increase vulnerability. For example, promoting heavily irrigated rice agriculture can lead to the increased incidence of malaria because mosquitoes breed where there is standing water; building embankments for new roads and railway lines can block natural flood drainage channels.

2.4 Disaster myths

Myths about disasters are widespread and persistent, despite repeated experience to the contrary and the findings of social science research. They are often reinforced in the public mind by media coverage. Disaster myths are a significant problem, because they influence the way operational agencies think and act. Among the most prominent myths are the following:[8]

- Disasters are acts of God (which means that nothing can be done about them) or acts of nature (which means that the problem can be resolved by scientific or technical interventions alone).
- People are fatalistic about disasters and do not take action to protect themselves against future events.
- When a disaster strikes, people are helpless, passive, dependent victims

Figure 2.2
The progression of vulnerability



B. Wisner et al., *At Risk: Natural Hazards, People's Vulnerability and Disasters* (London: Routledge, 2004), p. 51.

incapable of carrying out even basic tasks. Therefore they rely on help from aid agencies.
- People panic during disasters; they cannot be relied upon to react rationally at times of great danger.
- The chaos that follows disasters encourages many people to engage in anti-social behaviour (particularly looting).
- External 'experts', with their advanced knowledge and technologies, are the main agents in risk reduction and disaster response.
- The situation will return to normal within a few months of the disaster, and support for rehabilitation need only be for the short term.

2.5 Chapter summary

- Disasters triggered by natural hazards are a major threat to life and to sustainable development, especially in developing countries.
- The human and economic cost of disasters is rising, mainly because societies are becoming more vulnerable to hazards.
- Socio-economic vulnerability is complex and often deep-rooted.
- The weaker groups in society suffer most from disasters.
- Many persistent myths about disasters should be discarded.

Notes

1 D. Cherpitel, 'Deadly Forces', *The Guardian*, 28 March 2001.
2 *World Disasters Report 2002: Focus on Reducing Risk* (Geneva: International Federation of Red Cross and Red Crescent Societies, 2002), pp. 10, 186–88.
3 *Ibid.*, p. 10.
4 Mihir Bhatt, 'Participation, Planning and Mitigation in Dhandhuka', *Appropriate Technology*, vol. 22, no. 4, 1996, pp. 12-15.
5 *World Disasters Report 2002*, p. 11.
6 I. Davis, *Shelter after Disaster* (Oxford: Oxford Polytechnic Press, 1978), pp. 13–15, 21–22; P. Blaikie, T. Cannon, I. Davis and B. Wisner, At Risk: *Natural Hazards, People's Vulnerability and Disasters* (London: Routledge, 1994), pp. 170–71.
7 C. Clarke and M. Munasinghe, 'Economic Aspects of Disasters and Sustainable Development: An Introduction', in Munasinghe and Clarke (eds), *Disaster Prevention for Sustainable Development: Economic and Policy Issues* (Washington DC: The World Bank, 1995), p. 2.
8 E. L. Quarantelli, *Major Criteria for Judging Disaster Planning and Managing and Their Applicability in Developing Societies* (Newark, DE: University of Delaware: Disaster Research Center, Preliminary Paper 268, 1998), www.udel.edu/DRC/preliminary/268.pdf, pp. 16–18; C. De Ville de Goyet, 'Stop Propagating Disaster Myths', *Australian Journal of Emergency Management*, vol. 14, no. 4, 1999–2000, pp. 26–28.

Chapter 3
Institutionalising risk reduction

3.1 Introduction

When planning a programme or project of any kind, there are two important points to consider. First, planning and policy decisions are never made in isolation from the wider context of events, societies and institutions. In this sense, they are essentially 'political' decisions; they are certainly not purely technical ones. In particular, the ideologies and policies of governments and other institutional actors, and the factors that affect them, are part of the context in which the work will take place, and should be analysed as part of project planning (see Chapter 5).

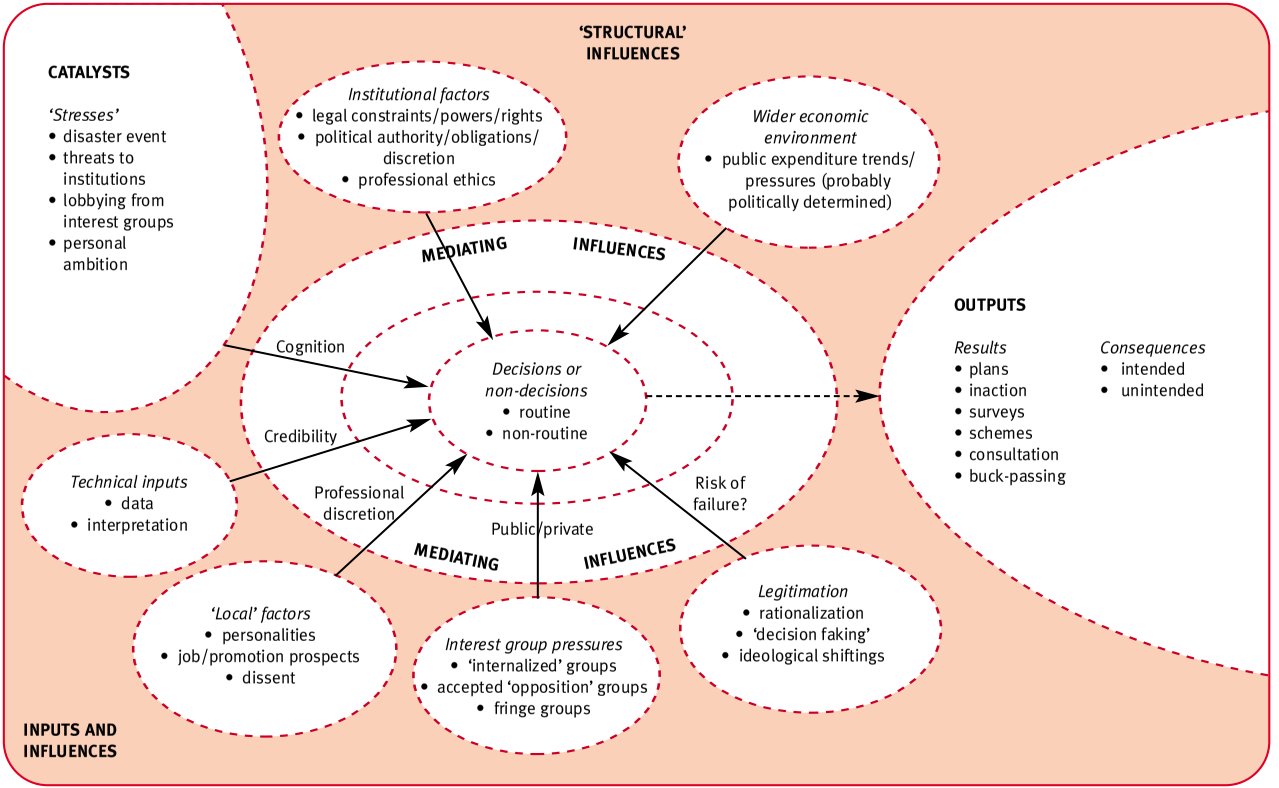
Second, the nature of the organisation planning the programme influences the way in which it approaches disaster reduction (or indeed any other issue). Programmes in the field must be supported by appropriate organisational attitudes, structures and systems. This means that institutional development is a vital part of the risk reduction process. Awareness of disasters and risk, and commitment to dealing with them, must be incorporated at all levels within an organisation. Risk management, in the broadest sense, should be an integral part of organisational strategy, procedures and culture. There is little guidance available on how to do this, and the guidance that there is usually takes the form of general principles, unsupported by examples of good or bad practice.

This chapter covers two aspects of the problem:

1. It identifies and comments on a few basic indicators that can show how far disaster risk reduction is being incorporated at organisational level.
2. It summarises some of the main challenges to 'mainstreaming' mitigation and preparedness within agencies, and the main opportunities for doing so.

The prospect of 'institutionalising' risk reduction in this way can be intimidating to organisations, but it becomes less so if it is approached as a process. It is unrealistic to expect organisations to mainstream mitigation overnight: it will usually take some time to achieve this, especially in large organisations. Improvements can be made incrementally. The reviews of policies, strategies and systems that all organisations carry out periodically offer a good opportunity to incorporate risk awareness and reduction practices with minimal

Figure 3.1
Decision-making in a political context



Mitigating Natural Disasters: Phenomena, Effects and Options – A Manual for Policy Makers and Planners (New York: Office of the United Nations Disaster Relief Coordinator, 1991), p. 18.

disruption. However, gradualist approaches should not be used as an excuse for delay: disasters can strike agencies, and those they aim to help, at any time.

3.2 Indicators of institutionalisation

Indicators can be found at all levels of an organisation, covering many different aspects of its work.

3.2.1 The policy level

Policy statements should refer to the importance of disasters, vulnerability or risk and commit the organisation to addressing these issues. They should set out the agency's broad goals in overcoming the problem, linked to its strategic objectives. Firm commitments to take action are particularly important, but are likely to be vague or rhetorical, and are often absent even when the importance of disasters has been acknowledged. Hazard-induced disasters may be placed under the catch-all heading of 'external shocks and stresses', which can indicate that the agency concerned is taking a holistic approach to vulnerability, but may lead to their particular significance being played down.

Nevertheless, general policy statements are important because they give a mandate to managers and planners within organisations. A specific risk/disaster policy can be helpful, but will only be feasible for large organisations. Even there, such a policy may become just one of many.

3.2.2 The strategic level

The limitations of policy statements make it essential to provide support at the level of strategic planning. An organisation's strategy or business plan should not only identify the importance of disaster risk reduction, but also set priorities and targets for addressing the challenge over a specified period. These might cover incorporation of risk/vulnerability questions into project planning guidelines, staff training in issues and methods, assigning responsibility for relevant tasks, giving appropriate authority to those responsible and establishing monitoring and reporting procedures.

3.2.3 Operational guidelines

Many relief and development organisations work to operational guidelines for planning and implementing projects (and for running the organisation itself).

Ranging from simple checklists to heavyweight manuals, they aim to ensure quality and consistency in agencies' work.

Risk analysis, treatment and monitoring can be inserted into the simpler operational guidelines without great difficulty. The simplest way is to add a few basic questions or criteria to standard checklists, such as:

- Will the project affect people's vulnerability to man-made and other disasters?
- What impact will the project have on socio-economic vulnerability?
- What significant hazards might affect the target group?
- What are the project's plans for identifying and reducing hazard risks to its beneficiaries?
- Projects should give consideration to the likelihood of disasters and, where appropriate, prepare the community and the project itself to deal with disaster situations.

Detailed operational manuals are another matter: here, more detailed guidance will be required. The rest of this book covers issues that such manuals will need to consider. (Organisations also need standard operating procedures for dealing with emergencies or disasters that affect themselves.)

The existence of operational guidelines does not, of course, guarantee that staff will use them. There must be supporting commitment among agency personnel.

3.2.4 Geographical and sectoral plans

Most agencies work to geographical plans, at regional, country or district level. A few plan their work sectorally (for example, small enterprise development, health, education). Such plans should contain an assessment of the major hazards, vulnerabilities and risks facing the communities with which the project works. They should also outline appropriate risk reduction strategies. Methods for carrying out such assessments are outlined in Chapter 4.

3.2.5 Programme and project proposals

Like geographical and sectoral plans, programme and project proposals should include risk assessment and plans to deal with risks. Where agencies use logical frameworks of one kind or another to design their projects, as

many do nowadays, the 'risks/assumptions' column should take hazards and disasters into account. Because these are always viewed as external factors beyond a project's control, mere identification of risks is only a weak indicator that project designers are actually planning to deal with them. In one NGO project's logical framework, the phrase 'No natural disasters' was repeated in every line down the risks/assumptions column – clearly a token gesture, with no thought given in the proposal to how the project might protect itself and its beneficiaries. So-called 'killer' assumptions, where projects are likely to fail if the assumptions turn out to be wrong – such as the assumption that there will be no major disasters – are sometimes left out of logical frameworks in funding proposals, for fear of frightening donors.

3.2.6 Structures and systems

The challenge of incorporating risk reduction into an organisation goes far beyond formal documents and project planning. Policies and practices must be understood, implemented and maintained. Risk management manuals stress that responsibility and authority must be clearly defined within the organisation, and sufficient resources allocated. Organisations should assess their own capacity to understand and address the disaster problem. Review procedures should be set in place.

Organisations are run by *people*, and the general level of understanding, capacity and commitment needs to be increased by information sharing and training at all levels of the organisation. The process must be firmly supported by senior managers if it is to succeed, but there must also be ownership throughout the organisation.

3.2.7 External relations

No organisation should work alone in this field (see Chapter 5). Agencies should be linked to other key players and relevant coordinating or networking bodies to share information, expertise and resources as required. Where appropriate, they should have a clearly-defined role in national and local government disaster management plans. They should also follow relevant international codes and standards (see Chapter 12).

3.3 Mainstreaming risk reduction: challenges and opportunities

Anyone who has tried to change policy and practice within an organisation will appreciate how difficult this can be, but change is possible and there are some encouraging signs in the field of risk reduction.

Case Study 3.1
Preparing organisations for disaster

In 2001, the IFRC drew up a set of guidelines called *Characteristics of a Well-Prepared National Society*. This simple, two-page document sets out 33 indicators that can be used by Red Cross and Red Crescent national societies around the world to assess their capacity to predict disasters, reduce their impact on vulnerable communities and respond to them.

The indicators cover every aspect of organisational capacity, from policy and planning to human, financial and material resources and advocacy. Indicators also cover the role of a national society in government emergency planning and the extent of its coordination with other organisations.

A questionnaire based on the checklist was developed to help national societies and IFRC staff obtain a picture of the status of disaster preparedness within the IFRC. The questionnaire was sent to 35 national societies to fill in as a self-assessment exercise. A revised version was then sent to another 60.

The self-assessment method needed to strike a balance between being quick and easy to use on the one hand and generating meaningful information on the other; it was not easy to manage this. Experience also showed that participatory assessment is desirable; otherwise questionnaires might be filled in by individuals or small groups who do not represent the views of their national society as a whole or whose knowledge of its disaster preparedness work is inadequate.

Notwithstanding these problems, many of the national societies that completed the questionnaire found it valuable for self-assessment and planning, providing a benchmark for monitoring progress. Many had not viewed their disaster preparedness capacity in such a way before. Some people argued that there were already so many systems and procedures to ensure good management that there was little added value in assessing disaster preparedness, but for many others its added value lay in giving a systematic overview. Some national societies used the assessment findings for action planning and preparing fundraising appeals. Collated findings were used at regional and international level to identify strengths and weaknesses.

Characteristics of a Well-Prepared National Society (Geneva: IFRC, 2001); 'DFID/IFRC Partnership: Disaster Reduction Global Workshop, Khartoum, Sudan, 16–18 December 2002. Thematic Report', unpublished workshop report (Geneva: IFRC, 2002).

3.3.1 Challenges

Introducing or modifying strategies can be a long and sometimes tortuous process, not least because few development or humanitarian organisations would now contemplate policy changes without extensive consultations with all the main stakeholders, especially their local partners. Considerable time, effort and money may be spent on this. Senior managers are unwilling to revise policies or strategies unless they are convinced it is necessary, and only after seeing the impact of those already in place.

Large agencies have more time, money and enthusiasm for strategic planning, whereas smaller ones lack the resources for this. International agencies operating in many countries can find it difficult to implement coherent regional strategies where individual countries' circumstances and priorities may vary widely. It may be unrealistic to attempt to standardise thinking and approaches, and more practical to encourage greater information sharing and collaboration (i.e. harmonisation) over time.

Operational guidelines may be revised more frequently, but these vary greatly in quality. In larger agencies they are more likely to be comprehensive and detailed, but for this reason less likely to be read. Simpler versions may be more accessible, but many contain limited practical guidance on planning and implementation, or on assessing proposals from partners. Moreover, operational guidelines usually contain so many issues to consider that no development or emergency programme can address them all adequately, and some are bound to be squeezed out by those that appear to be more important. The guidelines themselves tend to allow for this, often being meant to guide and not to prescribe. This gives project planners and managers considerable discretion. Where an organisation's mechanisms for monitoring or assuring project quality are weak, the gap between theory and practice will widen. Even when issues are firmly established at strategic level and in planning guidelines, individual projects may still continue to show little or no understanding of the subject.

Organisational size is an obvious influence on the rate of change. Small organisations, especially grass-roots ones and NGOs, often function as teams of individuals and can adapt their outlooks and systems relatively quickly. As organisations get larger, their structures become more formal and complex, and it becomes much more difficult to make substantive changes. This can be a very great challenge in large, high-profile organisations. A tradition of institutional and cultural barriers between relief and development professionals can also impede progress. Such tension has been observed in many agencies that work in both fields.

Institutional memories are weak in many organisations. Project documentation may be non-existent or difficult to find, and of poor quality. Much written material on disaster issues is found in books and academic journals, which few operational staff are likely to read. In development organisations especially, staff are uncomfortable with the technical language of disaster management, and this acts as a barrier to their engagement with risk and vulnerability questions.

Overwork is another major obstacle. Its significance cannot be overstated. Most people working in relief and development agencies are too busy, most of the time, to reflect about or absorb new ideas. In many agencies overwork, and pressures of work, have become *systemic weaknesses*.

3.3.2 Opportunities

In most agencies, especially NGOs, policy or strategy review seems to be a semi-permanent condition, which should give grounds for optimism about the uptake of relevant ideas at policy level in the medium term (the next two to five years). Recent strategy changes in international donor agencies and NGOs reinforce this view. Disaster mitigation and preparedness and vulnerability to natural hazards are rising up the policy agenda. Attitudes are shifting, with the old view of disasters as one-off events being gradually replaced by awareness of the connections between disasters and development processes.

This shift has taken place mainly as a result of the severe 'natural' disasters in the past few years – hurricanes Mitch and Georges in 1998, the Bangladesh floods of the same year, the Orissa cyclone in 1999, the Mozambique floods in 2000 and the Gujarat earthquake in 2001 – which forced many agencies to rethink their approach. Change has also been influenced by the considerable research and academic debate on vulnerability (Chapter 2) and thinking on the linkages between relief and development (Chapter 17.2) since the 1980s, and the current enthusiasm for sustainable livelihoods (Chapter 4.2.6) may stimulate more development organisations to take vulnerability and risk on board.

There is evidence that determined individuals can push significant innovations through, even in large organisations, if there is sufficient space within institutional structures and systems. People in senior positions or who have been in an organisation for a long time (with good knowledge of the system and extensive personal networks) are particularly well placed to do this. Specialist technical advisers can be very influential in encouraging, advising and supporting project managers. They can operate across an organisation

which may otherwise be compartmentalised in its structure and the focus of its work and thinking – a real problem for larger institutions. They have a mandate and, crucially, time to think. Their influence can come not just from their position and expertise, but also from their personality and approach, and the length of time they have worked in the organisation. In larger organisations, the decentralisation of authority – from international headquarters to country offices, or from capital cities to districts – is gathering pace. This may make agencies more sensitive to hazards and vulnerability, at least at local level.

3.4 Chapter summary

- Organisations should seek to 'institutionalise' risk reduction by incorporating it throughout their thinking, structures, cultures and operations.
- There are many challenges to be overcome, especially in large and more formal institutions, but change is possible and there are encouraging signs of progress in many organisations.
- Recent experiences of disaster are a significant influence on organisational change.
- Determined individuals can push significant innovations through, even in large organisations.

Chapter 4
Project planning

4.1 Introduction

This chapter looks at the two main aspects of planning:

1. Understanding the problem. This covers methods of analysing risk, principally by finding out about the hazards that vulnerable people face; understanding the social, economic and other human factors that make them vulnerable; and identifying the capacities of communities and institutions to reduce risk.
2. Project design to meet those needs. This covers issues in decision-making, deciding the approaches to be taken and setting priorities.

Understanding and design do not follow each other in a neat, linear process. Better understanding of the problem should be acquired throughout the project cycle through analysis and monitoring, and fed back into the design and implementation of subsequent phases.

4.2 Understanding the problem

The first stage in any project is an analysis of the problem to be addressed, which should set out its nature and causes. Here, the problems are to do with the nature of the risks faced by people living under the threat of natural hazards and their vulnerability to disaster. This section therefore focuses on 'risk analysis' in the broadest sense of the term, covering hazards, vulnerability and capacities analysis.

In particular, the discussion will cover sources and forms of information, their availability and usefulness. Information on hazards, risk and vulnerability is normally judged according to four criteria:[1]

- the form it comes in;
- the level of accuracy;
- how quickly it can be obtained; and
- the scale of coverage.

The focus will be on access to information and its application at the local level, but information needed to understand the bigger picture or context at global,

regional and national levels (i.e. information that will support policy- and strategy-making) will also be covered.

4.2.1 Hazards assessment

Project planners and managers need to understand hazards: their nature, characteristics, causes, geographical distribution, frequency, magnitude or severity, and the kind of damage they do. Development and disaster workers do not need to be hazards specialists, but ought to understand the main features of the hazards in the places where they work. General information on hazards is available in standard text books and manuals.[2] Hazards should also be seen in a broader context, as part of eco-systems and the environment in general. In field projects and programmes, more location-specific data are needed. Again, the technical manuals give more detail.[3]

Hazards data are largely scientific: quantitative or spatial. They take many forms, for example:

- geological hazard maps showing fault lines or unstable slopes liable to cause landslides;
- hydrological maps of flood-prone areas;
- wind, rainfall and sea-surface temperature data;
- recordings of seismic activity from monitoring stations; and
- local rainfall and flood level records.

A high level of accuracy and detail can be obtained visually (for example, in geological mapping and satellite images; geographical information systems are discussed in section 4.2.5 below) and prediction (for instance, complex flood models that model rainfall to runoff, the movement of floodwaters through waterways and floodplains, and flood inundation areas). Data of this kind are used particularly for 'microzonation': the identification of areas subject to hazards.

Valuable though such information is for project planning, it is not always easy to use or obtain. It is usually prepared by and for specialists, such as state geological and meteorological services, or university research institutes. Therefore, specialists may be needed to interpret it (although maps should be translated into more readily intelligible formats if they are to be used to raise awareness among decision-makers and the public).

Access to other relevant material also varies greatly. Even a basic atlas will contain some geological and meteorological data; information on weather

and rainfall is generally distributed through media channels (press, TV and radio) and is increasingly available online; and data from academic research are likely to be in the public domain.

However, in many countries, maps are considered militarily sensitive and high-resolution maps in particular are not available to the public. Government or industry hazard and risk maps may be considered too commercially or politically sensitive to share. Information on technological hazards is likely to be hard to find as many sources of such hazards are commercial industrial operations such as factories. Governments' official enquiries or health and safety departments may have produced relevant reports and there may be some published research. Environmental pressure groups may be a useful source of information as they often document such threats (see Case Study 12.4, page 207).

Hazards data are extensive in many countries, but not in all. Many poor countries find it difficult to collect and maintain data sets because of cost and skills shortages. Hazard monitoring requires considerable infrastructure and staffing. The provision and maintenance of seismic monitoring equipment, for example, may be beyond the resources of national or local governments. Project planning must therefore consider how extensive and accurate existing hazard monitoring and information systems are.

Initiatives need not always be planned on the basis of complete and up-to-date data sets. In practice, field agencies often have to make decisions according to the information that is available. For example, the Kathmandu Valley Earthquake Risk Management Project accepted at the start the need to work in conditions where data were lacking. Instead of carrying out further research, the project used previously collected geological and seismological information, matched this to the current state of infrastructure and the built environment and adapted an existing loss estimation method to the Kathmandu context.[4]

It is not always necessary to rely on sophisticated technologies and outside specialists. Visual surveys by experienced people can identify areas at risk from landslides; simple stream gauges or flood marks can be used to monitor rising water and identify areas likely to be flooded; and local people's knowledge of hazards is often more accurate and extensive than outsiders appreciate (see Chapters 9 and 10).

4.2.2 Vulnerability assessment

Vulnerability is complex. It has many dimensions: economic, social, demographic, political and psychological. It is influenced by a number of factors at

different levels, from the local to the global. It is also dynamic, altering under the pressure of these many different forces. Many attempts have been made to develop methods for identifying and analysing the different facets of human vulnerability – and human resilience or capacity, which is the other side of the coin. These vulnerability analysis (VA) methods are starting to make a major contribution to disaster mitigation and preparedness work, especially for NGOs in developing countries. The first and perhaps still the best known method is the Capacities and Vulnerabilities Analysis (CVA), devised in the late 1980s (see Case Study 4.1).

Case Study 4.1
Capacities and Vulnerabilities Analysis

CVA is a framework for NGOs to use in planning and evaluating projects. It was designed to make relief interventions more developmental, but has been used more widely in disaster preparedness and mitigation. It is above all a practical and diagnostic tool.

The basis of the CVA framework is a simple matrix for viewing people's vulnerabilities and capacities in three broad, interrelated areas: physical/material, social/organisational and motivational/attitudinal (see Figure 4.1). Each of the three areas covers a wide range of features:

1. Physical/material. This is the most visible area of vulnerability. It includes land, climate, environment, health, skills and labour, infrastructure, housing, finance and technologies. Poor people suffer from crises more often than people who are richer because they have little or no savings, few income or production options, and limited resources. They are more vulnerable and recover more slowly. To understand physical/material vulnerabilities, one has to ask what made the people affected by disaster physically vulnerable: was it their economic activities (e.g. farmers cannot plant because of floods), geographic location (e.g. homes built in cyclone-prone areas) or poverty/lack of resources?

2. Social/organisational. How society is organised, its internal conflicts and how it manages them, are as important as the physical/material dimension of vulner-

(continued)

Case Study 4.1 *(continued)*

ability, but less visible and less well understood. This aspect includes formal political structures and the informal systems through which people get things done. Poor societies that are well organised and cohesive can withstand or recover from disasters better than those where there is little or no organisation and communities are divided (by race, religion, class or caste). To explore this aspect, one has to ask what the social structure was before the disaster, and how well it served people when disaster struck. One can also ask what impact disasters have on social organisation.

3. Motivational/attitudinal. This includes how people in society view themselves and their ability to affect their environment. Groups that share strong ideologies or belief systems, or have experience of cooperating successfully, may be better able to help each other at times of disaster than groups without such shared beliefs, or who feel fatalistic or dependent. Crises can stimulate communities to make extraordinary efforts. Questions to be asked here include what people's beliefs and motivations are, and how disasters affect them.

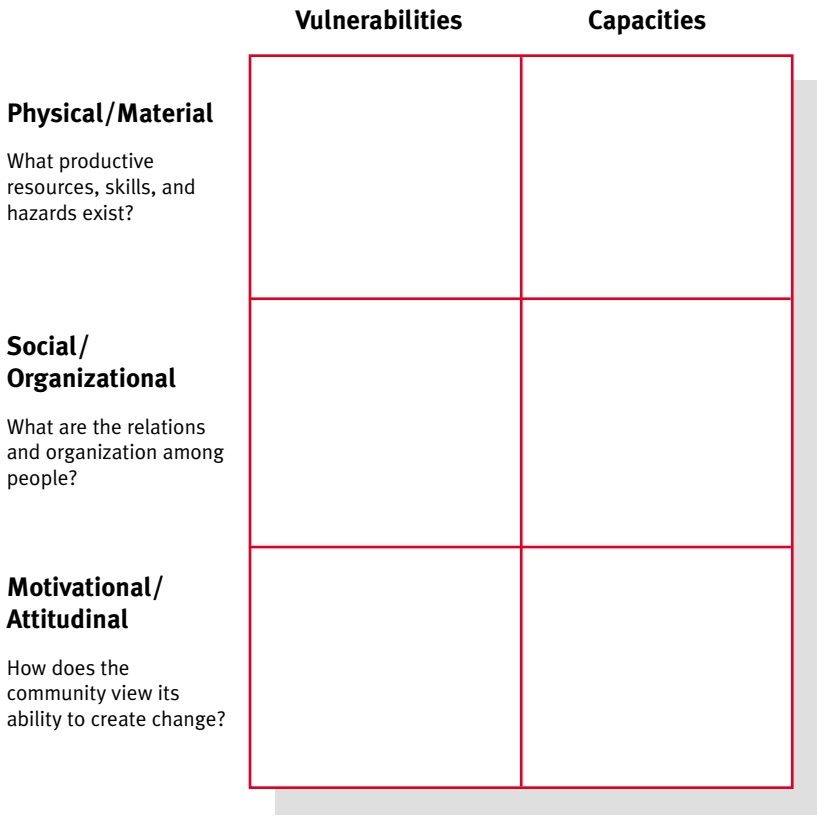
Five other factors can be added to the basic matrix. These are: disaggregation by gender, disaggregation by other differences (e.g. economic status), changes over time, interaction between the categories, and different scales or levels of application (e.g. village or national levels).

M. B. Anderson and P. J. Woodrow, *Rising from the Ashes: Development Strategies in Times of Disaster* (London: I. T. Publications, 1998), pp. 9–25.

A number of other vulnerability analysis methods build on the CVA framework. Which approach to take depends on the user, but the best ones, such as IFRC's Vulnerability and Capacity Assessment (VCA), supply a 'toolkit' of methods from which to choose. The discussion that follows draws extensively on this toolkit, as well as on more recent writing on how vulnerability analysis methods work in practice.[5]

Figure 4.1

CVA matrix



Anderson and Woodrow, *Rising from the Ashes*, p. 12.

4.2.3 Vulnerability assessment in practice

Level of application

A vulnerability analysis can be carried out at different levels. Usually, it takes place locally, but national-level analyses have sometimes been produced (see Case Study 4.2).

Methods

Most local-level vulnerability analysis will be based on participatory techniques and tools, largely derived from participatory rural appraisal (PRA) and rapid rural appraisal (RRA) work, and including:

- transect walks;
- mapping and modelling (physical and socio-economic – this is particularly important in vulnerability analysis);
- wealth and well-being ranking and other forms of social grouping;
- stories and oral histories;
- semi-structured interviews and focus groups;
- daily time charts and seasonal calendars;
- long-term time lines showing trends and change;
- problem trees and flow charts;
- direct observation; and
- Venn diagrams of institutional linkages.

Secondary sources of information – maps and other documents – can easily dominate the investigation, and are often best used to cross-check information generated in the field.

There is still much to learn about how different vulnerability analysis methods are applied, and the operational issues associated with their use, but a few general points can be made with some confidence.

1. *Process*. How the vulnerability analysis is done is as important as its findings. Analysis should be seen not just as an information-gathering exercise by project planners. If it is done properly, with vulnerable people themselves taking part, it can build community capacity by raising awareness and increasing knowledge of the risks people face and their ability to deal with those risks.
2. *Participation*. Community participation should be integral to the vulnerability analysis. It is essential that the views of all groups in the community are heard (see Chapter 8).
3. *Timing*. To build up a comprehensive view of vulnerabilities and capacities requires time, because these are complex and not easily perceived. Vulnerability analysis should not be rushed, therefore. It should be carried out well before a potential disaster, allowing hazards and risks to be set within the broader socio-economic issues affecting the community. It can also be done as part of long-term rehabilitation after a disaster, and in long-term development.
4. *Resources and capacity*. Vulnerability analysis can require considerable resources, particularly staff and community time. Staff training in the req-

uisite methods will probably be needed. Many field agencies lack sufficient experience and skills to implement analyses effectively. Much more training is needed, although there are still few trainers in vulnerability analysis methods.

5. *Techniques*. A vulnerability analysis should use a variety of sources and types of information (see below). Information-gathering methods can be equally diverse. Simple techniques are often the best.
6. *Indicators*. There are many different indicators of vulnerability and capacity. Some are more helpful than others; some (such as indicators of coping ability) are particularly hard to obtain. Do not rely on only a few indicators, or those that are most easily identified. Careful triangulation of the different indicators is needed to build up an overall picture.
7. *Consensus*. Because vulnerability is not simple, and the data will be diverse, it may be difficult to reach agreement on priorities. Organisations carrying out vulnerability analysis may have to put significant effort into reaching a consensus on how to proceed.
8. *Repetition*. Ideally, vulnerability analysis should be an ongoing process, not a one-off, because vulnerability is itself dynamic and ever-changing. There should always be an up-to-date vulnerability analysis for the district or communities being assisted. In practice, this rarely happens because agencies lack the resources to carry out repeated vulnerability analysis exercises. Typically, analysis is undertaken at the start of a project or programme.

Sources of information

Many kinds of quantitative and qualitative information can be used. Hazard data (see above) are clearly important, and over-emphasis on the purely socio-economic aspects of vulnerability can cause hazards to be overlooked. Vulnerability analyses often draw upon existing sources of information that are publicly available, such as general social and economic surveys by governments and other agencies. Other commonly used data sources are drought and food security early-warning systems, situation reports by operational agencies, the news media, analyses commissioned or carried out by international and bilateral donors, and anthropological studies.

Such sources can provide a large amount of data, especially quantitative data. Finding and extracting relevant information can be a major job, however. Official surveys are often out of date, inaccurate or biased. Coverage may be incomplete: data may only cover selected aspects of community or household economies, for example. Documents may not say much about vulnerability itself, although they may provide useful background. Often, analyses rely solely on basic national-level indicators of socio-economic development (e.g.

size of land holdings, per capita income, literacy levels, mortality and morbidity rates, access to clean water), which are readily available in government statistical yearbooks or international aid agency publications such as the UNDP's *Human Development Report* or UNICEF's *State of the World's Children*. These give valuable insights into vulnerability, but the picture is by no means comprehensive. Alternative national-level indicators of vulnerability are now being developed. The World Wide Fund for Nature's *Living Planet Index* addresses different aspects of environmental stress. The UNDP is developing a global index for disaster risk.

Everyone acknowledges that it is a very difficult task to find a method that is comprehensive enough to capture the different elements of vulnerability and capacity, without becoming too complex and cumbersome an exercise. There seems to be a particular difficulty in assessing the capacity of structures and policies to deal with disaster risk – both government capacity and that of civil society, although there are some useful research studies of particular countries and regions.[6] Major disasters occasionally prompt thinking and publication on how well a country is coping. However, there is no generally accepted methodology for assessment. The UN International Strategy for Disaster Reduction (ISDR) has begun work to develop such a framework.

Small agencies are unlikely to have the resources or capacity required for meaningful national-level analysis, and will usually have to rely on the work of larger agencies such as Oxfam, which in 2000 carried out a 'risk mapping' exercise, *Risk-Mapping and Local Capacities*, covering several Central American countries (see footnote 6). Key informants can be helpful in explaining systems and filling knowledge gaps, but may have individual biases.

Data on the frequency, location and impact of previous disasters are particularly useful. The EM-DAT database managed by CRED (www.cred.be/emdat/into.html) is the standard source of information on disasters worldwide since 1900. Its data sets are published annually in the IFRC's *World Disasters Report,* which is widely read and cited. The reinsurance company Munich Re also publishes an authoritative report each year on the economic costs of disasters globally (www.munichre.com/pdf/topics_ 2002_e.pdf). Because these do not cover many smaller events, they should be seen as underestimates. By contrast, the DesInventar database for Latin America (www.desinventar.org) records all hazard events. National data sets in some countries may also be more detailed. For example, the Ministry of Water Resources in Nepal publishes an annual review of disasters, covering events of all sizes throughout the country, with details of deaths, injuries, numbers

of families affected, animals lost, damage to housing and land, and estimated economic losses.

There are problems with all disaster data sets of this kind. Some limit themselves to larger events defined as 'disasters'. All rely on imperfect methods of collection, leading to omissions and inconsistency. They tend to be far less reliable on economic impact than on human casualties, and particularly weak on indirect effects. They tend to focus on numerical totals rather than the spatial distribution of impact. The figures produced are rarely linked explicitly to the wider vulnerability context.

Case studies of recent events are a valuable supplementary source of information on disasters' impact, the vulnerability of people and the capacity of agencies. It may not be easy to find good-quality case studies, however. The published literature may be limited, or hidden in academic journals. Agencies' situation reports generated during major disasters are more accessible (many are on the ReliefWeb site at www.reliefweb.int/w/rwb.nsf), but may have only a limited amount of information that is useful for vulnerability analysis.

Agencies may use some of the sources given above for context, but will base their understanding on local-level data, especially that generated by communities themselves through participatory methods. Such approaches give more limited coverage, geographically and in terms of the number of people involved. Because the methods used and data collected will vary according to time and place, the results are not standardised and it can be difficult to compare findings. However, these drawbacks are outweighed by the advantages: the approach supplies far more detail and provides much better insights into the multiple pressures that communities face and the causal links between them, local needs and priorities, people's understanding of their own vulnerability, indigenous methods for dealing with risks, and community capacity (actual and potential).

Data analysis

Experience suggests that vulnerability analysis tends to generate more information than is needed, and identifies more issues than local agencies can address. Excessive data collection is expensive and – if not used – wasteful. The task of processing volumes of information can put pressure on large and small organisations alike. This shows the importance of setting clear and realistic targets for a vulnerability analysis exercise. To be fair, it is not always easy to judge how much information will be necessary at each stage of project design and implementation, or for whom (community organisations, NGO field staff and headquarters staff will have different information needs).

Some field workers have suggested that a picture of vulnerability could usefully be built up gradually through a series of smaller assessment exercises, rather than a single intensive, complex vulnerability analysis. This would also enable an operational agency to fit its work around community activities, thereby causing minimal disruption.

Data analysis usually presents more problems than data collection. Data sets contain a variety of evidence and indicators that are not easily triangulated, collated or analysed. Methodological guidelines have little to say on the subject of analysis. There are signs that this causes problems for many staff who have used vulnerability analysis. As a result, in some cases the 'findings' are more descriptive than analytical, and this of course makes it difficult to set priorities for intervention. Where organisations follow an open-minded, participatory approach, the selection and weighting of indicators are usually left to participants in the analysis process, but this too causes problems for many field staff who need appropriate training and guidance.

Outcomes

An obvious point, but one that can be forgotten, is that vulnerability analysis should lead to *action*. In some cases it has been seen as an exercise in gathering information for its own sake – the same problem has sometimes beset PRA and similar methods.

Actions that result from a vulnerability analysis could take the form of improvements to project design and implementation that increase community resilience, changes in the thinking and practice of the operational agency itself, or policy changes at a higher level. The IFRC's experience is that application of its VCA method has led to better relationships with communities, national governments and other agencies that have been involved in the process or used the findings.

For many practitioners, one important question will be: how much information and analysis is actually needed before one can embark on a project? There is an inherent tension in project work between the need for knowledge gathering and understanding on the one hand, and the pressure to take action on the other.

Carrying out a vulnerability analysis can raise community expectations that the organisation concerned will intervene to solve all the problems identified. This is rarely possible. It is therefore important to discuss its purpose and likely outcomes with communities and other stakeholders at the outset.

Case Study 4.2
Vulnerability and capacity assessment in Palestine

In 1999, the Palestine Red Crescent Society (PRCS) decided to carry out a vulnerability and capacity assessment (VCA) as a first step towards a national disaster preparedness plan. The six-month assessment was explicitly participatory. It drew on interviews with officials and NGOs and 22 focus groups in towns, villages and refugee camps across the West Bank and Gaza, seeking to get a cross-section of Palestinian society. The work was carried out by PRCS staff, who received training in interview and group animation techniques. Two pilot studies were held to test the focus group method. Care was taken to ensure good gender balance in the focus groups, and the involvement of other vulnerable groups such as the elderly. Two information-gathering workshops were held involving PRCS employees, and a great deal of documentary data was collected.

One novel element of the VCA was that it included children and young people, who make up more than half of Palestinian society. They expressed their understanding of disasters and disaster mitigation through drawings.

Key institutional stakeholders were brought into the project's steering committee to ensure that the process would be taken forward. These included Palestinian Authority ministries and local NGOs.

The data analysis revealed many local capacities in the PRCS (including the quality of its specialised staff, equipment and supply levels, and the potential for recruiting more volunteers), but also highlighted the need for much more training in the community. It showed weaknesses in coordination between local institutions, and a lack of communication between communities and the authorities about hazard risks.

The interviewees and focus groups identified lack of water as their greatest priority in terms of hazards, with political events second. Road accidents, open sewers, pollution, fires, earthquakes and health came lower down the list. The significance given to water shortage surprised the analysts, who had expected political problems to be the dominant concern.

The VCA report was finalised in August 2000. Barely a month later, a renewed round of conflict between Palestinians and Israelis broke out. The VCA was rapidly overtaken by events and priorities shifted dramatically. Many proposed measures had to be put on hold and, inevitably, some communities that had hoped for more support

(continued)

Case Study 4.2 *(continued)*

felt let down. The exercise had nevertheless been valuable in helping the PRCS to understand its strengths and weaknesses, and this understanding was put to use in setting up more resilient organisational systems to deal with the new crisis. The PRCS was also able to take steps to address the water problem in some locations, such as camps for displaced people, by improving supplies and sanitation. In Gaza, where the VCA had identified open sewers as a major problem, PRCS volunteers, students and municipal authorities launched clean-up campaigns.

Vulnerability and Capacity Assessment: A Participatory Action Research Study of the Vulnerabilities and Capacities of the Palestinian Society in Disaster Preparedness (El Bireh: Palestine Red Crescent Society, 2000); *World Disasters Report 2002: Focus on Reducing Risk* (Geneva: International Federation of Red Cross and Red Crescent Societies, 2002), pp. 129–47.

4.2.4 Risk analysis

Many disaster management practitioners use what they call 'risk analysis' methods to draw up mitigation plans and make operational decisions. Technically speaking, risk analysis is different from hazards and vulnerability analysis, focusing on how often specified events may occur and the magnitude of their consequences. Risk analysis may be based on quantitative or qualitative data, or a combination of these. Qualitative analysis uses descriptive scales to describe the likelihood and magnitude of risks. It is mostly used as an initial screening, where the level of risk does not justify fuller analysis or where there are insufficient data for more quantitative analysis. It often takes the form of a probability/impact matrix, which can be quite simple to produce (see Figure 4.2 for an illustration).

Quantitative risk analysis is based on numerical values. This requires extensive and accurate 'hard' data, and uses mathematical manipulation of the data to produce tables that assign numerical values to the probability and frequency of risk, and to exposure to risk. For example, a fire risk assessment in the capital city of Laos, Vientiane, identified seven key risk factors and gave a numerical value to each to arrive at a total risk score for each geographical unit surveyed (Table 4.1).

Figure 4.2
Probability/impact matrix

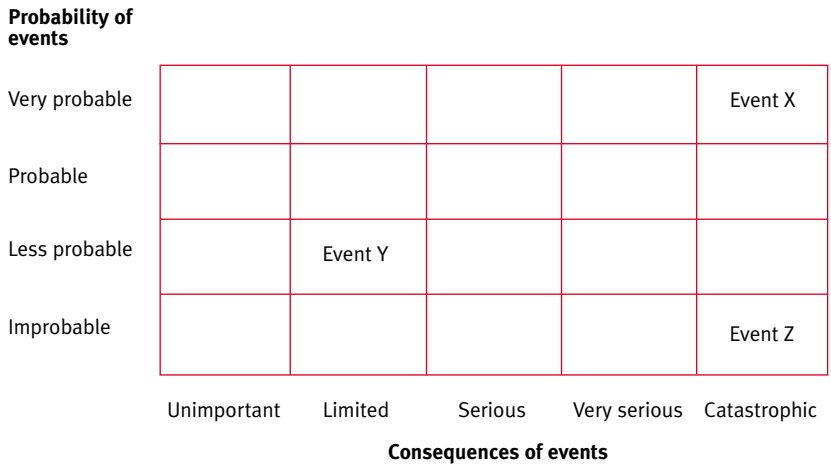


Table 4.1 Fire risk assessment in Vientiane

Risk factor	*Total score*
Building material type	25
Sources of flammable material	15
Fire-fighting scenario (availability of water and manoeuvring space for fire-fighters)	15
Quality of electrical wiring	5
Fire history	10
Building density	15
Accessibility (roads)	15
Total:	**100**

P. Sounnalath et al., 'Fire Risk Assessment in Vientiane Lao PDR', in *Proceedings: Regional Workshop on Best Practices in Disaster Mitigation. Lessons learned from the Asian Urban Disaster Mitigation Program and Other Initiatives, 24–26 September 2002, Bali, Indonesia* (Bangkok: Asian Disaster Preparedness Center, 2002), pp. 97–102.

There was a sub-set of quantifiable features within each of the seven categories. Again, each carried a numerical score. For example, under 'fire history', there were four categories of risk: high (four incidents of fire recorded during the past five years – score ten), moderate (three incidents – score five), low (two incidents – score three) and very low (one incident – score one).

The more sophisticated forms of risk analysis are often carried out by highly-trained specialists, found mostly in research institutions, government departments and emergency management agencies, insurance companies and other large businesses working in this field. But this may not be necessary. In the case of Vientiane referred to above, much of the data could be collected by visual surveys and the scoring system was straightforward. Moreover, in many cases the assignment of numerical values to particular features of risk is subjective.

For all its sophistication, one limitation of risk analysis as often practised is that it does not take a broad view of human vulnerabilities and capacities, tending instead to focus on more visible and quantifiable elements at risk, such as buildings and physical or financial assets, and human lives (although wider dimensions can be incorporated into qualitative or semi-quantitative models). It is possible to carry out more subjective, participatory risk analysis, and the results of such exercises can be valuable in understanding local perceptions and priorities (see Case Study 4.3).

In practice, the difference between risk analysis, hazards analysis and vulnerability analysis is often blurred, with the various terms being used by different people to mean similar things. There is often a lot of overlap. It is perhaps most helpful to see risk analysis in a broad sense, as an interpretation of all kinds of data on hazards, vulnerabilities and capacities in order to take decisions about priorities for intervention.

4.2.5 Geographical Information Systems

Rapid advances in information and communications technologies, especially Geographical Information Systems (GIS), are revolutionising the potential capacity to analyse hazards, risks and vulnerability, and plan for disasters (some helpful recent publications consider this in more detail).[7]

A GIS is a software package used for information storage, situation analysis and modelling. The software works with spatial data: it enables different kinds of data to be overlaid on maps. The kinds of data that can be inputted include:

Case Study 4.3
Risk-mapping among East African pastoralists

A team of US researchers developed a simple but systematic approach to classifying and ordering the sources of risk faced by pastoralist populations in arid and semi-arid districts of southern Ethiopia and northern Kenya. The aim was to find a robust participatory method that was less costly and time-consuming than full surveys.

There were two stages in the method: identifying risks; and ranking risks. The first stage was achieved using an open-ended questionnaire. The researchers emphasised to the pastoralist informants that they could each list as many problems as they wished, and should identify these through discussions amongst themselves.

The second stage used a simple numerical ranking method to group the risks in order of severity. Risks thought to be equally severe could be ranked equally. After they had done the ranking, the informants were asked to discuss each risk in turn, explaining how they dealt with the problem, or why they no longer could, and how they would like to overcome it.

Assessment of the incidence of a risk was based on the proportion of participants who identified it. Severity of risk was assessed using a mathematical calculation that translated the informants' perceptions into a simple risk scale. Findings could be plotted on maps to identify areas and groups at risk. Disaggregation by age, gender, wealth and other socio-economic characteristics was also possible.

The method was tested in the field over six months in 1998, involving 120 groups (59 groups of women, 61 of men). The responses identified 15 major sources of risk, ranging from availability of food and water to banditry. The most frequently mentioned problems were insecure access to food and water, livestock disease and access to health clinics. Food and water shortage were the only risks mentioned by a majority of informants, indicating that the extent of the other risks varied considerably across the region and its population, even though some (for instance malaria and conflict) were certainly severe in places.

K. Smith et al., *Participatory Risk Mapping for Targeting Research and Assistance: With an Example from East African Pastoralists,* Utah State University College of Natural Resources, 1999, www.cnr.usu.edu/research/crsp/tr199.htm.

- contour lines, hills, forests and watercourses and other geophysical phenomena;
- transport routes, power lines, housing and other features of the built environment;
- demographic and other social factors, including nutritional status and the distribution of particularly vulnerable individuals or groups; and
- the location of emergency services and facilities.

Data can be added to or removed from the program and its maps.

Several GIS packages are available. Some are custom-built, others are standard software. The main users have been scientists and national and local governments' emergency management services in developed countries.

How useful are GIS for NGOs and similar organisations working at local level in developing countries? There is still a lack of evidence about its application in the field, although there are examples of successful GIS risk management applications by NGOs. One of the best known is Save the Children's RiskMap package, which has been used for many years to monitor trends in food security (see Case Study 15.8, page 281). GIS has also been used by the Philippine Red Cross in a community-level disaster preparedness programme.[8]

Evidence from development applications has highlighted several common operational problems that cause GIS initiatives to fail.[9] These include:

- Underestimation of the considerable workload required to input, retrieve and analyse data, and the fact that much of the work is routine and tedious. This can lead to incomplete databases.
- Technical facilities (software, hardware, networks) that are inadequate, often because the lowest-cost option is chosen.
- Selection of data based on cost rather than usefulness.
- Too much time spent on systems and software, and on routine tasks, at the expense of practical applications.
- Lack of systematisation in collecting, inputting and storing data, leading to data sets that are hard to retrieve or do not match well.
- Inadequate training or staff who are not sufficiently qualified to manage GIS, and failure to upgrade skills.
- The risk that individuals with specialist GIS skills will gain power informally within their organisations.
- Loss of faith in GIS in the light of the practical problems listed above.

Case Study 4.4
Preparing for floods with GIS

In 1998, the NGO Action Against Hunger began an initiative to strengthen the capacity of people in Kampong Chan Province, northern Cambodia, to prepare for and respond to flooding of the Mekong River. The project had three main aims: identification and preparation of safe areas for evacuation, building the capacity of local Red Cross volunteer networks, and stockpiling emergency relief kits.

Interviews and questionnaires were used to identify areas at risk, safe areas and the patterns of movement of villagers and their livestock during floods. The safe areas identified were both external to the village (other villages on higher ground which traditionally receive evacuees) and internal (higher-placed houses). The data were incorporated into a simple GIS developed by the project team. Analysis revealed that the pattern of villager movement during evacuation was more complex, dynamic and diverse than expected. Once safe areas and likely evacuee numbers had been identified, the project could take steps to prepare them for emergencies, such as improving drinking-water supplies and sanitation facilities, and educating villagers in relevant hygiene issues. In at-risk villages and safe areas, Red Cross volunteers were trained to organise the movement of displaced people and manage relief efforts during floods.

Activities carried out during the first two years of the project included providing 21 external safe-area villages with new or rehabilitated water sources and latrines, and training 161 Red Cross volunteers in these villages and 54 flood-affected villages. A local flood early-warning system was established and a flood damage and safe area database covering 600 villages was developed.

Preparation for Flood-Related Disasters, NGO Initiatives in Risk Reduction Case Study 14 (London: British Red Cross Society, 2001), www.redcross.org.uk/riskreduction.

It has also been suggested that GIS' reliance on quantitative data may limit its potential application to vulnerability analysis. It is not always possible to assign a quantitative value to some dimensions of socio-economic vulnerability. Spatial representation is also made difficult by the different levels at which

Figure 4.3

A typical GIS map showing accessible water sources

different dimensions of vulnerability operate – e.g. root causes have an impact on a much larger geographical area or social group than locally unsafe conditions, but both interact to create vulnerability.[10]

Organisations thinking of using GIS are advised to consider the following four main questions regarding its practicality:

- *Cost*. GIS software is sophisticated and therefore expensive, requiring state-of-the art hardware to run effectively (though see Case Study 4.4 above). Back-up maintenance and support should also be considered.
- *Skills*. Staff will need extensive training in collecting, inputting and analysing data. The temptation to save costs by training only a few people in GIS should be avoided, since travel, illness or job change will leave the organisation without experts who can operate the system.
- *Need*. At local level, GIS may not be necessary. The problems may not be sufficiently complex to justify it.
- *Data*. To be really useful, GIS need reliable and extensive data. These may not be available, or it may be very difficult to obtain and process them. Data sets also need to be kept up to date, which takes time and can cost money.

4.2.6 Sustainable livelihoods

Vulnerable people face a number of risks in their everyday lives, of which hazards are only one. For many, poverty is the main problem. Their priorities and their capacities for dealing with disasters are directed by the need to earn a living.

Livelihoods and livelihood security will be a recurrent issue in this Good Practice Review because of the centrality of livelihood strategies to the lives of poor and vulnerable people, the close relationship between these strategies and risk reduction or coping strategies, and the importance of rebuilding livelihoods after disasters. Poor people's livelihoods are unlikely to be sustainable unless they can cope with the numerous external stresses and shocks that affect them.

Recent thinking in development circles is placing livelihoods – in particular, sustaining and strengthening livelihoods – at the centre of discussions about poverty reduction. Vulnerabilities, of all kinds, are viewed as part of the context in which livelihoods are shaped. The ideas and tools that are being developed in this area are commonly referred to as the 'livelihoods approach', 'sustainable livelihoods approach' or 'livelihood security approach'.

Literature on the theory and practice of sustainable livelihoods is extensive, and there is a 'gateway' website devoted to the subject (Livelihoods Connect: www.livelihoods.org). The account that follows draws on a handful of key sources.[11] Figure 4.4 (page 56) shows one widely used livelihood model in diagrammatic form.

Vulnerability context

A central feature of sustainable livelihoods approaches is that they recognise that poor people live and work within a context of vulnerability that frames the environment in which they exist, is responsible for many of the hardships they face, and has a direct impact upon their assets and the livelihood options that are open to them. This is something that poor people are only too aware of.

Many factors make up the vulnerability context. Long-term, large-scale trends are one: these include population trends, resource trends (including conflict over resources), economic trends (national and international), trends in governance and politics, and technological trends. The second main factor is external shocks: human health shocks (e.g. epidemics), natural shocks (e.g. natural hazard-induced disasters), economic shocks (e.g. rapid changes in exchange rates), conflict and disease, and drought or pest infestation that affects crops and livestock. Shocks can destroy assets directly (e.g. in the case of floods or storms). They can also force people to dispose of assets as part of coping strategies. The third main factor is seasonality: seasonal shifts in prices, production, food availability, employment opportunities and health. These are among the greatest and most enduring sources of hardship for poor people.

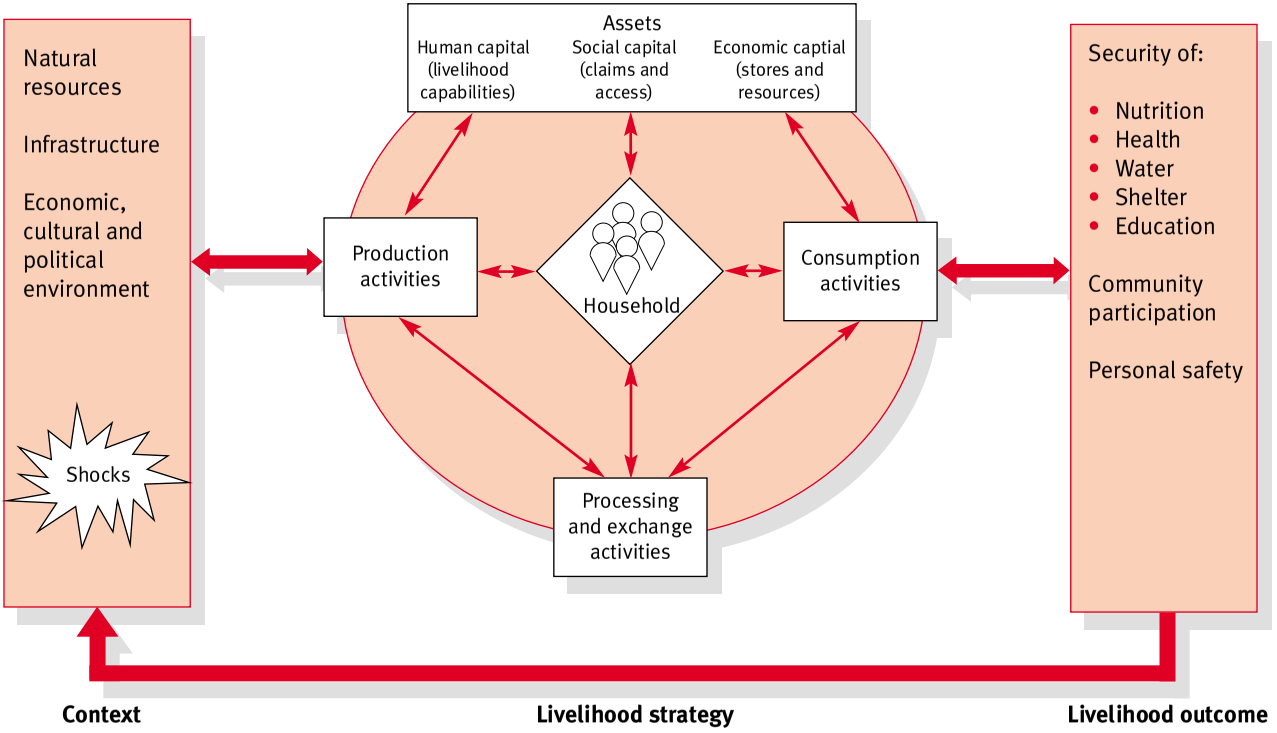
Livelihood assets

The term 'livelihoods' should be seen broadly, to include a range of assets and activities required for a means of living. Livelihoods approaches generally describe people's strengths or capacities as livelihood assets, which are destroyed and created as a result of the trends, shocks and seasonality of the vulnerability context.

Livelihood assets can be broken down into several different categories:

- *Human capital:* skills, knowledge, ability to labour, good health.
- *Social capital:* the social resources upon which people draw in pursuit of

Figure 4.4
CARE's livelihood model



M. Drinkwater and T. Rusinow, *Presentation on CARE's Livelihoods Approach for NRAC '99* (London: CARE International, 1999), www.careinternational.org.uk/resource_centre/livelihoods/cares_livelihoods_approach.doc, p. 2.

livelihood objectives (e.g. networks and connections, membership of groups, relationships of trust, reciprocity and exchange).

- *Natural capital:* the natural resource stocks from which resource flows and services are derived (e.g. land, forests, marine/wild resources, water, protection from storms and erosion).
- *Physical capital:* the basic infrastructure and producer goods needed to support livelihoods. Infrastructure components include affordable transport, secure shelter, adequate water supplies and sanitation, and access to information. Producer goods are the tools and equipment that people use to function more productively.
- *Financial capital:* includes savings and credit, and inflows of money other than earned income (e.g. pensions, remittances).

By perceiving livelihood assets in this way, one can gain valuable insights into the strengths and weaknesses of different types of asset, their relative importance and the linkages between them.

Livelihood strategies

In their livelihood strategies, poor and vulnerable people use their assets for consumption, production and exchange. If successful, the strategies will lead to a variety of improvements to their livelihoods, both economic and non-economic:

- greater income and more economically sustainable livelihoods;
- increased well-being (comprising non-material elements such as self-esteem, sense of control and inclusion, personal safety, community participation and political enfranchisement, and maintenance of cultural heritage);
- better access to services such as health, water, power and education;
- reduced vulnerability to external trends, shocks and seasonality;
- improved nutrition and food security – which is of fundamental importance; and
- more sustainable use of the natural resource base.

Institutions, organisations, policies and legislation all affect livelihood strategies by influencing access to assets and resources. These forces operate at all levels, from the household to the international arena, and in all spheres, from private to public.

Application of livelihoods approaches to risk reduction

Broad-based livelihoods approaches of the kind outlined above are now being widely used in development planning. There is little evidence of their applica-

tion specifically to risk reduction work, although the potential value is obvious. Livelihoods approaches could help to identify the extent and nature of the whole range of poor people's livelihood assets, and their vulnerability to hazards as well as other external forces. From this, it should be possible to identify entry points for protecting those assets that are most at risk, or that could be most valuable in a crisis.

The livelihoods approach also gives an insight into the factors influencing people's choice of livelihood strategy. In particular, it should help in understanding the reasons behind their willingness to tolerate hazards and risk – which is often due largely to the need to keep fragile livelihoods, particularly family incomes, going from day to day. Disaster mitigation and preparedness projects that fail to appreciate the fundamental importance of this will find it difficult if not impossible to achieve success.

Interventions to sustain and protect livelihoods can take place at any stage in the disaster cycle. Long-term livelihood strengthening can be part of pre-disaster mitigation strategies, integrated with development work. Shorter-term disaster preparedness initiatives can include steps to protect material assets, or move them to safety as part of contingency planning.

Social capital in the form of strong community organisation is of obvious benefit in an emergency (see Case Study 4.5). When a disaster strikes, emergency

Case Study 4.5
Social capital and self-reliance in disasters

Catuche, a neighbourhood in Venezuela's capital city, Caracas, was hit by severe floods in December 1999. Field reports suggested that community solidarity and strong community organisation combined to save hundreds of lives. As the flood waters rose, neighbours helped one another by passing on the latest news about water levels, helping older residents from their homes and in some cases forcing people who were reluctant to evacuate to move to safety. Only 15 people were believed to have been killed, whereas hundreds lost their lives in other similarly affected neighbourhoods.

D. Sanderson, 'Cities, Disasters and Livelihoods', *Environment & Urbanization*, vol. 12, no. 2, 2000, pp. 93–102.

relief can be used to maintain livelihood activities – for example, by providing seeds or tools that have been lost to the disaster – in addition to meeting basic needs. Livelihood support helps longer-term rehabilitation and recovery from disasters to proceed more quickly (see Chapter 17.3, page 323).

Human vulnerability analysis of the kind described above often picks up livelihoods issues but usually not systematically, which can lead to significant gaps in understanding. Yet it is not difficult to incorporate a livelihoods perspective into vulnerability analyses when they are carried out for research or baseline studies. It may also be possible in some cases to regroup or reinterpret existing data from such analysis according to the livelihoods point of view.

4.3 Project design

In this phase of planning, objectives must be set and a strategy for achieving those objectives drawn up, which includes selecting the approach to be adopted. This section looks at some of the general issues in decision-making, presented in the form of basic features of good planning.

Planning a project assumes that something will be done to address hazard and vulnerability problems. This may not always be the case, however. Conventional risk management approaches allow the option of ignoring the risks that have been identified, principally on the grounds that they are likely to be minimal or that the chance of a major disaster happening is too remote and there are other more immediate problems to address.

Only when a decision has been made to tackle the risks identified do other project planning processes come into play. The stages then are to identify and evaluate the different options for dealing with the risks, select the options and approaches to be taken, prepare plans and implement them.

4.3.1 Basic features of good planning

Many of the features of good project design set out in this section are common to project planning in general, while some are more specific to disasters. The following paragraphs draw on a variety of disaster mitigation guidelines.[12]

Among the main issues to be considered in planning are:

- *Process.* Planning should be approached as a process, not merely the production of written documents. In particular, it should be seen as a process

of continuous improvement, reflecting the idea of risk reduction as a long-term goal to be approached gradually. This means that one should not try to work out all the details at the outset.

- *Clarity.* There must be clarity about the goals, strategies and scope (broad parameters) of the activities to be undertaken. Project plans should also be clear about how proposed activities are linked to broader strategic objectives (logical frameworks and similar devices may help here).
- *Targets.* All projects should set targets whose achievement can be verified by monitoring and evaluation. Evaluation of risk reduction work does present problems, as Chapter 18 shows, but that is no excuse for avoiding the issue. Targets should be realistic and understood by everyone involved in the initiative. But targets may also have to shift, because vulnerability is not static.
- *Analysis.* The need for a thorough understanding of the problem cannot be overemphasised. Hazard, vulnerability and risk analysis are well worth the time and effort spent on them. The analysis should include thinking about what might realistically happen in the future, not just about what has happened in the past or what a vulnerability analysis shows could happen in the present. The nature of a community's vulnerability can shift very quickly under external pressures and opportunities. Climate change will probably change the hazard context in many regions. Anticipate problems.
- *Definition.* There are many different dimensions of human vulnerability to disasters and many different ways of approaching the problem. It is important to define clearly the nature of the project (e.g. activities, participants), its extent (time, location) and its outputs, together with performance criteria.
- *Resources.* Inputs and resources should be matched closely to the projected outputs – i.e. make sure that the outputs are realistic given the resources available. Assess the implementing organisation, its capacity to address the risks and needs identified, and factors that support or impair its capacity to deal with those risks. An institutional assessment of the kind outlined in Chapter 3.2 (page 24) will help here. Assess partner organisations' capacity, too (see below).
- *Setting priorities.* This is fundamental. All projects need to balance costs, benefits and opportunities. Should a project adopt an all-risks approach or a more selective approach targeting particular risks? Is the project designed to reduce the direct, indirect or secondary impacts of disasters? (See Box 18.5 (page 361) for an explanation of these terms.) How does one set priorities regarding not only different hazards and vulnerabilities, but also different vulnerable groups? What minor or remote risks are acceptable or tolerable? On what basis should such decisions be made (e.g. the magnitude and frequency of the potential disaster, beneficiary priorities, organisational

capacity and resources)? The criteria for making such decisions may be operational, technical, financial, social, humanitarian, political or legal. Analysis of costs and benefits (discussed in Chapter 18.3) forms part of this. In a development project, reducing risk will be only one of the project's goals, so the priority to be given to it must be agreed at the start.

- *Generic approach.* As a general rule, one should adopt an approach that is generic rather than hazard/risk specific – i.e. that builds up capacities to deal with the range of threats that will affect a given community. On many occasions this does not happen in practice, with separate planning around different hazards. This is inefficient and often leads to duplication and gaps in the coverage of disaster threats, as well as to conflict between disaster management agencies. This does not mean that agencies should not have priorities regarding what they can tackle, nor that all hazard threats are the same and can be treated identically; rather, it means that the basic human and organisational problems of preparing for disasters are similar, whatever the hazard. Many fundamentals of good planning apply to a wide range of hazards (e.g. participation, stakeholder partnership, and effective communication of risks and warnings). Moreover, one should not focus on one hazard risk to the extent that other significant risks are overlooked.
- *Partnership and capacities.* Agree roles and responsibilities within the organisation and with partners well in advance. No organisation or group can work alone. Identify all relevant internal and external stakeholders, considering everyone who might be affected by an intervention: what are their roles and capacities, how does the implementing organisation relate to them and how can its work complement or support theirs? Partners and other stakeholders should be involved in the planning process, not simply written into the plans. Understanding the capacities of individuals, communities and agencies who might be involved in a project is an essential element in planning, and needs to be considered. Stakeholder partnerships are discussed in more detail in Chapter 5.
- *Integration.* Take an integrated approach to the problem. There is rarely, if ever, one single option for reducing risk. A package of measures will be required, based on an all-round view of hazards, vulnerabilities and livelihood options. Choices will have to be made according to local needs, the likely success of different interventions and the resources available. Integration of risk reduction in development programmes is very important.
- *Flexibility.* This is essential. It requires process, not blueprint, planning, which can adapt according to changes in understanding and circumstances.

- *Assumptions*. These should be stated clearly at the outset so that all partners are aware of them. What external factors that are not influenced by the project might affect its implementation and long-term sustainability? What are the risks – natural, social, economic, political – to this risk-reduction initiative?

4.3.2 Fundraising

It is not feasible to give extensive practical advice on fundraising within the scope and length of this Good Practice Review, but a few general comments can be made.

The first is that dedicated funding for disaster mitigation and preparedness is very limited. There are two main reasons for this: the lack of commitment to this issue among governments and donor agencies; and the persistence of artificial divisions between emergency and development budgets (disaster mitigation and preparedness fall into the gap between the two).

Humanitarian assistance grants generally have short time limits and strict criteria that do not allow expenditure on anything other than meeting urgent needs. A few international humanitarian organisations which raise large amounts of money for disaster relief from public fundraising appeals are beginning to think about allocating a proportion of this money to preparedness and mitigation.

Development budget lines tend to categorise anything relating to disasters as a problem for their humanitarian aid counterparts. Drought mitigation is a notable exception to this tendency, since it can be packaged differently, as food security work. Other projects can be successfully presented as development in this way: an initiative to build earthquake-proof housing can also be a community-based housing project; a scheme to redress environmental degradation through reforestation and more sustainable use of natural resources also reduces risks from floods and landslides. But this ought not to be a cynical exercise in marketing. Funding applications of this kind are likely to be successful only insofar as they take a genuinely developmental approach.

4.4 Chapter summary

- Project planners need to understand hazards, vulnerability and risk.
- Relevant hazards data may not always be easy to obtain and may require specialist collectors and interpreters, but less sophisticated methods and incomplete data sets can be used effectively.

- A number of methods of vulnerability analysis are available, many derived from PRA techniques, although we still have much to learn about their application.
- Community participation should be central to vulnerability analysis.
- Data collection and particularly analysis present technical problems in vulnerability analysis. The whole process therefore needs to be thought through carefully.
- Vulnerability analysis must lead to action.
- Risk analysis can be based on quantitative or qualitative data and carried out to varying degrees of complexity.
- One limitation of risk analysis as often practised is that it tends to focus on more visible and quantifiable elements at risk. However, more subjective, participatory forms of analysis can be used.
- Geographical information systems are revolutionising our potential capacity to analyse hazards, risk and vulnerability, but organisations need to consider the cost, skills and data required.
- Sustainable livelihoods approaches may provide a conceptual means of mainstreaming disasters and vulnerability in development thinking.

Notes

1 *Mitigating Natural Disasters: Phenomena, Effects and Options – A Manual for Policy Makers and Planners* (New York: Office of the United Nations Disaster Relief Coordinator, 1991), pp. 12–13.

2 Such as Keith Smith, *Environmental Hazards: Assessing Risk and Reducing Disaster* (London: Routledge, 1996); *Primer on Natural Hazard Management in Integrated Regional Development Planning* (Washington DC: Organization of American States, 1991), www.oas.org/usde/publications/Unit/oea66e/begin.htm.

3 See, for example, D. Alexander, *Principles of Emergency Planning and Management* (Harpenden: Terra Publishing, 2002); UNDRO, *Mitigating Natural Disasters*; and A. Coburn, R. Spence and A. Pomonis, *Disaster Mitigation*, UNDP/DHA Disaster Mitigation Training Programme, www.undmtp.org/english/Disaster_mitigation/disaster_mitigation.pdf.

4 A. M. Dixit et al., 'Hazard Mapping and Risk Assessment: Experiences of KVERMP', in ADPC (ed.), *Proceedings: Regional Workshop on Best Practices in Disaster Mitigation – Lessons Learned from the Asian Urban Disaster Mitigation Program and Other Initiatives, 24–26 September 2002, Bali, Indonesia* (Bangkok: Asian Disaster Preparedness Center, 2002), pp. 103–106.

5 'DFID/IFRC Partnership: Disaster Reduction Global Workshop, Khartoum, Sudan, 16–18 December 2002. Thematic Report', unpublished workshop report (Geneva: IFRC, 2002); T. Cannon, J. Twigg and J. Rowell, 'Social Vulnerability, Sustainable Livelihoods and Disasters: Report to DFID Conflict and Humanitarian Affairs Department and Sustainable Livelihoods

Support Office', unpublished report (Greenwich: University of Greenwich Natural Resources Institute, 2003), www.benfieldhrc.org/DMU/OtherPublications/DFIDVulandLiveRepFino303.pdf.

6 See, for instance, A. Lavell and E. Franco (eds), *Estado, Sociedad y Gestión de los Desastres en América Latina* (Lima: LA RED/FLACSO/ITDG Peru, 1996); M. Trujillo et al., *Risk-Mapping and Local Capacities: Lessons from Mexico and Central America* (Oxford: Oxfam, 2000); the Pan-American Health Organization (PAHO)'s 1994 study of La Paz, *Desastre Natural de la Ciudad de La Paz*, www.disaster.info.desastres.net/lapazriada; and D. R. Godschalk et al., *Natural Hazard Mitigation: Recasting Disaster Policy and Planning* (Washington DC: Island Press, 1999).

7 See, for example, Alexander, *Principles of Emergency Planning and Management*, pp. 18–23; and R. Stephenson and P. S. Anderson, 'Disasters and the Information Technology Revolution', in *Disasters*, vol. 21, no. 4, 1997, pp. 305–34.

8 L. Masing, 'Integrated Community Disaster Planning: The Philippine Experience', in J. Ingleton (ed.), *Natural Disaster Management* (Leicester: Tudor Rose, 1999), pp. 201–203. See also Kerry Abbott, 'Geographic Information Systems in Food Security and Demining Programmes', *Humanitarian Exchange*, no. 24, July 2003, pp. 31–33.

9 C. Feldkötter, 'GIS – What Can Go Wrong?', in *Workshop Proceedings: Application of Resource Information Technologies (GIS/GPS/RIS) in Forest Land & Resources Management. October 18–20, 1999, Hanoi, Vietnam* (GTZ, 1999).

10 *Living with Risk: A Global View of Disaster Reduction Initiatives* (Geneva: UN International Strategy for Disaster Reduction, 2002), pp. 72–73.

11 DFID's *Sustainable Livelihoods Guidance Sheets*, www.livelihoods.org/info/info_guidancesheets.html; J. Twigg, *Sustainable Livelihoods and Vulnerability to Disasters* (London: Benfield Hazard Research Centre, 2001), www.benfieldhrc.org; and M. Drinkwater and T. Rusinow, Presentation on CARE's Livelihoods Approach for NRAC '99 (London: CARE International, 1999), www.careinternational.org.uk/resource_centre/livelihoods/cares_livelihoods_approach.doc.

12 These include Standards Association of Australia, *Risk Management. AS/NZS 4360: 1999* (Strathfield: Standards Association of Australia, 1999); E. L. Quarantelli, *Major Criteria for Judging Disaster Planning and Managing and Their Applicability in Developing Societies* (Newark, DE: University of Delaware: Disaster Research Center, Preliminary Paper 268, 1998), www.udel.edu/DRC/preliminary/268.pdf; and UNDRO, *Mitigating Natural Disasters*.

Chapter 5
Partnerships and stakeholders

5.1 Rationale for partnerships

The disaster 'community' – those who are professionally engaged in efforts to prevent disasters and deal with their consequences – comprises a great diversity of professional disciplines. These include physical scientists (of many different kinds: earth scientists, hydrologists and meteorologists, for instance), social scientists (also of many different kinds including geographers, anthropologists, sociologists and economists), engineers, architects, doctors, psychologists, development and emergency planners, and humanitarian relief workers.

The disaster community also comprises people from very different organisations, such as international aid agencies, governments (at all levels), NGOs and other civil society organisations, academics, consultants, military agencies and private sector interests of various kinds. All of these have a role to play in reducing risk – together, of course, with vulnerable communities, who are the main actors in mitigation and response at local level.

The scale, frequency and complexity of disasters as physical and social phenomena can only be addressed by deploying a wide range of knowledge, skills, methods and resources, both in development and emergency programming. This means that risk reduction initiatives must be multi-disciplinary partnerships involving a range of stakeholders. Such partnerships should be vertical (between national and local actors) and horizontal (between government, the private sector and civil society). The need for such an approach is becoming ever more urgent with the rising number of disasters and their increasing impact on vulnerable people.

Risk management thinking, as outlined in Chapter 1, represents just such a holistic approach. It is also quite new. Disaster management itself is a relatively recent discipline. It largely originated in civil defence organisations, established in response to war or the threat of war during the 1940s and 1950s, which then broadened out to address wider civil protection. By the 1970s emergency management – focusing on hazard analysis, emergency planning and emergency response – was becoming recognised as a distinct

field of professional expertise in some countries, and the process of professionalisation has continued ever since.

However, awareness of the need for integration between disaster preparedness and long-term mitigation, and acceptance of the need to address the wider socio-economic dimensions of vulnerability, did not become widespread until the 1990s. Even today, such views are far from being fully accepted.[1] Nonetheless, progress towards the goal of a 'culture of prevention' has been made in many countries, as shown in the development of laws and policies, improved institutional frameworks and planning, and a growing number of risk reduction initiatives, in developed and developing countries alike (see Case Study 5.1).[2]

5.2 Challenges and opportunities

Partnerships are necessary, but they are also difficult to manage. Some of the main challenges are given here, together with instances of effective measures to overcome them.

5.2.1 A stronger disaster community

Disasters are complex problems demanding a holistic response from different disciplinary and institutional groups, but they rarely get this. The disaster community is often characterised by:

- fragmentation along disciplinary and institutional boundaries (one of the key fault lines being between those who work on hazards and those who work on disasters);
- a lack of understanding between different disciplines, and often a lack of mutual respect;
- a lack of dialogue between different actors (e.g. between physical and social scientists, between governments and NGOs, or between so-called 'experts' from developed countries and people in developing countries);
- a culture of competitiveness and professional jealousy (fuelled by competition for funds); and
- insufficient humility in the face of the disaster problem – a greater readiness to talk than to listen.[3]

Another critical failing is that disaster specialists and people working on long-term sustainable development programmes tend to act in isolation from each other. Overcoming such deep and long-standing barriers will take consider-

Case Study 5.1

Towards a culture of prevention in Latin America and the Caribbean

Many countries in the Caribbean and Latin America are highly hazard-prone and have a significant proportion of vulnerable people in their populations. In the 1970s and 1980s, a number of major disasters in the region revealed the lack of coordination in relief work, and highlighted the need for a shift in focus from response to preparedness.

This led to a series of new initiatives. In 1977, the Pan-American Health Organization (PAHO) launched a health sector preparedness programme. In the 1980s, government civil defence organisations began to include disaster preparedness in their work. In the 1990s, disaster mitigation rose up their agenda. They also began to recognise that there was a role for other governmental agencies and NGOs in disaster management. From the early 1980s, local NGOs and communities became increasingly involved in risk reduction work, which was often linked to socio-economic development. In some countries, new legislation has helped to define the roles and responsibilities of the different agencies. New administrative frameworks have been created.

At the same time, there has been greater collaboration between national governments, at first in relief but increasingly in preparedness. For example, the Pan-Caribbean Disaster Preparedness Project, established in 1981, ran for a decade and was then institutionalised as the Caribbean Disaster Emergency Response Agency (CDERA). The Coordination Center for the Prevention of Natural Disasters in Central America (CEPREDENAC) was established in 1988, and has played a major role in stimulating and coordinating work on mitigation.

The number and outreach of technical assistance projects in all aspects of mitigation and preparedness have grown considerably during the past 20 years. Regional, national and local training programmes have proliferated, some with support from international donors. Higher education institutions have taken up relevant topics in their courses; research centres have been created; and there is an extensive literature on disasters and their causes.

A World Safe from Natural Disasters: The Journey of Latin America and the Caribbean (Washington DC: PAHO, 1994).

able time and effort by all parties concerned. Greater emphasis on inter-agency and inter-disciplinary networking is needed.

5.2.2 Governance

Disasters should be seen as a governance issue. It is generally agreed that national governments should be the main actors in risk reduction. They have a duty to ensure the safety of their citizens. Only governments are likely to have the resources and capacity to undertake large-scale multi-disciplinary initiatives, and a mandate to direct or coordinate the work of others. Governments also create the policy and legislative frameworks within which risk reduction can be accomplished.

In practice, governments may lack capacity and resources, especially in developing countries, but attitude and management are often the root problems: failure to recognise the importance of hazards and vulnerability to national development, coupled with short-sighted planning and inadequate organisation.

Governments are not monolithic. They are divided by function, hierarchy and politics, all of which can work against sustained risk management. In most countries, a large number of government agencies have a legitimate role in disaster management. Simply coordinating these may be a major task. In many disaster management systems, integration between higher and lower levels is weak. Case Study 5.2 illustrates some of these issues.

The 1995–97 volcanic eruptions on the Caribbean island of Montserrat illustrate some of the problems of governance that disasters can bring to light. Failure to plan and prepare for a volcanic emergency meant that officials could only respond to events, not anticipate them. For nearly two years 'wait and see' was the approach taken, until the island's main town was partly destroyed by the volcano in 1997. Effective disaster management was also hindered by a complex government system. As a British Overseas Territory, Montserrat has its own government, but also a governor appointed by Britain. The UK government became increasingly involved in managing the emergency, and there was added bureaucratic complexity in having three major UK government departments involved.[4]

Cuba's management of Hurricane Michelle in November 2001 offers a complete contrast. The hurricane made landfall with winds of 216km/hour, causing heavy damage in five provinces. More than 22,000 homes were damaged and 2,800 destroyed, yet only five deaths were reported. Some 700,000 people

Case Study 5.2
Institutional barriers to risk reduction

Severe floods and landslides in 1988 left over 18,000 people homeless and caused extensive infrastructural damage to the Brazilian city of Rio de Janeiro. In their wake, the World Bank supported a flood reconstruction and prevention project. The project's central goal was to strengthen the Rio metropolitan region's institutional and financial capacity to manage appropriate urban development and environmental planning.

From the start, the project faced a major problem of institutional weakness. Responsibilities were distributed between so many local agencies that coordination was almost impossible. Bank staff found it difficult to clarify and understand the roles of each institution and level of government. There was political rivalry between government institutions at federal, state and municipal levels. Numerous managerial changes in the government financial agency co-financing the project in the two years after the disaster contributed to an 18-month delay. The project was able to move ahead, but the institutional difficulties impeded progress.

In La Paz, the Bolivian capital, another World Bank urban development and disaster mitigation project in the late 1980s also found weak municipal administration to be a problem. A comprehensive scheme of measures was proposed, including structural measures to control floods and landslides and non-structural measures to build local institutional capacity. However, implementation was held up for several reasons, including frequent changes in the municipal administration. Protracted technical discussions delayed moves to improve the system for collecting public revenues, which was essential for the project's sustainability.

M. Munasinghe et al., 'Case Study: Rio Flood Reconstruction and Prevention Project', and A. Kreimer and M. Preece, 'Case Study: La Paz Municipal Development Project', in Kreimer and Munasinghe (eds), *Managing Natural Disasters and the Environment* (Washington DC: The World Bank, 1991), pp. 28–35.

(out of a population of 11m) were evacuated. In Havana, electricity was turned off to avoid deaths or injuries from electrocution, and the water supply was suspended in case of contamination. The two million inhabitants of Havana were advised to store water and food, and it seems that most did so. Citizens

also helped to tie loose roofing down and to clear away debris that might be dangerous if picked up by strong winds. The success of these arrangements was due to an effective warning and communication system, memory of previous disasters (encouraged by the authorities), the ability to mobilise people at neighbourhood level, and the general population's trust in official warnings and advice.[5]

Government policies are often a major contributor to people's vulnerability to hazards. Disaster management efforts by one branch of government, such as civil defence, may be undermined by the general thrust of economic, social or environmental policies. The value of establishing tropical cyclone early-warning systems and building shelters, for example, is seriously reduced if coasts are being stripped of natural defences such as mangrove forests in order to build commercial shrimp farms encouraged by export-driven economic programmes.

At a more immediate level, disaster management can become subject to political forces. Casualty and damage figures are often used by political parties for their own purposes. For example, when Hurricane Georges struck the Dominican Republic in September 1998, the government consistently reported a relatively low number of deaths, while the opposition-controlled congress alleged that five times that number had been killed. The opposition used a high death toll to make the government look inept or uncaring, while the government's political interests led it to downplay the disaster's impact.[6] In other situations, governments may exaggerate the human and economic casualties in the hope of attracting more international aid. Disaster management structures may also be shaped by political motives (see Case Study 16.1, page 292).

Such problems are researched and written about by academics. Because their linkages to NGOs and other operational agencies tend to be weak, this has not generally been translated into more effective lobbying for greater policy coherence and the depoliticisation of disaster management. The humanitarian aid arena, where fundamental issues of impartiality and non-interference are publicly debated, is a notable exception to this.

5.2.3 Decentralisation

Over the past 10–15 years, many governments in developing countries have progressively decentralised a range of their responsibilities from national to local levels. This has had both positive and negative consequences for risk reduction.

On the positive side, decentralisation has changed the ways in which communities and local NGOs interact with state institutions. In some places, there are

more partnerships between the public and NGO sectors aiming to strengthen local capacities. Being closer to the communities involved, staff in local organisations of all kinds are more likely to understand or even share their needs. In some places, local government institutions may be less politicised than those of central government.

There is no standard mechanism for partnerships between local government and civil society organisations in this area – this subject deserves much more study. But it is obvious that it takes time and effort to build up levels of trust and cooperation to the point where they can significantly improve capacity to manage real disasters, as opposed to everyday emergencies. Examples of different kinds of collaboration that appear to have had some effect are given in the following paragraphs and Case Study 5.3.

In the Philippines, which underwent extensive decentralisation in 1991, a national NGO, the Corporate Network for Disaster Response, has since 1997 been helping Local Government Units (LGUs) to institutionalise mitigation in their development strategies. An evaluation in 2000 suggested that this work had had some effect, shown in changes in LGUs' outlook and practice, the reorganisation of local disaster coordination councils, the allocation of resources for mitigation and preparedness, and issuing of supportive legislation.[7] More generally in the Philippines, there are signs of growing collaboration between government and civil society in local-level disaster management since the fall of the Marcos dictatorship in 1986.[8]

Researchers in Nicaragua found 'creative and surprising alliances' being forged between overstretched municipal authorities and NGOs to deal with the consequences of Hurricane Mitch, despite a history of uneasy relations between the two sectors. Reasons for these alliances included the fact that municipalities were under great financial strain, unable to manage their ordinary costs with their own resources, let alone manage an emergency. Leadership assumed by mayors and municipal authorities – in the absence of national agencies and formally established arrangements – turned out to be an important factor during the Mitch emergency and subsequent rehabilitation work. Cutbacks in state funding which had led to job losses in government disaster management institutions proved to be a gain to Nicaraguan NGOs, which took on ex-government staff experienced in disaster preparedness and equipped with the skills to deal with the bureaucracy.[9]

Decentralisation can also undermine risk reduction efforts. Central governments without financial resources may simply abdicate their responsibilities, leaving local government and NGOs to take on the task of managing disasters,

Case Study 5.3
NGO–local government collaboration to prevent a public health disaster

The Bolgatanga, Bawku West and Bawku East districts in northern Ghana are prone to outbreaks of cerebro-spinal meningitis. In 1997 9,331 cases were officially reported, of whom 861 died. The outbreak was considered a normal seasonal occurrence, and no emergency plans had been made in advance.

The NGO ActionAid Ghana and the three District Assemblies (the main local government units) recognised that something should be done to deal with the problem. The first stage was to organise a workshop for all stakeholders in emergency management: government departments and agencies responsible for fire, forestry, social welfare, community development, cooperatives, water and sanitation, civic education, disaster management, health, food and agriculture, minerals, environmental protection, national mobilisation and town and country planning.

The workshop was facilitated by ActionAid Ghana. Its main objectives were:

- To harmonise the agencies' contingency plans into one workable plan that District Assemblies could implement.
- To achieve clearer definition of an 'emergency' and develop indicators.
- To improve collaboration.
- To strengthen the District Assemblies' capacity (and that of their decentralised departments and communities) to prevent and manage emergencies.

The emergency contingency plan that came out of the workshop included a range of measures. A public awareness component broadcast songs, plays and stories on local radio stations, advising people how to avoid contracting cerebro-spinal meningitis and what to do when there was an outbreak.

Immunisation was intensified and carried out earlier in the year, before the season when outbreaks were likely to occur. The District Assemblies and local NGOs supported the immunisation by providing staff, vehicles and fuel. The Ministry of Health trained community health workers and volunteers to give first aid to victims and transport them to health facilities.

(continued)

Case Study 5.3 *(continued)*

All government departments and NGOs involved in the programme included awareness-raising as part of their community development work. In particular, they sought to strengthen community-based surveillance through training in monitoring and reporting outbreaks. Coordinating bodies with responsibility for all emergency-related issues were appointed in each district. There were regular emergency review meetings. The District Assemblies channelled part of their funding into financing the plan's activities. During the following three years, there were only 75 reported cases of cerebro-spinal meningitis and only six deaths. The contingency planning process was also generally reckoned to have strengthened working relations between the agencies involved.

'Emergencies Impact Assessment Study: Case Studies for Ghana', unpublished paper (London: ActionAid, undated).

even though they often lack the skills and finances to do so. Communities do not necessarily lower their expectations of local government to reflect this. They may continue to expect it to undertake structural mitigation measures, such as building dykes and embankments, just as they expected national government to do so.

Another fundamental, but less visible, weakness of decentralisation is that it puts responsibility for implementation on those who can only address local-level causes of vulnerability. Local government does not have the jurisdiction or political power to address the deeper political, social and economic forces that put people at risk. Under local government direction, disaster reduction can easily become fragmented into a series of small-scale initiatives, focusing on individual hazard events and artificially separated from the surrounding vulnerability context.[10]

5.2.4 Widening civil society participation

Conventional NGOs (local, national and international) feature in many disaster reduction plans. Yet often they are regarded as minor players, especially in countries whose governments remain hesitant to concede authority and resources to civil society. They have also found it hard at times to gain acceptance internationally. For example, the UN's International Decade for Natural

Disaster Reduction (IDNDR) in the 1990s was dominated by well-established networks of scientists and engineers, and by governments and the large international agencies. It had little or no impact on the NGO community, at least in some parts of the world.[11]

Governments do not always welcome the growth of civil society and resist any expansion of its role, especially where this involves criticism of government policies or practice. Disasters can open up opportunities for civil society organisations to take on a greater role, but governments may take firm steps to close these down thereafter (see Case Study 5.4). Under authoritarian regimes, more repressive measures may be taken (see Case Study 6.7, page 100).

Other civil society organisations that are perhaps not normally thought of as NGOs should also be brought into risk planning. Examples include the following (partnerships with grass-roots groups are discussed in Chapters 7 and 8):

- Trade unions are already active in promoting health and safety in the workplace. They have organisational skills and mass membership that could be mobilised to tackle hazards and vulnerability more generally. This potential has not been explored.
- Religious institutions and faith-based groups have traditions of supporting the needy and disaster victims. At times of famine in India, for instance, Hindu temples have provided grain for the hungry. Local faith organisations with established congregations and membership affiliations are often a source of volunteers and sometimes of leaders in emergencies, but there is a danger that such groups will favour people of their own religion (as sometimes alleged in the distribution of relief aid), and members of minority religions are among the more vulnerable groups in some societies. Little is known about the activities and capacities of faith-based groups overall, but given the extensive grass-roots outreach of such groups in many societies it is reasonable to assume that they could play a role in risk reduction.
- For many years in the US, amateur radio operators have been valuable in providing communications channels for emergency services during and after disasters. More than 80,000 operators have formally registered their availability to support local and state government in this way. Indian amateur radio operators played a role after the October 1999 cyclone in Orissa, when conventional communications channels broke down.[12] Such groups should be included more systematically in disaster preparedness plans.
- Universities and other research institutions are already improving understanding of hazards, vulnerability and disaster management. Academic networks and publications constitute well-established and effective channels for sharing knowledge between researchers. International networking

Case Study 5.4
Civil society and the state after disaster

In August 1999, an earthquake devastated the Marmara region of Turkey: over 17,000 lives were lost and an estimated 100,000 houses and 16,000 businesses destroyed or severely damaged.

The scale of the disaster put enormous pressure on emergency management systems. In the first weeks after the earthquake, state institutions were ineffective and civil society organisations filled the gap. The government's clear inability to respond adequately drew sharp criticism from the media, some NGOs and those affected. The media also focused on government corruption as a factor contributing to the disaster.

However, in the months that followed, central authorities regained control and there was a shift in attitude towards civil society, from spontaneous acts of collaboration to systematic control and threats. Only designated state authorities and a few state-friendly NGOs were allowed to deliver aid to earthquake victims. Other NGOs running tent cities for the homeless were asked to leave the region; if they refused, their depots for donated goods were closed, they were threatened with having water and electricity supplies turned off, and some had their bank accounts frozen.

Members of the Turkish Association of Architects and Civil Engineers were refused permission to inspect destroyed and damaged buildings – some lawyers claimed that evidence to convict the building contractors was being destroyed by the government. A Turkish television channel, Kanal 6, was closed down for a week by the government for reports deemed too critical of its response.

R. Jalali, 'Civil Society and the State: Turkey after the Earthquake', *Disasters,* vol. 26, no. 2, 2002, pp. 120–39.

and information-sharing is particularly strong among scientists and engineers. If anything, the scientific and engineering community, with its hazards-focused perspective, may have exerted too strong an influence over disaster thinking. Social scientists have been slower to explore the subject, individually and collectively. Better interaction between researchers and practitioners is needed across the board.

- The mass media are potentially very important partners in risk reduction (see Chapter 11.3.2 and Case Study 11.1, page 171).

5.2.5 Networks

Many development and humanitarian practitioners have considerable experience of working with vulnerable people to protect them against hazards and help them recover from disasters. Often, this experience is neither documented nor shared. Usually this is because project staff are too busy and the institutions they work for do not give sufficient priority to organisational learning. Staff are also often ignorant of similar work in other organisations, or even in other offices of their own organisation.

Better networking – in the broadest sense of the term – is therefore essential. It improves access to, and exchange of, information and expertise. Beyond this, it can help network members to maximise their impact through the synergy that comes from partnerships and greater cooperation. The proliferation of development and emergency networks, especially at national and international levels, indicates that agencies have recognised the value of better networking. The Humanitarian Practice Network is one successful example of this.

Those working in disaster mitigation and preparedness have been slower off the mark, and the lack of effective inter-disciplinary networking remains a major stumbling-block. However, a number of significant regional and global initiatives have been established. In academic circles, the pioneering Research Committee on the Sociology of Disasters was set up in 1986 to provide a forum for academics and practitioners to share information about all aspects of disasters. During the past decade, regional networks have been established in Latin America (LA RED), South Asia (Duryog Nivaran) and Southern Africa (Peri-Peri) for the purposes of research, publication, training and advocacy, with members drawn mostly from the NGO and academic communities. A semi-formal network, the Global Alliance for Disaster Reduction, has been created by engineers, disaster managers and academics from all over the world to document and promote good practice. UN IDNDR national committees and platforms sometimes stimulated greater sharing of information, discussion and collaboration, and these forums have been maintained in some countries.

There have also been many national-level initiatives, such as the Bangladesh Disaster Forum (see Case Study 5.5) and the Community Drought Mitigation Partners Network in Zimbabwe. Local-level networks tend to focus on particular risk reduction initiatives, such as early warning or watershed management.

There has been little monitoring of the sustainability and impact of such initiatives. However, the outputs produced by many networks, the level of participation in them, their impact on thinking and policy in some cases and the

Case Study 5.5
A national network for disaster reduction

Founded in 1994, the Bangladesh Disaster Forum is a national network of 70 humanitarian and development NGOs, research institutions, government departments and independent activists working on disaster preparedness. It seeks to make agencies of all kinds more accountable to vulnerable people, and to promote more systematic, community-based approaches to disaster reduction.

The Forum's work concentrates on information dissemination and capacity-building. It has developed six training modules on different aspects of preparedness; more are planned. It publishes videos, booklets, posters, leaflets and fact sheets for professionals and the public on different types of hazard and ways of dealing with them. There is also a quarterly newsletter. Situation reports are produced at times of crisis or impending disaster. Since 1997, an annual report on disasters in Bangladesh has been published.

Bangladesh Disaster Forum: www.disasterforum.org.

widespread support among their members and associates, are indicators of achievement.

There are many types of network and many practical challenges to networking. Common problems faced by networks include:[13]

- lack of clear objectives;
- disparity of membership;
- domination by particular organisations or interest groups;
- excessive centralisation of network administration and communications;
- lack of critical debate about achievements;
- competitiveness between participants;
- lack of resources (and in some cases donor interference); and
- the difficulty of monitoring and evaluating impact.

Disparity of membership is perhaps the most important problem in disaster reduction work, in view of the wide range of organisational and professional stakeholders. Creating a forum at which all the different viewpoints can be adequately represented has so far proved beyond the capacity of many

disaster reduction networks, and some have struggled because of the perceived dominance of particular interest groups. It is easier to form a network around particular academic or practical disciplines (e.g. social scientists or nutritionists) or themes (e.g. arsenic in Bangladesh), but this should not be at the expense of multi-disciplinary networking, to which everyone should be encouraged to devote some of their time.

5.2.6 Private sector partnerships

There have been calls for greater private sector involvement in disaster reduction for a number of years. Business is already heavily involved commercially. Engineers, consultants, software designers, insurers, transporters and suppliers of goods and services of many kinds are among those for whom risk and disasters are business opportunities. Such commercial activity has increased in recent years.

The commercial role of the private sector in disaster management has now become a strongly contested issue, especially with regard to how far business will support broader social and humanitarian objectives. Attempts are being made to encourage commercially inspired initiatives to mitigate risks, notably the World Bank's efforts to create public–private partnerships linking insurance with mitigation. Some attempts have been made in developed countries to widen the scope of business preparedness for emergencies (known as business contingency or recovery planning) by making businesses aware that they depend on local people, resources and infrastructure, and should therefore take steps to protect these as well as their own premises.

There may be potential for corporate social responsibility (CSR) initiatives in risk reduction at local levels. CSR has a range of meanings, but essentially it involves businesses recognising their impact on society and the environment, and acknowledging some degree of responsibility for making a more positive contribution to sustainable development. Business self-interest is rarely if ever absent from CSR thinking, but it is secondary. CSR often involves dialogue and partnerships with other stakeholders in government and society.

Research into the extent and nature of CSR in disaster reduction[14] has found that, although companies of all kinds are often keen to give cash and in-kind support to emergency relief, they are not involved in preparedness and mitigation to any great extent, especially in developing countries. Where there is activity it is usually *ad hoc* and short-term and, significantly, addresses only the immediate symptoms of need or vulnerability, not the root causes – for which business may in part be responsible.

In a number of developing countries, companies have little confidence in government or the NGO sector, preferring to act alone. Elsewhere, governments and international organisations have to persuade businesses to take part in collaborative activities. Where business takes the initiative, this usually takes the form of unilateral actions closely linked to its own activities (e.g. provision of materials or information) or interests (e.g. sponsorship of research). Business leadership and commitment are most likely to come from sectors most closely linked to issues of risk and safety: insurers, principally, but also engineers, hardware retailers, architects and telecommunications enterprises. Such firms have a large commercial stake in risk reduction and understand the problems associated with it. Business leadership appears to be influential in encouraging other businesses to join projects. Partnership-building between different sectors can take a long time.

A number of examples of CSR-inspired initiatives in risk reduction could nonetheless serve as the basis for developing strategic partnerships with business. For example, Jamaican hardware stores are said to have donated materials to encourage homeowners to fit straps to their roofs to secure them against high winds during hurricanes. In St Kitts and Nevis, a local store owner allowed the Red Cross to use one of his vacant buildings as a distribution centre for housing materials used in reconstruction after Hurricane Hugo in 1989. In the Solomon Islands, a local NGO was created in the aftermath of Cyclone Namu in 1986 to improve rural housing, principally by giving training in low-cost building techniques, for which it received technical support on a *pro bono* basis from a local firm of architects. Insurers and other firms publish and distribute information on risk reduction measures; insurance and reinsurance companies have sponsored important hazards research; and there are public–private insurance schemes in which insurance premiums are reduced if households or communities demonstrate that they have taken steps to protect their property. Business has been active in rehabilitation projects in Gujarat since the earthquake in January 2001. In the Philippines and the US, business has created NGOs to address disaster problems.

5.2.7 Military involvement in disaster reduction

This has been the subject of discussion for some years, especially with regard to military support for humanitarian work in complex emergencies. In most countries, armed forces personnel, equipment and facilities are called upon to support emergency services during major disasters. In some, they may take a leading role, especially if civil authorities are overwhelmed, as in the Dominican Republic when Hurricane Georges struck in 1998.

Military engineers have sometimes been involved in risk reduction, usually by putting up structural mitigation measures such as embankments. In some countries, disaster management was traditionally run by the military, as in Mexico, where it had the main responsibility for disaster response until the 1985 earthquake. Many disaster management organisations originated in civil defence, while many civil protection/civil defence institutions have ongoing military links (which has led to an often uneasy relationship between disaster planners and civil defence agencies).

Civil society tends to be wary of the military's true motives for wishing to play a greater role in humanitarian and mitigation work, especially in countries where the armed forces have a history of interference in domestic policy-making. The military's 'command-and-control' approach also goes against modern risk management approaches, which stress coordination, participation and partnership.[15] However, since the military clearly does have a role to play, and considerable capacity, greater dialogue and collaboration are surely needed.

5.2.8 Regional and international collaboration

Disasters are 'shared events': they cross national boundaries and affect whole regions. A Caribbean hurricane may go on to hit Central America; an earthquake in Nepal is likely to be felt in north India; where major rivers cross national boundaries, such as those entering Bangladesh and Mozambique, floods that begin in one country can spread to others. Moreover, countries in the same region tend to face similar hazard threats, and often have similar institutional and social structures.

This creates a strong incentive for national governments to collaborate with each other, especially in sharing forecasting and warning data. There is also a role for regional and international bodies in coordination, information sharing and resourcing. Systems for sharing scientific information – particularly hydro-meteorological data for early warning – between countries are well-established and effective. However, collaboration between national governments is not yet common.

If anything, disasters are likely to raise tensions between states. The sudden release of a build-up of floodwater from dams in one country can cause severe flooding in a neighbouring state downstream. Concern is growing about the possibility of 'water wars' between states as environmental destruction, population growth and climate change combine to make water scarce in already dry regions.

Case Study 5.6
Regional response to drought in Southern Africa

Drought in 1991 triggered a major food security crisis in Southern Africa. At its height, 20m people were affected in ten countries. The crisis stimulated a concerted regional and international response that drew Southern African countries together in a complex relief effort. This cross-border collaboration would not have been possible without a number of earlier humanitarian and political measures.

The actions taken in the late 1980s to end armed conflict in the region, and moves in several countries towards democratic government from the early 1990s, were important political supports. The creation of the Southern African Development Coordination Conference (SADCC) in 1980, to reduce economic dependence on apartheid South Africa and coordinate investment and aid, stimulated collaboration between countries. SADCC made food security a priority for regional coordination, setting up a regional early-warning unit and a centre for agricultural research. It also put great effort into improving transport and communications infrastructure and rehabilitating ports.

From late 1991, SADCC's early-warning unit, international famine early-warning systems and NGOs gathered growing evidence of drought and crop failure. The early-warning unit's vigilance and ability to work with international, bilateral and other partners was pivotal to the successful response. In June 1992, when food crisis threatened, SADCC launched a joint appeal with the UN, which provided a vital platform for attracting international attention. The appeal generated $708m in food and non-food assistance.

Between April 1992 and April 1993, 11.6m tonnes of drought-related commodities were imported and transported across Southern Africa in an operation involving nine ports, six transport corridors and 11 countries. There was an unprecedented level of communication across international borders and between different organisations. Coordination of transport and logistics also reached an unprecedented level.

A. Holloway, 'Drought Emergency, Yes … Drought Disaster, No: Southern Africa 1991–93', *Cambridge Review of International Affairs,* vol. 14, no. 1, 2000, pp. 254–76.

A lack of trust between national governments and international aid agencies can hinder collaborative preparedness efforts. One example is the reaction to warnings of the impending El Niño event in Ethiopia in 1997–98. The government of Ethiopia took the risk of erratic weather and drought caused by El Niño very seriously from an early stage, and subsequent events showed that it was right to do so. However, international donors and NGOs working in the country felt that the government's warnings of likely food shortages represented a face-saving excuse to account for earlier over-optimistic government forecasts about national food production levels, and were unwilling to take action. The resulting political impasse made adequate contingency planning impossible and, when finally overtaken by events, the international community could only respond to the food shortage through its normal relief mechanisms.[16]

5.3 Chapter summary

- Disasters are complex phenomena that can only be addressed by deploying a wide range of knowledge, skills, methods and resources. This means that risk reduction initiatives must be multi-disciplinary partnerships involving a wide range of stakeholders.
- The 'disaster community' is very diverse, and at present it is too fragmented.
- Disasters should be seen as a governance issue. National governments should be the main actors in risk reduction, but there are obstacles to this: lack of capacity and resources, short-sighted planning, inadequate organisation and political interference.
- Government policies are often a major contributor to people's vulnerability to hazards.
- Decentralisation of government has had both positive and negative consequences for risk reduction.
- Civil society has an important role to play, though it is not always welcomed. A wider range of civil society actors should be encouraged to take part in collaborative risk reduction initiatives.
- Better networking, especially inter-disciplinary networking, is needed; so too is regional collaboration, which can be very effective.
- The roles and potential of the private sector and the military are still being worked out.

Notes

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Chapter 6
Marginalised groups

6.1 Introduction

This chapter discusses some of the most vulnerable groups, whose views and needs should be taken into account in risk reduction projects. It looks at four groups – people marginalised by:

- gender;
- age (the young and old);
- ethnicity or 'foreignness' (including migrants and travellers); and
- disability.

Of these, only gender has been studied in any detail, and then only recently. More research is needed, on these and other factors making particular groups vulnerable, such as political and religious affiliation.

6.2 Gender

The literature on gender and disasters has grown considerably since the mid-1990s. There are now several useful general surveys of the issues, some of which are drawn on here.[1]

6.2.1 Gender and vulnerability

The impact of disasters on women can be very different from the impact on men. In general, disasters hit women harder. One study of the cyclone that killed 138,000 people in Bangladesh in April 1991 found that mortality amongst females over ten years of age was three times as high as amongst males of the same age.[2] In the Maharashtra earthquake in India in 1993, women made up 48% of those affected, but 55% of fatalities.[3] Strategies for surviving food shortage may give priority to men over women (and to adults over children and old people) in the amount of food eaten.

Yet it is not always women who are hit hardest. Men who have to work away from the home may be more vulnerable to certain kinds of hazard: for example, deaths from cyclones are often particularly high among those who go fishing at sea.

©ITDG/Janet Boston

Members of a women's farming group in Zimbabwe

Why do some disasters affect women particularly badly? In the Bangladesh example, a number of factors were probably at work. Women's physical size, strength and endurance were generally less than that of men. They may have been slowed down by clothing and children. They were probably more reluctant to venture far from their homes on their own and to be crowded into a cyclone shelter with men and strangers, and so may have delayed leaving for places of safety until it was too late. In the case of Maharashtra, female mortality rates were higher because the earthquake struck at night, when many men were sleeping outside because of the heat, but women, because of cultural constraints, slept indoors.

These are the immediate causes of women's vulnerability. The root causes lie in women's position in society. There is a heavy economic and social burden on women, especially poor women. First, they have a 'productive' role: supporting the household economically by productive work such as farming. Then they have a 'reproductive' role: carrying out a host of domestic tasks such as cooking, cleaning, fetching water, rearing children and caring for other family members. Finally, they have a role in community tasks, such as joining with other women to ensure that scarce water supplies are shared equally.[4]

Compared to men, women's access to education, resources and income-earning opportunities is limited. Decision-making is still largely under male control, be it about the division of household labour and control of household assets, the resolution of community problems or benefiting from official development and relief programmes. In many places, traditions and cultural taboos prevent women from travelling far from their homes without their husbands. In some societies, widows are shunned.

Disasters can accentuate such vulnerabilities. During long-running crises, women's workloads may increase as they are often left in charge of house-

holds because their menfolk have to migrate in search of work. Even in rapid-onset disasters, women are expected to carry out their normal domestic tasks, but in more difficult conditions, in addition to dealing with the consequences of the disaster itself. After disasters, women's bargaining position may be weakened during competition for relief aid and other scarce resources: single women and woman-headed households are particularly likely to lose out. Relief agencies easily lose their gender sensitivity during emergencies, amid pressures to deliver aid quickly in chaotic conditions. Many relief and rehabilitation operations target male heads of households. Jobs and training in recovery projects tend to be provided mainly for men – although women are often expected to work as labourers in reconstruction.

There is evidence that increased economic and psychological stress in disaster-affected families leads to a rise in domestic violence against women. There were signs of this in Nicaragua after Hurricane Mitch in 1998, and it has been documented on many occasions in North America. It can also lead to men abandoning their families, as was widely reported in the famines in Bengal in 1943, Bangladesh in 1974 and Malawi in the 1970s.

Participatory methods of vulnerability analysis (see Chapter 4) should identify such gender issues. Special care should be taken to ensure that women's voices are heard: women are aware of their vulnerability and the forces that create it (see Case Study 6.1).

6.2.2 Building on women's capacities

Awareness of gender issues is standard in development and relief programmes – or should be: it is certainly almost impossible to obtain funding without demonstrating some awareness of these issues. Few agencies are without gender policies or stated commitments to gender equity, even if it may be difficult to put such ideals into practice.

By contrast, disaster mitigation and preparedness programmers have been slow to adopt a gender perspective, and their awareness of gender issues remains relatively limited. This is partly because gender did not feature much in disaster literature before the mid-1990s, partly because the traditional technocratic bias in many disaster management organisations has allowed little room for considering social issues, and partly because such organisations are staffed mostly by men.

Most agencies working on risk reduction pay some attention to gender issues, but often not in a systematic manner. Recognition of the different vulnerabilities of men and women is common, but there is relatively little understanding of how

Case Study 6.1

Women's analysis of their vulnerability in urban and rural Gujarat

The Self Employed Women's Association (SEWA) in India helps its 220,000 members to build more secure and sustainable livelihoods. It has used a method known as Participatory Evaluation Writing (PEW), which allows women to present their views of their vulnerability to natural and man-made hazards. The aim is to find new tools for participatory evaluation and assessment by the local stakeholders – the poor – and to 'democratise' evaluation writing.

Each PEW exercise goes through a cycle:

- focus group meetings of 10–15 participants;
- joint preparation of PEW manuals;
- two- to three-day PEW sessions with 10–15 people and facilitators;
- one-day sessions to select the final material; and
- completion of the final text (edited by outsiders but agreed by PEW participants in a separate session).

PEW has been used to help poor women from urban and rural districts in Gujarat to explain the causes of their vulnerability, the strengths and weaknesses of their coping strategies and the value of external interventions. The process showed that these women had a sophisticated view of their vulnerability as the product of a variety of deprivations and emerging conditions. Consequently, their attempts to reduce vulnerability emphasised improvements in different aspects of their lives and livelihoods.

E. R. Bhatt, 'Women Victims' Views of Urban and Rural Vulnerability', in J. Twigg and M. R. Bhatt (eds), *Understanding Vulnerability: South Asian Perspectives* (London: I. T. Publications/Duryog Nivaran, 1998), pp. 12–26.

to address this. Many interventions focus on the most visible symptoms of women's vulnerability, and fail to look at underlying problems. For instance, risk reduction programmes may seek to ensure that women take part in training courses and community volunteering schemes, but are less likely to look at ways of getting more women into leadership positions in those programmes and in their communities. It is still possible to find project plans that do not mention gender at all, even in supposedly community-based initiatives.

Women's resilience and skills in coping with crisis make up a valuable resource that is under-utilised by field agencies. Women's efforts in producing and selling goods and as wage earners are central to household livelihoods – an important point that most organisations working on disasters have yet to appreciate. More and more women are acting as heads of household where their husbands have migrated to find work elsewhere or abandoned them. They are experienced in looking after others and often take on informal disaster management roles within their communities: managing food and water supplies during drought, for instance, or looking after people who have been injured or displaced by disasters. Research in developed and developing countries suggests that, after disasters, women are much more likely to seek support from informal structures – other women and their kinship groups – than from officials. Such roles and informal structures are often invisible to outsiders.

Women also possess considerable technical knowledge and skills that can be important for disaster mitigation. They are often expert in traditional farming practices, such as soil conservation and inter-cropping, which can reduce the damage caused by drought or sudden rainfall. Many women in Africa know a great deal about traditional drought-resistant seed varieties and how to use them, and about roots, fruits and other food growing in the wild that families can turn to when crops fail. They know how to preserve food for use during the hungry season or more prolonged periods of scarcity: in Sudan, for instance, women are known to have invented 90 different dried and fermented foods, based on crops such as sorghum and millet, wild plants and meat from wild and domestic animals.[5] Women are often expert in home health care, and knowledgeable about traditional medicines. They are likely to be responsible for keeping drinking water clean, and in some societies for building and maintaining houses.

Agencies need to recognise such capacities and build upon them. This can be very effective. In Sub-Saharan Africa, for instance, a number of successful drought mitigation programmes have drawn on women farmers' and gardeners' knowledge of how to preserve traditional drought-resistant seed varieties and grow crops from them. In many places, disaster preparedness programmes have trained women as first-aiders, building on their customary role in giving health care. However, there are both practical and 'political' challenges to ensuring that women are adequately represented in risk reduction programmes, and are reached by such programmes.

One of the most immediate practical challenges is to make sure that risk reduction measures fit with a woman's busy working day. Training courses should be held at times of the day when women are most likely to be free from domestic and other tasks. Child care facilities may be needed to encourage

attendance. In communities where women have little or no education or experience of taking part in formal group discussions, special attention to the training approach is needed.

Even where women acquire valuable knowledge and skills as a result of training, social constraints may not offer them the opportunity to use them fully. ActionAid found that giving first aid training to women living in cyclone-prone areas of Bangladesh gave them more confidence in dealing with potential crises, but there was no visible evidence that it was influencing women's position in the community, and their participation in local disaster management committees remained limited.[6] Strong cultural conservatism locally may have been an important influence.

Methods of raising awareness of risk and transmitting early warnings are other areas needing attention. Women tend to acquire a good deal of information through informal methods, such as conversations with their neighbours when working in the fields or collecting water and fodder. More formal systems for disseminating information, such as broadcasts, leaflets or public meetings, may not reach them. For instance, in parts of Africa it has been found that transmitting climate forecasts by radio suits male farmers, who can find time to listen, better than it does women. Women farmers cannot schedule a regular time to listen to the radio. They prefer information to be made available through agricultural extension officers or in schools, so that they can ask questions and discuss it.

6.2.3 Disasters and women's empowerment

The main 'political' challenge is to ensure that women's views are properly represented in project planning and implementation – before, during and after a disaster – and from this foundation to tackle both the immediate and root causes of their vulnerability. Participatory methods provide the practical tools for giving women a voice but, given that the root causes of female vulnerability are often to be found in the social structures or customs that create gender inequality, there is clearly a potential political problem in attempting to empower women, and a significant risk that initiatives may alienate men and traditional leaders.

There are many examples from development programmes of backlashes against women who have been encouraged to speak out in public: women being beaten by their husbands for spending time at community meetings instead of on housework, and older women giving younger women extra domestic chores to stop them going out to meetings or training courses. Such problems can often be overcome through discussions in advance with poten-

Case Study 6.2
Building women's confidence

For many years, the Bangladesh Red Crescent has managed a cyclone preparedness programme which, in recent times, has taken on an increasingly community-based character. In the Cox's Bazaar district, on the coast, women have been trained to take part in local disaster preparedness committees responsible for maintaining cyclone shelters and transmitting warnings. This disaster preparedness work has been supplemented by supporting the women more widely in their everyday lives through education and training in reproductive health, organising self-help groups and running small enterprises.

As a result, women are playing a more active role in the committees. One, 40-year-old Shoba Ranishli, exemplifies the increased confidence that their involvement has given them:

women definitely have to be involved in disaster preparedness, because women can then teach other women; men are not teaching women! In general, women can transport messages better, because they have access to more people than men, like to the elderly, to other women and of course to the children … the preparation for a cyclone at the household level is our work and responsibility. Men tell what should be done at the household without taking action themselves. But women just do it, we are more practical. Am I not correct?

H. Schmuck, 'Empowering Women in Bangladesh', *FOCUS Asia/Pacific*, vol. 27, no. 4, 2001.

tial opponents such as village elders, religious leaders, husbands and mothers-in-law, although a good deal of time and persuasion may be needed.

Nevertheless, disasters, by upsetting social norms, can become opportunities for addressing deeper social problems and conflicts. As well as presenting new income-earning opportunities, women's involvement in relief and rehabilitation projects can improve their standing in the community, especially where they take on new roles and responsibilities. It can certainly boost their confidence (see Case Study 6.2).

Women's groups formed to respond to disasters can become a resource for longer-term community development, and for future risk reduction activities.

Development and emergency organisations can do much to help such groups build their capacity by giving technical, institutional, financial and moral support, provided that this is sensitive to the nature of local society and social structures.

Organisations involved in disaster recovery can also take advantage of the temporary weakening of social constraints to press for more fundamental changes in gender relationships, notably those that increase women's control over basic assets such as food, cash and property (see Case Study 6.3).

Case Study 6.3
Women's empowerment through rehabilitation

Pakistan

In 1992, Pakistan experienced severe floods. In the Punjab, 1.7m acres of land were laid waste and over 8,000 cows killed. In response, Oxfam created a new local NGO, PATTAN, to support relief and rehabilitation work. PATTAN sought to develop new institutional structures that would enable all members of the community to reduce their vulnerability, strengthening women's capacities in particular.

The steps taken included the employment of women relief workers, distribution of food by local women and registering women as heads of household to receive food for their families. Women were also involved in designing and building new houses.

Other innovations were more radical. PATTAN helped women to set up their own village organisations because they were barred from the general village organisations. Normally, this step might have met resistance, but amidst the post-flood disruption, villagers were dependent on PATTAN's support and respected its involvement.

PATTAN also introduced the concept of joint ownership of houses by husband and wife. It took many meetings with men and women before the concept was accepted. Joint ownership gave women a greater sense of security, and there were indications that it reduced domestic conflict. As a result of these initiatives, women began to take action collectively in other projects.

F. Bari, 'Turning Crisis into Capacity. Pakistan: Working with Riverine Communities', in P. Fernando and V. Fernando (eds), *South Asian Women: Facing Disasters, Securing Life* (Colombo: ITDG/Duryog Nivaran, 1997), pp. 55–60.

(continued)

Case Study 6.3 *(continued)*

India

After the earthquake in Maharashtra in September 1993, the government, with support from the World Bank, began a major house repair and strengthening programme. It aimed to reach 200,000 households in 1,300 villages.

An NGO, Swayam Shiksan Prayog (SSP), was appointed to facilitate community participation after the limitations of the programme's initially top-down approach became evident. SSP worked with local women's organisations, known as *mahila mandals*, which had not been very active in the past, but became key players in the reconstruction.

The first stage was to hold meetings with 500 *mahila mandals* and convince the women that they had a role in building – they had previously considered it a male domain. The next stage was to train groups in surveying, house design and supervising construction. They were encouraged to attend village assemblies, and taken to meet government administrators.

As a result, women took up leadership roles in their villages for the first time. They went from door to door to explain construction techniques, suggested appropriate actions (e.g. regarding house design and the choice and collective purchasing of building materials) and organised contacts between householders, engineers and masons. They negotiated support from village committees, held meetings with officials and organised visits to demonstration sites. Groups organised or facilitated the purchase of materials, and the contracting and supervision of builders. They helped communities to make applications for government grants. Problems were brought to the village assemblies for discussion.

There was opposition from men, village leaders, engineers and officials, but the women's groups worked hard to build consensus, and their effectiveness as community mobilisers won them respect. They began to take a more active role in other development initiatives, including health, education, water and sanitation, and savings and credit.

P. Gopalan, *Cementing a Future: Women's Leadership in a Reconstruction Program* (Mumbai: Swayam Shiksan Prayog, 1999), www.sspindia.org/Cementing%20a%20Future.pdf.

6.3 Age

The specific needs of old and young people are often overlooked in disaster and development programmes. Both groups are highly vulnerable. Although casualty figures in disasters are often not broken down by age group, the evidence there is indicates that they are much more likely to suffer injury or lose their lives. For instance, research after the cyclone in Bangladesh in April 1991 showed that mortality was greatest among children under ten years, and women aged over 40 (for women, mortality levels increased sharply with age, reaching 40% among the over-60s). Another study of the same event showed death rates among people under 14 and 50 or over were more than three times higher than for those aged 15–49.[7]

Young and old people also have considerable capacities, and can play valuable roles in preparedness and mitigation.

6.3.1 Older people

Recognition of the needs of older people in emergencies is growing, thanks mainly to research and advocacy by HelpAge International. Generally, however, they remain invisible and marginalised, finding it hard to obtain adequate humanitarian relief and support for economic and social recovery. Aid agencies remain largely unaware of older people's needs, or tend to treat them as passive recipients of welfare rather than active members of society.

Vulnerability and capacity

Ageing makes people more vulnerable physically. Older people are frailer and less mobile. They are more likely to suffer from long-term health problems such as heart or respiratory illness, and from physical disabilities such as poor eyesight and hearing. These physical characteristics of ageing reduce older people's capacity to take action before and during emergencies: they may, for example, be unable to keep their houses properly maintained and hence more secure against hazards; or they may be unable to escape quickly enough to higher ground or shelters when floods or hurricanes threaten.

Socio-economic forces also create vulnerability among older people. Many live alone, isolated from family and community support structures. Lack of education and conservative attitudes may limit their capacity to take independent action. Older women, for instance, may be more likely than younger ones to adhere to social or religious customs that discourage them from going far from the house on their own.

On the other hand, older people do not lack capacities. They are economically and socially active – an important point that is usually overlooked by development and humanitarian organisations alike. They may have considerable knowledge of their environment and the hazards within it. They are more likely to have first-hand experience of previous disasters (especially those which occur infrequently, such as earthquakes and volcanic eruptions), together with knowledge of relevant coping strategies: for instance, knowledge of traditional drought-resistant seed varieties or fruit, nuts and roots growing in the wild that can be eaten at times of food scarcity. In this respect, they may be better at dealing with disasters than many younger people. They may well have been community leaders or held other positions of responsibility. Older women in particular are experienced in caring for children and the sick. It is not true that older people are necessarily difficult to train or unwilling to accept new ideas, and they are often keen to play an active role in their communities.[8]

Approaches to risk reduction

Risk reduction projects need to pay much more attention to such issues. Participatory approaches (see Chapter 8) are valuable in assessing older people's vulnerabilities and capacities, and giving them a voice in disaster planning.

Relatively straightforward steps, such as making homes more secure or making plans for evacuating older people well ahead of impending floods or hurricanes, can be very effective. Nisadu, a grass-roots organisation in the Indian state of Orissa, set up a scheme in which young people looked after elders when danger threatened: 48 hours before the cyclone of October 1999, the young people helped the older ones to places of safety; there was not a single fatality when the cyclone struck.[9]

Older people's knowledge, skills and experience can be put to good use in disaster mitigation and response, even in difficult operating environments. For example, humanitarian assistance projects implemented by HelpAge International in Sudan have seen older people put in charge of assessing vulnerability and distributing food and other relief aid, and of construction of shelters and water pumps for people displaced by conflict.[10]

Because singling out older people for special attention can lead to resentment among other members of the community, projects should find ways of helping them to make a greater contribution to their families and communities. This not only brings material benefits for the older people concerned, but can also improve their status (see Case Study 6.4).

Case Study 6.4
Incorporation of older people in disaster recovery

The village of Llhate, in Mozambique's Gaza Province, was cut off by the floods of February–March 2000. Older people living in the area – 97 of them – formed an association of elders to grow food for themselves and their community. HelpAge International gave them oxen to plough the fields, as well as tools and seeds.

The help of younger people was needed to prepare and plant the fields, so the older women offered in return to help the younger ones with their household chores, such as cooking and looking after children. According to a village elder, Mrs Matusse, this had more than material benefits: 'By doing this,' she said, 'we have also avoided our older people being accused of witchcraft … Because we are gaining the trust and respect of the young ones through our contribution and the food we are producing for the community, they are less likely to accuse and blame us when things go wrong.'

In Chokwe, another flood-affected province, HelpAge International and a local partner NGO, Vukoxa, supported a volunteer-based home visiting programme in eight villages covering older people and those who were sick or disabled. The home visitors were expected to raise awareness of ageing issues in the community, give practical support and undertake counselling.

The home visitors, who called themselves *vaingeseli* (the listeners) and included many older people, were selected by the community. They were trained to understand how ageing takes place and how it changes people's needs, to identify signs of older people's vulnerability, and to listen to, understand and record problems and methods of solving them. They were issued with bicycles to travel to villages, and received a modest gift in the form of household items such as salt, sugar and soap.

By October 2000, 35 *vaingeseli* had been trained and were caring for nearly 200 people. The project appeared to be helping to change attitudes towards older people, and there were signs that the initiative was encouraging older people to become more involved in community discussions.

HelpAge International, 'Mozambique: Restoring Older People's Livelihoods', unpublished paper, 2000.

6.3.2 Children and young people

Although much attention has been paid to the needs of children in emergencies, especially in conflicts, less thought has been given to ways of reducing their vulnerability to potential disasters. There is relatively little coverage in disaster literature.[11]

Disaster management guidelines and manuals usually start from the position that interventions to help children are best made through the 'primary caregivers' – i.e. parents or guardians. In the literature generally, women and children are usually discussed together as a combined category of people. This is logical, for several reasons.

- First, children can be very, even totally, dependent on their parents, according to their age, strength, skills, or maturity.
- Second, their daily routines are closely linked to those of adults in the household, and particularly to their mothers' work. Even quite young children help their mothers with important domestic and productive tasks.
- Third, the capacity of groups and individuals to deal with risk is greatly boosted by previous experience of disasters, from which coping strategies are learnt or knowledge of them is reinforced. Even though children and young people may have an extensive and close knowledge of their environment, which should not be overlooked, their lack of experience puts them at a disadvantage in the event of a disaster, when they will probably rely heavily on older generations for guidance.

However, much of the written material on 'women and children' overlooks any distinctiveness that there may be in the child's position.

Vulnerability

Many factors affect children's vulnerability to hazards. Nutritional deficiencies have a significant impact on the health of infants and young children in particular, as well as on their growth. Food shortages affect the health of pregnant women and foetuses, often leading to reduced birth weight – which puts babies at greater risk of ill health. Younger children are particularly likely to suffer from protein deficiency and malnutrition at times of famine. Undernourished lactating mothers are unable to breast-feed infants properly.

Children are particularly susceptible to pollutants, such as pesticides, lead and mercury, because they absorb more in relation to their total body

weight. Air and water pollution are major causes of illness among children in developing countries.

Children's lack of physical strength and of practical skills such as being able to swim can prevent them from getting to places of safety during sudden-onset disasters. Where they spend a good deal of time in and around the home, they can be at greater risk from certain sudden-onset hazards such as earthquakes or landslides. Lack of literacy and other education limits their understanding of a potentially dangerous situation and how to prepare for or react to it. They may be in particular need of psychological or emotional support for dealing with a crisis, especially if they are on their own and cannot rely on older family members.

After a disaster, children are highly vulnerable, especially if they have lost parents or become separated from them. Emergency responses do not always recognise children's particular dietary, material and emotional needs. Abuse and exploitation of children in such events is common. Poor families whose livelihoods have been wrecked by disasters often withdraw children from school to help in income-earning activities or in rebuilding homes.

Knowledge of traditional coping strategies is fundamental to understanding children's vulnerabilities. In some cultures where drought is common, for example, women and children may be given preferential treatment when scarce food is shared, but in other cultures facing similar problems, they may not.

Other than in the area of nutrition, child-focused initiatives before disasters are rare. Preparedness and mitigation activities have tended either to be aimed at the whole community, or to concentrate on supporting mothers and carers. An example of the latter would be ensuring that women with children receive warning messages sufficiently early for them to move their families to safety.

Any intervention to support children cannot address their needs alone but must respond to those needs in the context of their family, community and culture. Agencies whose mandate is to work for children sometimes find it difficult to strike the right balance in their interventions, between concentrating on small groups of vulnerable children and more diffused targeting of communities in which those children live. Setting the balance in favour of the first approach has an impact on a needy group but reaches fewer people, while a shift towards the second reaches more people but risks spreading benefits too thinly. Tricky decisions of this kind have to be made in the light of local knowledge and experience.

The tendency to regard all children and young people as a single group should be resisted. Vulnerabilities and capacities will differ, influenced by age,

gender, class, culture and other socio-economic factors. Identifying these differences is not easy, as so many factors are involved. A survey of a Guatemalan village hit by an earthquake in 1976, for example, showed that instead of the risk to children diminishing with age, as one would expect, the risk to the youngest child was less severe than that of the second youngest. The youngest child usually slept with its mother, who, it seemed, was able to protect it.[12]

Reducing risks to children

Some organisations involved in community-based projects give young people and children opportunities to present their own views of the risks they face. In most cases, they are encouraged to express themselves by drawing risk maps or other images of hazard and vulnerability. Children are very close to their environment and observe it acutely, so this approach can provide new insights to outsiders as well as helping to raise the children's own awareness.

For instance, drawings collected by the Palestine Red Crescent as part of its Vulnerability and Capacity Assessment (described in Case Study 4.2, page 42) indicated that children were well aware of the threats facing the community, viewed disasters and their consequences as part of the broader environment, not as self-contained events, and were full of ideas for preparedness. The NGO Plan Viet Nam has drawn on children's knowledge of the local environment in designing a flood preparedness initiative.[13]

It is less clear if projects subsequently build on such activities to involve children more fully in their broader mitigation and preparedness work at community level, although this is the logical follow-up. In the US, where government agencies encourage each family to have its own disaster plan, the need to explain risks to children and discuss what they should do in an emergency is recognised. In El Salvador, young people are able to take on a more substantial role through the UNICEF-supported initiative Defensorías de los Derechos de la Niñez y Adolescencia (Defenders of Children's and Adolescents' Rights), where volunteers are trained to give psycho-social support to traumatised children and adults.[14]

Institutions such as schools, child care centres and nurseries can provide a focus for child-focused mitigation activity. Such activity can take both a physical or structural form, such as strengthening school buildings, and non-structural forms such as raising awareness of hazards and risks and promoting good practice in risk reduction through the curriculum (see Chapter 11.3.7, page 180).

One consequence of the 1999 Orissa cyclone was that many schoolbooks and other teaching materials were lost. UNICEF advocates preparedness measures on the part of educators to ensure that they can resume teaching as soon as possible after an emergency. These include making sure that reserve sets of textbooks and other teaching materials are kept in safe places.[15]

In many communities, schools serve more than one purpose. They may be community meeting places and public shelters during emergencies. In parts of Bangladesh and India, cyclone shelters double as schools or community centres during normal times. Children's nurseries or kindergartens may grow food to supplement poor children's diets; their capacity to do so can be supported during times of food shortage or crisis (see Case Study 6.5).

Case Study 6.5
Greenhouses for nurseries and kindergartens

Severe flooding in 1995–96 triggered an acute food shortage in North Korea, affecting an estimated five million people.

Children's Aid Direct (CAD) supported agricultural production by nurseries and kindergartens in South Pyongan Province. These institutions had enough land for greenhouses, and all the food produced would go to the children, supplementing official rations.

During 1998, a CAD project built 254 100m² greenhouses. The frames were manufactured locally, but the high-quality plastic sheeting required had to be imported. The state seed company was persuaded to supply seeds at competitive prices, for distribution. In some places, local government contributed doors, ventilation windows and heating and irrigation systems. It was estimated that the greenhouses would be able to provide vegetables for 31,000 children in 340 nurseries, kindergartens and hospitals.

'Greenhouses for Nurseries and Kindergartens, South Pyongan, DPR Korea: Proposal'; and 'Greenhouses for Nurseries and Kindergartens, South Pyongan, DPR Korea: Final Report', Children's Aid Direct, 1998, 1999.

6.4 Disability

People with disabilities or 'special needs' are particularly vulnerable to many kinds of natural and man-made hazard. Yet there has been surprisingly little study of this subject.

Guidance on how to protect disabled people from the threat of disasters is limited, and most of the available material relates to developed countries.[16] It is difficult to say much about good practice because it has not been documented – indeed, there may not be much to document. Disaster planning often overlooks the needs of people with disabilities, and disaster managers have limited or no contact with disabled people's groups, or organisations working on their behalf. Until further research is done, only very general guidance can be given, and even this is tentative.

Anecdotal accounts illustrate the kinds of problem faced by disabled people in developing countries during disasters. There are stories of disabled people being left to drown during the 2000 floods in Zimbabwe and Mozambique: BBC TV news showed a man with mental health problems left chained to his bed. There is one tale of disabled members of a community in India who were put on the roofs of houses during a flood, while the rest of the community evacuated. Unfortunately, the local snakes also sought safety on the same roofs.[17]

6.4.1 Disability and vulnerability

Disabilities are of many kinds, physical and mental, including impaired sight or hearing, lack of mobility, and difficulty in understanding or communicating. The extent of disability can vary considerably. The vulnerabilities arising from disability, though, are of two main kinds: physical and social.

A number of steps can be taken to deal with physical vulnerabilities. Many of these are simple and inexpensive. The first step is to identify the disabled, the nature of their disability and how this will increase their risks to known hazards. Further steps can then be taken to make them aware of the risks they face and how to deal with them, improve the security of their homes and workplaces, move them to safe places when severe hazards threaten, and attend to their specific needs after an emergency. The kinds of measure that may be required include:

- Methods for communicating risk and early warnings that are appropriate to the nature of the disability. Examples are printed material in large type or Braille for partially-sighted or blind people, sign language on television

broadcasts for the deaf, and face-to-face discussions with people who have learning difficulties or other health problems that may affect their understanding of messages. Field staff should be trained to communicate with disabled people effectively.

- Improvements to the physical environment that give greater protection and make evacuation easier. Emergency shelters should be accessible to disabled people, for instance. Homes, offices, escape routes and emergency facilities should be designed (or redesigned) with their needs in mind. Disaster preparedness plans need to appreciate that people with disabilities often require more time to make necessary preparations for an emergency and to move to a place of safety. Staff training will also be needed, in assisting disabled people and using relevant equipment.

Physical disability leads to economic and social vulnerability. Disabled people are often poor, without education, marginalised in society, misunderstood or avoided by neighbours, excluded from community structures, and either dependent on others or assumed to be so. Some specialists in disability and development issues believe that, because disabled people lack status in their communities, little effort is made by the community to save them from disasters. This problem of status is therefore a root cause of their vulnerability.

6.4.2 Supporting disabled people to reduce risk

The notion that disabled people are unable to help themselves and must be aided or directed by others is widespread, even among welfare services that work with them. Although some do indeed require considerable help, many have skills, experience and other capacities that can be utilised. Agency staff and community volunteers ought to be trained to support the independence and dignity of people with disabilities or impairments. At present, even those organisations that do try to provide special services tend to plan from the top down: *for* disabled people, but not *with* them.

Some disaster organisations in the US attempt to go beyond this directive model by encouraging the formation of 'personal support' (or 'self-help') networks: groups of people who agree to assist an individual with a disability in an emergency. These groups comprise three or more people known to the disabled person and trusted by them – family members, friends, neighbours and colleagues – who can be made aware of the person's needs, work with them to make preparations for potential disasters, and assist them during crises.[18]

This collaborative approach should be taken further. Initiatives to reduce risk must be developed in partnership with disabled people and their organisa-

Case Study 6.6
Disabled people and disaster planning

The Northridge earthquake in Los Angeles in 1994 stimulated a more participatory approach to disaster/disability planning. A group was formed calling itself 'Disabled People and Disaster Planning'. It met between 1996 and 1997 and came up with several recommendations for dealing with problems identified during and after the earthquake. These covered preparedness, management of emergency shelters, training of rescue workers, ways of assisting wheelchair users and communicating information to people with disabilities, making emergency shelters and services more accessible after a disaster, and sources of online information.

In Turkey, after the 1999 earthquakes, a non-governmental organisation set up a programme to support deaf people. A core group of deaf people were trained as disaster awareness instructors, with the plan that they should then travel the country giving training to others. By 2002, some 2,000 deaf people had been trained.

B. Wisner, 'Disability and Disaster: Victimhood and Agency in Earthquake Risk Reduction', in C. Rodrigue and E. Rovai (eds), *Earthquakes* (London: Routledge, forthcoming).

tions. This would bring disaster reduction into line with modern approaches to disability and development that place greater emphasis on participation. People with disabilities are increasingly demanding that they are not simply treated as problems to be solved by planners but as part of society, and hence entitled to equal opportunities and rights.

6.5 Ethnicity and 'foreignness'

Ethnicity, caste and other aspects of 'foreignness' – groups of people perceived by their neighbours to be different, such as migrants and refugees – are generally acknowledged to be important factors in determining vulnerability. Yet there is little guidance available on how to deal with these issues; the subject is scarcely mentioned in the literature on natural disaster mitigation, although it features strongly in writing on conflict and humanitarian crises.[19]

Minorities of all kinds are often more vulnerable to hazards than majority communities. This is due to social exclusion. Dominant groups have control over resources and political power, and tend to use these to their own advantage. The needs of minority ethnic groups are likely to overlooked by decision-makers. So too are their capacities, including indigenous knowledge and coping strategies. They may even be deliberately excluded from decision-making.

The exclusion and attendant poverty of ethnic minorities may force them into settlement in dangerous locations, or to live on land of poor quality that produces little food, while language, educational and cultural barriers can restrict access to information on risk and risk avoidance. Migrants can be doubly vulnerable: as members of minority ethnic groups, they may be neglected or even persecuted; as strangers to an area they lack the knowledge and coping strategies to protect themselves.

Migrant workers may have to take on hazardous jobs where health and safety standards may be poor (especially if they are illegal or unregistered labour). For instance, when Hurricane Georges hit the Dominican Republic in September 1998, many of those swept away by floods and landslides were migrant workers from Haiti. These are a particularly marginal group in the country, living in poor housing and unsafe conditions and facing racial hostility from local people and officials. How many died nobody could say, as so many were unregistered and unable to obtain identity papers.[20]

Ethnic and political or class divisions often overlap. Ethnicity is a significant political factor in many countries, at local and national levels. Ethnic polarisation can result from development programmes that are perceived to favour one community over another. Tensions between communities often appear when aid for relief and recovery is targeted at one particular group. For example, it is common practice to give food aid, tools and household goods to those displaced by disasters, who have lost their possessions, but host communities are likely to feel that they deserve something as compensation, especially if they too have given assistance such as food and shelter.

The displacement of communities in the cause of socio-economic development – forcing them to make way for the construction of large dams, or taking over common land on which animals are grazed or food collected – has become a controversial political issue. Communities that depend heavily on natural resources are highly vulnerable to developments that affect the natural environment. Forcible displacement of ethnic groups for political reasons has been a major factor in civil wars and low-level conflicts within

states. Both kinds of displacement can make those affected vulnerable to all kinds of external pressures. Mitigation efforts, too, can be wrecked by ethnic politics (see Case Study 6.7) and conflict.

Development and humanitarian work needs to bear such issues in mind. Basing projects on the key principles of non-discrimination and participation is essential. From this, it will be possible to identify particular vulnerabilities and develop appropriate responses.

Case Study 6.7
Ethnicity, politics and mitigation

In February 1976, an earthquake killed 22,000 people in the rural highlands of Guatemala and in squatter settlements in the capital, Guatemala City. In the highlands, NGOs including Oxfam America and World Neighbors supported community-based programmes to build safer houses. Community development and leadership training were important components of this work – indeed, it pioneered community-based approaches to disaster mitigation.

The earthquake rapidly became a political issue in Guatemala and internationally because most of its victims were the rural poor and urban squatters, whilst the middle and upper classes were left almost unscathed. The country's repressive government was unhappy about these issues being aired, and particularly about initiatives that empowered communities. A number of community workers in the capital and the countryside were murdered.

In the highlands, where the population are largely indigenous Mayan Indians, the situation worsened in the following years with disputes over the expropriation of Indian land. Tens of thousands were killed by the military in the early 1980s, and community leaders and other individuals who had been active in relief and reconstruction work after the earthquake were targeted. Many were killed by the army or fled into exile. Efforts to make communities less vulnerable physically – to earthquakes – had actually made them more vulnerable politically.

P. Blaikie, T. Cannon, I. Davis and B. Wisner, *At Risk: Natural Hazards, People's Vulnerability and Disasters* (London: Routledge, 1994), pp. 170–71.

In the area of warnings, one important improvement might be to make greater use of minority languages and media in order to ensure that the warnings reach minority communities. In 1985, Aboriginal people living around the town of Alice Springs in Australia were hit much harder by floods than the rest of the population, partly because the radio broadcasts that alerted local people were not on channels normally used by Aborigines.[21]

The indigenous knowledge and coping strategies of different ethnic groups can be used as a resource. Some tribal and nomadic communities may have considerable experience of coping with stress and crisis, or strong social structures that adapt well to difficult conditions.

6.6 Chapter summary

- Certain groups are particularly vulnerable to disasters: they include people marginalised by gender, age, ethnicity and disability. The root causes of their vulnerability lie in their position in society.
- The needs of such groups are often overlooked by disaster managers, and their voices are rarely heard. There should be more planning *with* them, not simply *for* them.
- Women's skills, technical knowledge and coping capacities are a valuable resource for risk reduction, which should be utilised more extensively.
- Disasters can be used as opportunities to empower women and make significant changes in gender relationships.
- Older people's knowledge and experience of previous disasters can be put to good use in risk reduction.
- Children and young people should be given more opportunities to present their views of their environment and their needs.
- Institutions such as schools and nurseries can provide a focus for a range of mitigation activities benefiting both children and the community as a whole.
- A number of simple, inexpensive steps can be taken to reduce the physical vulnerability of elderly and disabled people.
- Inclusive, non-discriminatory approaches are needed to overcome minority groups' vulnerability.

Notes

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M. Fordham, 'Challenging Boundaries: A Gender Perspective on Early Warning in Disaster and Environmental Management', paper given to the UN Division for the Advancement of Women/International Strategy for Disaster Reduction Expert Group Meeting on 'Environmental Management and the Mitigation of Natural Disasters: A Gender Perspective', Ankara, Turkey, 6–9 November 2001, www.un.org/womenwatch/daw/csw/env_manage/documents/EP5-2001Oct26.pdf; S. Kumar-Range, 'Environmental Management and Disaster Risk Reduction: A Gender Perspective', paper given to the same meeting, http://www.un.org/womenwatch/daw/csw/env_manage/documents/BP1-2001Nov04.pdf; A. von Kotze and A. Holloway, *Reducing Risk: Participatory Learning Activities for Disaster Mitigation in Southern Africa* (Oxford: IFRC/Oxfam, 1996); R. E. Wiest et al., *The Needs of Women in Disasters and Emergencies* (Winnipeg: University of Manitoba Disaster Research Institute, 1994).

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9 HelpAge International, personal communication, 2000.

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21 Blaikie et al., *At Risk*, p. 133.

Chapter 7
Community-level risk reduction

7.1 Introduction

This chapter forms an introduction to the chapters that follow, all of which focus to a greater or lesser extent on working with vulnerable communities. Other relevant issues that do not fit easily into those chapters are also covered here.

The choice of the phrase 'community-*level*' risk reduction is deliberate. Most community-level projects are community-based – that is, they rely on the participation of the people who will benefit – but the two terms are not synonymous. Community-level projects may offer few or no opportunities for communities to participate. Participative projects should be community-based, but are not necessarily community-level as they may cover many communities.

The main aim here is to indicate what is possible at community (or local) level, which is the level where many users of this Good Practice Review will be working. Inevitably, there is some overlap with the chapters that follow, because it is not easy to draw clear boundaries between the themes.

7.2 The value of community-level work

The importance of participative, community-based approaches is generally acknowledged in the fields of development, disaster preparedness and mitigation, and (with some qualifications) disaster relief. The rationale for participatory approaches is set out in the next chapter. For working at community/local level, further pragmatic arguments can be put forward. The principal one is that, in reality, local people and organisations are the main actors in risk reduction and disaster response.

Communities are active in risk reduction, even in the most hostile environments (see Chapter 9). When a disaster strikes, the immediate response – search and rescue, dealing with the injured, the traumatised and the homeless – is carried out almost entirely by family members, friends and neighbours. It might be many hours or days before professional emergency teams arrive. In the case of the many small-scale events triggered by natural hazards, there may be no external support. When it comes to rebuilding

homes and livelihoods, communities are again often left to their own devices. This is particularly true in countries where government capacity is limited, for whatever reason.

7.3 Operational issues and challenges

Working at community level may be essential to give protection against hazards, but it does present some important operational challenges.

7.3.1 Capacity to address bigger problems

First, how much can be accomplished on this scale? Chapter 2 discussed how the root causes of people's vulnerability can often be found in political, social and economic structures and trends at national and global levels.

Local-level activity can be dwarfed by such forces. This does not necessarily make it ineffective. The likely results of an initiative depend on the prevailing geographical, social, economic and political conditions. There are many examples of successful community-level risk reduction initiatives in this and the following chapters (and see Case Studies 7.1 and 7.2). However, project workers need to be realistic about what can be achieved locally.

7.3.2 Scaling up impact

The second challenge is related to the first. How can successful local-level initiatives be 'scaled up' so that their benefits are shared by many more poor and vulnerable groups? For development NGOs, this has been a pressing issue for many years. There are many approaches to this problem in development work, which fall under three main headings:[1]

1. *Additive strategies*, which increase the size of a programme or organisation.
2. *Multiplicative strategies*, which achieve greater impact through influence, networking, policy reform or training.
3. *Diffusive strategies,* where the spread is informal and spontaneous.

The subject has been much researched and discussed in development circles, but it has not featured in writing on disaster mitigation and preparedness, so there is little evidence showing what approaches to scaling up work best, and under what conditions.

There are, however, good examples of successful scaling up. The Bangladesh Red Crescent's Cyclone Preparedness Programme (see Case Study

Case Study 7.1

Mobilising communities

In the mid-1980s, a Peruvian NGO, PREDES, gave technical assistance to communities affected by floods and *huaicos* (mudslides) in the Upper Rimac Valley to rebuild river defences and plan the relocation of families who had lost their houses. The defence works were built, but the relocation projects could not be implemented because people were unable to resettle on public land and could not afford to buy land.

To provide greater security a more comprehensive programme, addressing soil erosion in the upper valley and rapid urbanisation in the lower valley, was developed, while local CBOs joined together to implement a package of mitigation measures.

The results of two years' project work were a substantial strengthening of community organisation in the area, construction of a large number of local flood and *huaico* control structures that reduced immediate risks, and investment of significant central government resources in the CBO initiatives. Local CBOs gained greatly in confidence, and were thus able to negotiate more effectively with the government over resources.

A. Maskrey, *Disaster Mitigation: A Community Based Approach* (Oxford: Oxfam, 1989), pp. 47–61.

16.5, page 304) is a classic additive approach: a major agency developed a long-term initiative covering a very wide area along the country's coastline, based on thousands of community volunteers within a single overarching structure. Starting from a much smaller institutional and geographical base, the Chivi Food Security Project (Case Study 15.2, page 260), which works with smallholder farmers and gardeners in Zimbabwe, has over several years mixed additive and multiplicative strategies to achieve growth.

Significantly, both of these examples are long-term programmes that have adapted themselves repeatedly over time to maximise their outreach and effectiveness. In contrast, many mitigation and preparedness projects at community level never progress beyond the pilot or demonstration phase. Short-term projects (of three years or less) provide poor foundations for long-term growth.

Case Study 7.2
Disaster preparedness at grass-roots level

Buklod Tao (the name means 'people's unity') is a CBO with more than 190 volunteer members in a community of some 500 families close to the Marikina River in the Philippines. It was set up in 1995 to address acute environmental problems along the riverbank and in the river itself. In 1997, Buklod Tao secured funds for a seven-month environmental protection project, comprising a clean-up operation and planting fruit trees along the riverbank; environmental education; training in environmental management and advocacy; and disaster preparedness.

The disaster preparedness component of the project had two elements: training and organisation; and the purchase of equipment and materials for disaster response. Buklod Tao arranged a one-day training workshop on disaster management and preparedness to introduce the issues and share information. Three disaster management teams were created, each covering a different location, coordinated by a local emergency operations centre. Subsequently, a rescue drill was carried out to apply the newly learnt skills and test equipment.

Three fibreglass rescue boats were built. Ropes, first aid kits, megaphones and flashlights were ordered. The mould for the boats was borrowed from a parish priest, and they were made in a local workshop by one of the group's members. Buklod Tao also made arrangements with the Citizens' Disaster Response Centre (a national NGO specialising in building local capacities for disaster management and coordinating emergency response) to ensure that relief goods would be available in an emergency.

The new disaster preparedness system was tested within a few weeks of being established. When Typhoon Ibyang arrived on 18 August 1997, heavy rain fell on the area, leading to the flooding of two rivers and a night-time rescue operation. Thirty-one families were rescued by the disaster management teams and 28 families received relief goods in the form of food and water.

Disaster Preparedness at Grass-Roots Level (London: British Red Cross Society, NGO Initiatives in Risk Reduction Case Study 3, 2000), www.redcross.org.uk/riskreduction.

7.3.3 Sustainability and external inputs

This leads to the third issue: sustainability. Community-level projects cannot be made sustainable overnight, whether one views sustainability in terms of the acquisition and application of technical skills, development of effective management systems or self-financing.

Projects that start promisingly may not maintain their progress. In Peru, a project to build flood defences in the highland town of Cuyocuyo in 1984 achieved a remarkably high level of community mobilisation in its first phase: for 30 consecutive days, 120 men and women worked eight hours a day to build a ten kilometre-long, two metre-high wall to control the local river. However, it lost impetus thereafter. Longer-term mitigation measures to prevent water run-off and erosion in the hills were not carried out, nor was maintenance of the river walls that had been built in the first phase.[2]

The issue of sustainability is often concealed by agencies' monitoring and evaluation reports, which tend to cover activities during relatively short-term funding periods rather than a project's longer-term development and impact. Much of the literature on local-level projects suffers from the same failing, and in many cases is little better than agency propaganda.

The level and nature of external inputs will change over time, but the need for such inputs may not go away. The Chivi Food Security Project shows that, even with a strongly participatory approach, it took years for community technical and managerial capacity and the ability to negotiate more effectively with other external agencies to really take root and become widespread in the project area. On a much smaller scale, the Buklod Tao example in Case Study 7.2 was supported by external inputs as it got under way, but appears to have maintained its impetus thereafter with minimal external support. This is probably because it is a community organisation addressing issues that are priorities for the community – the flood risk is one the community has to face every year.[3]

In some cases, external inputs will always be required. The Cyclone Preparedness Programme in Bangladesh, which has been running for 30 years, may be based on a volunteer army but depends equally on ongoing government and donor funding for its professional staff, equipment, the construction of shelters and other operational costs. In a recent study of local-level mitigation in Pampanga and Quezon provinces in the Philippines, it was shown that 'community organisers' (local people employed by NGOs) played an essential role in community-level training and planning, and

ensuring that risk reduction plans and measures were maintained and updated. Members of community disaster response committees acknowledged that their motivation dropped significantly when the community organisers were away: meetings were not held and activities were not carried out.[4]

7.3.4 Stakeholder relationships

A fourth important issue is that community-level activity does not take place in a vacuum. There are no neat boundaries between one community and another. Community activities take place in relation to other actors, such as the government, the private sector and civil society organisations, which must also be considered stakeholders. Many kinds of community organisation may be active, such as peasants' associations, gardeners' clubs, community kitchens, burial societies, irrigation committees and neighbourhood committees. The relationship between these different actors is dynamic, changing as a result of new knowledge and shifts in attitudes, resources and political power.

Facilitating these diverse, often complex, relationships effectively is essential for the success of any disaster reduction initiative. Considerable time, effort and diplomatic skill will be needed for this task. Supporting agencies, principally NGOs, will often have to assume the role of intermediaries, facilitating links between community-level organisations and other actors, especially national and international institutions. Their intermediary functions include assisting communication between project beneficiaries and governments, supporting participation and group formation, training and building the capacity of local organisations, channelling resources, and helping to identify and voice community needs.[5]

Professional emergency services often ignore community organisations and capacity, or resent them because they are outside their plans, systems and, above all, control. NGOs also vary greatly in the extent to which they ensure beneficiary participation within their own programmes. Some NGOs deliver services directly.

7.4 Community action planning

In the light of the experiences described above, some NGOs prefer to keep to a purely local-level planning process, based on principles of popular participation and pragmatism. Sometimes referred to as action planning, this has the following characteristics, many of them shared with PRA methods:[6]

Case Study 7.3
Intermediaries in local-level vulnerability reduction

In recent years, the Philippine National Red Cross (PNRC) has begun facilitating community-driven initiatives. One of the main vehicles for this has been an Integrated Community Disaster Planning Programme (ICDPP). One ICDPP project, in the community of Tigbao on the island of Leyte, highlights some of the challenges the PNRC has faced.

The project gave training in first aid and disaster management, established a community disaster action team and implemented several structural measures (building a seawall, strengthening a river dyke, dredging and diverting a stream, and planting mangroves). The initiative required considerable coordination with communities as well as members of local government.

As an intermediary body or facilitator, the PNRC faced several challenges and constraints. It had to consider how far it should fill gaps in the disaster management systems that were not being covered by government agencies – yet this meant adopting a traditional service-delivery role. To reduce vulnerability, livelihood support initiatives were needed, but the project's agenda was limited to more conventional disaster management. Donor conditionality and the organisation's own standardised systems for project design and implementation ran counter to the flexibility required for community-based work.

In addition, other stakeholders came into the project with their own expectations of what the PNRC should do, based on its traditional roles as an auxiliary service to local government, a distributor of relief goods and a charitable organisation. Despite these problems, the PNRC did become significantly more of a facilitator of local actors and less a giver of aid.

K. Allen, 'Vulnerability Reduction and the Community-based Approach: A Philippines Study', in M. Pelling (ed.), *Natural Disasters and Development in a Globalizing World* (London: Routledge, 2003), pp. 170–84.

- problem-based and opportunity-driven;
- based on achievable solutions;
- participatory, encouraging rapport and partnerships;
- reliant on local knowledge and skills, and on traditional wisdom;
- does not rely on complete information;
- small-scale and community-based;
- incremental rather than comprehensive plans;
- emphasis on starting points, rather than end states;
- fast, but not rushed, approach; and
- visible, tangible outputs.

Although community action planning often involves engagement with a range of local stakeholders, there is no provision for scaling up impact, nor for advocacy to influence the policies and practices of more powerful stakeholders in government and elsewhere. But for many working at the grassroots, with limited resources or capacity, this framework may help to guide them towards realistic initiatives that can be sustained by communities and their organisations (see, for instance, Case Study 7.4).

Box 7.1
Key features of local-level risk management

An analysis of local-level initiatives in Central America has identified six premises or basic features that should characterise local risk management:

1. It should be integrated with the management of development initiatives.
2. Its character as a process, not a product, implies the need for local structures and institutions to drive and coordinate it.
3. Its nature is wide-ranging and integrated, addressing all of the so-called phases in the disaster cycle.
4. Linkages with ongoing developments in neighbouring and surrounding areas are needed.
5. It must involve participation and local ownership, and local government has a fundamental role in the process.
6. Sustainability is crucial.

A. Lavell et al., *Local Risk Management: Some Areas Relating to the Concept and Practice* (Panama: CEPREDENAC/UNDP, forthcoming), www.cepredenac.org.

Case Study 7.4
Reducing the risk of urban fires

Delhi has attracted an ever-growing number of immigrants in the past 40 years, many of whom live in informal settlements on public land. In 1991, squatters were estimated to comprise more than 25% of the city's population.

Squatter settlements face a number of hazards, including flooding and water-logging, poor sanitary conditions and pollution. They are also vulnerable to fire. Using a variety of participatory assessment and action planning methods, a community risk reduction initiative in a squatter settlement in the riverbed of the Yamuna River worked with slum dwellers to assess their risks and vulnerabilities, and identify risk reduction measures. Fire was identified as a major concern, an action plan was prepared by the community and a fire safety task force set up.

A number of fire protection initiatives were considered in collaboration with local authorities and the fire services, but the task force finally opted for a community fire post with its own power and water supply. The fire post is the first of its kind in this area. Its planning and establishment were led by the community, and it is manned and maintained by a trained community task force. Residents built the post and are responsible for using and maintaining it.

'Our Experiments with Action Planning', unpublished paper (Delhi: Sustainable Environment and Ecological Development Society (SEEDS), undated).

The next chapter also looks at methods of working at community level and with communities.

7.5 Chapter summary

- Community-level approaches are an important element of risk management, since in reality local people and their organisations are the main actors in reducing risk and responding to disasters.
- Working at community and local levels presents significant challenges, including how far it can address supra-local problems, how to scale up impact, and how to ensure sustainability.

- Local activities take place in relation to a range of stakeholders, within and beyond the community. Supporting agencies must often assume the role of facilitators and intermediaries.

Notes

1 M. Edwards and D. Hulme, 'Scaling-up the Developmental Impact of NGOs: Concepts and Experiences', in Edwards and Hulme (eds), *Making a Difference: NGOs and Development in a Changing World* (London: Save the Children Fund/Earthscan, 1992), pp. 13–27.

2 A. Maskrey, *Disaster Mitigation: A Community Based Approach* (Oxford: Oxfam, 1989), pp. 63–68.

3 Zenaida Delica, Asian Disaster Preparedness Center, personal communication, 2002.

4 I. Brémaud, 'Disaster Risk Management: An Opportunity for Sustainable Development? Perspectives and Limits in Two Provinces of the Philippines', MSc dissertation, Coventry University, 2002, pp. 63–64, 86, 91, 104–105.

5 *Participation and Intermediary NGOs* (Washington DC: The World Bank Environment Department, Dissemination Note 22, undated), wwwesd.worldbank.org/html/esd/env/publicat/dnotes/ dn220695.htm; Maskrey, *Disaster Mitigation*, pp. 91–99.

6 N. Hamdi, 'Action Planning Theory: Characteristics, Techniques, Process', *Open House International,* vol. 24, no. 3, 1999, pp. 5–15.

Chapter 8
Participation

8.1 Introduction and rationale

Popular or community participation can be broadly understood as the 'active involvement of people in making decisions about the implementation of processes, programmes and projects which affect them'.[1] Community participation is being encouraged in many areas of development, including disaster management, but practical guidance remains relatively limited.[2] In humanitarian circles, though, the relevance of participation is more questionable – at least in some contexts (see Section 8.3).

Participatory approaches are valuable in disaster management for the following reasons:

- They enable people to explain their vulnerabilities and priorities, allowing problems to be defined correctly and responsive measures to be designed and implemented (see Case Study 8.1).
- The principal resource available for mitigating or responding to disasters is people themselves and their local knowledge and expertise.
- Participatory work takes a multi-track approach, combining different activities, hazards and disaster phases. It is therefore well placed for dealing with the complexity of disasters and the diversity of factors affecting people's vulnerability to them.
- The process of working and achieving things together can strengthen communities. It reinforces local organisation, building up confidence, skills, capacity to cooperate, awareness and critical appraisal. In this way, it increases people's potential for reducing their vulnerability. It empowers people more generally by enabling them to tackle other challenges, individually and collectively.
- Participatory risk reduction initiatives are likely to be sustainable because they build on local capacity, the participants have 'ownership' of them, and they are more likely to be compatible with long-term development plans.
- Community participation in planning and implementing projects accords with people's right to participate in decisions that affect their lives. It is therefore an important part of democratisation in society, and is increasingly demanded by the public.
- Participatory approaches may be more cost-effective, in the long term, than externally-driven initiatives, partly because they are more likely to

Case Study 8.1
Revealing the socio-economic context

A study of disaster threats and coping strategies in a village in the Philippines tried to create a forum that would allow the most vulnerable residents of the village – typically the poor and least articulate – to explain their own situation and express their opinions.

One of the methods used by the researchers was three-dimensional mapping. A map was made on a sheet of plywood (plywood is a popular building material, so it was easy to find). The village street plan was drawn first; then the surrounding hills that form the local watershed were modelled in dough (made from flour and water). The river and seasonal streams were marked, and every house in the village was plotted on the map.

The map became the key reference-point for all the other participatory work with the community, carried out over five days. More details were added day by day, until every household's situation (physical, economic, social) was mapped. The process gave rise to many arguments – for example, over whether a particular house was sufficiently well maintained to withstand the next typhoon, or whether people living near the river had somewhere dry to store their harvest.

ITDG/Nick Hall

Making the village map

(continued)

Case Study 8.1 *(continued)*

The mapping gave people a chance to identify the most vulnerable, and it led into workshop sessions that described how the situation had changed in recent years, and to explore 'what-if' scenarios. It seemed to give many people the chance to express concerns about their own vulnerability, and it spelt out in a matter-of-fact, non-confrontational way the hidden structures of power and patronage (e.g. between landlords and tenants, landowners and wage labourers, and those in debt and those earning interest from others).

Community members observed that the information was familiar to them, but the map had given them an overview that would be invaluable for preparing a disaster plan.

N. Hall, 'Incorporating Local Level Mitigation Strategies into National and International Disaster Response', in J. Scobie (ed.), *Mitigating the Millennium: Proceedings of a Seminar on Community Participation and Impact Measurement in Disaster Preparedness and Mitigation Programmes* (Rugby: Intermediate Technology Development Group, 1997), pp. 35–45.

be sustainable and because the process allows ideas to be tested and refined before adoption.

- External agents cannot cope alone with the enormous risks facing vulnerable populations. Local people can bring a wealth of resources, especially knowledge and skills, to help reduce risk.
- Working closely with local people can help professionals to gain a greater insight into the communities they seek to serve, enabling them to work more effectively and produce better results.

8.2 Approaches

Approaches to participation can be grouped into two main categories:

1. Guided participation (also known as instrumental participation)
2. People-centred participation (also known as transformative participation)

This is admittedly an oversimplification. Furthermore, individual approaches may contain elements of guided and people-centred participation.

8.2.1 Guided participation

Guided participation seeks to include people in improvement projects, mostly in implementation and sometimes planning, but the projects are still initiated, funded and ultimately controlled by professional planners from outside the community. The planners determine the level of popular participation. The outside agents involved range from international agencies through different tiers of government to NGOs. Guided participation covers a wide range of interventions, from work that is essentially community-focused to government-centred programmes.

Early-warning and response systems to rapid-onset hazards such as cyclones are one example of guided participation in the disaster reduction context. These require community participation in their operation and local-level targeting (e.g. transmitting warnings, organising evacuations, handing out relief supplies), but usually are designed by disaster managers and based on centralised decision-making.

Another example is housing programmes introducing safe building techniques (e.g. against earthquakes or cyclones) where technologies are developed externally in laboratories or test sites before being handed over to communities by training local builders and producing public information materials. In this case, community participation is limited to builders receiving training, who are then expected to take the programme forward.

Within the category of guided participation, a distinction should be made between participation solely in implementing project activities, and participation in planning. In the former, community participation may be limited to undertaking prescribed tasks (e.g. a food-for-work programme following a disaster).

8.2.2 People-centred participation

People-centred participation addresses issues of power and control. Its view is much wider than the technical and managerial aspects of programmes and projects. It is concerned with the nature of the society in which these programmes and projects are developed. It aims at the empowerment of communities. People-centred participation is founded on the belief that ordinary people are capable of critical reflection and analysis, and that their knowledge is relevant and necessary. In countries where ordinary people are excluded from decision-making and political discussion, or are discouraged from taking part, the importance of participation in giving them a voice may be magnified.

Participation should empower individuals and communities by involving them in:

- defining problems and needs;
- deciding solutions to them;
- implementing agreed activities to achieve those solutions; and
- evaluating the results.

They must also share the benefits of the initiatives. Participation should enable those who are usually the most vulnerable and marginalised within their community to be heard and have their due influence on decision-making.

Disaster specialists have been slower to take to participatory approaches than their colleagues in development. This is largely due to the history, character and culture of disaster work, with its command-and-control mentality, blueprint planning, technocratic bias and disregard for vulnerable communities' knowledge and expertise. Literature on disasters can conceal this, especially where it is produced by those involved in disaster reduction activities. After the earthquake in Maharashtra in 1993, it seemed that nearly every agency involved in reconstruction claimed that local communities were participants in the reconstruction programmes. However, off the record some of the people working there challenged this. The tendency to use the label, but not the substance, of 'participation' is widespread, in development as well as disaster work.

8.3 Operational issues

Participation is difficult to manage, by its very nature. Indeed, to attempt to 'manage' the process may defeat the purpose of participation and undermine its practice. Nor, for the same reason, should it be seen as a single, coherent ideology. It is rather a package of disparate theories, methods and experiences guided by only a very few, very broad principles. Above all, it must not be regarded as some kind of magic wand that will instantly solve all the problems of planning and implementing disaster reduction activities. Participation is difficult in theory and in practice.

This section sets out some of the main issues to be considered in planning and implementing participatory approaches. It also identifies some of the likely problems, under two main headings:

1. Who participates, and why?
2. Facilitating the process.

8.3.1 Who participates, and why?

In disaster reduction, the aim is to enable communities to protect themselves more effectively against hazards. Participation is a means to this end. To the extent that it can empower and thereby mobilise the community *collectively*, it will succeed. If only some parts of the community are involved in a participatory programme, its impact will be limited at best, it is likely to overlook those most in need, and in some circumstances it may lead to community fragmentation and hence to failure.

To avoid these dangers, it is essential to acquire a thorough understanding of the community. Who is in it? How are they vulnerable to disaster? How can they be mobilised collectively to reduce the risks they face? Such knowledge is not easily won. The main reasons for this, and the main challenges in gaining understanding, include the following.

Complex communities

Communities are not single, homogeneous, entities. There will be differences in wealth, social status and labour activity, and divisions according to gender, ethnicity, age, religion and caste. Tensions always exist. Divergence in needs and priorities can create or worsen divisions within communities. Moreover, groups are not always fixed in isolation. They can join together to work for common goals and then separate again once these have been achieved. All of these dimensions must be considered in participatory work. This is difficult. It requires skill, insight, patience and flexibility.

Power relationships

Participation must be based on an understanding of power relations within a community's culture and social structure. Social relations are not equal. In any society or community, some groups will be weaker than others, or even marginalised. As a result, their voices are less likely to be heard, and more effort is needed to ensure that they become involved in participatory initiatives. As the most marginal groups in society tend to be the most vulnerable, this is an important issue for disaster reduction work. In humanitarian action, however, a degree of tension has arisen between the desire to protect the vulnerable (and, hence, to address the causes of their vulnerability, which may include socio-political structures) and the need to maintain the fundamental humanitarian principles of impartiality and neutrality.[3] This debate is largely driven by experiences in complex political emergencies, but it is also relevant to natural disasters.

Facilitators need to be careful, when choosing their local partners to organise and plan activities, and when identifying whom to include in those activities. Local authorities, political leaders and business people are often keen to be involved, but may have little understanding of the needs and circumstances of the most marginal and vulnerable groups; or they may have their own agendas. On the other hand, members of local élites cannot be disregarded as they have the power to disrupt community-based initiatives. Deciding how to acknowledge and include local leaders is one of the most difficult challenges in participation.

Where people-centred participation involves real social change, it leads inevitably to the possibility of confrontation and conflict with those accustomed to holding power and influence and used to controlling resources. For example, attempts to challenge restrictions on women's or other groups' access to decision-making power are often criticised and challenged, usually on the grounds of respect for cultural norms.

Community organisations and capacity

In developing countries, where the capacity of the state to protect its citizens may be limited, communities have to rely on their own knowledge and coping mechanisms to mitigate against disasters, as they have done for generations (see Chapter 9). Customary support structures can also play a significant role in disaster response and recovery. Although few communities are likely to have disaster preparedness committees, many will have their own formal and informal groups to deal with common issues, for instance water management or the regulation of disputes. Such groups can provide an entrance point for outside facilitators, and a basis for establishing sustainable local-level structures to assess and counter risk.

In developed countries, traditional community systems have been abandoned for more individual lifestyles and forms of association. This has been accompanied by a massive extension of the role and functions of the state. One consequence of these developments is that people rely heavily on the state to support and protect them. Their capacity for independent action may be limited. This may leave them more vulnerable to hazards when formal protective systems prove inadequate.

But in both developed and developing countries, at times of emergency there will be a variety of *ad hoc*, largely informal responses by loosely-knit groups from within communities before formal organisations are able to mobilise. These 'emergent' groups carry out activities such as search and rescue,

damage assessment, handling the dead, distributing relief supplies and presenting survivors' grievances. For example, during the first three days after the Mexico City earthquake in 1985, the organisational response was dominated by extensive independent actions. Ten years later in Kobe, Japan, a strong contingent of volunteers emerged to assist in response to another earthquake even though there was little tradition of voluntary organisation or community self-help in the city.[4]

Change

Communities are always undergoing change. So are their needs and resources. The relationship between the different actors is also dynamic, changing as a result of new knowledge and shifts in attitudes, resources and political power. Participation must therefore be a dynamic process, which implies constant readjustment of understanding, planning and implementation in order to adapt to such changes. This is not easy, and may be particularly difficult for external actors who have to work to less flexible schedules and targets set down by their managers or donors (see Case Study 7.3, page 110). Understanding of what participation implies must reach right up the management chain.

Conflict and social breakdown

Conflict uproots people from their homes, leaving them without assets and means of livelihood, vulnerable, frightened, susceptible to intimidation, and living in dislocated communities characterised by an absence of traditional authority and social structure, kinship affiliation and reciprocity. Many professionals question if a participatory approach (to both development and disaster reduction) is appropriate or even possible in such conditions of social breakdown. Moreover, local civil society organisations often find it difficult to remain neutral in conditions of conflict. This presents a considerable challenge when it comes to identifying suitable NGO and CBO partners in community-level work.

External forces

Communities do not exist in isolation from one another, or from the other actors in human development, such as governments, political parties, private-sector companies, the military and international agencies. External actors can have a decisive impact on community-level initiatives. In an authoritarian state, participation may well be considered subversive (see Case Study 6.7, page 100). In a state where government responsibilities are

being decentralised – which is now happening in many developing countries – there may in consequence be new opportunities for more equal dialogue between communities and officials (see Chapter 5.2.3, page 66). With the retreat of the state from many aspects of socio-economic development, the need for active and influential civil society organisations has grown rapidly and massively, extending the scope for community-level work (see Chapter 5.2.4, page 69).

Community initiatives can arise in response to threats from external forces – for example, to challenge development plans or environmental damage. This is important in the context of disaster reduction, for many hazards to people are made worse, or even generated, by unsustainable development processes. Community participation must be underpinned by recognition of these external forces and their implications.

8.3.2 Facilitating the process

Participation involves a number of operational choices – about the time and scope of the process, and the methods to be used. The following paragraphs highlight a few of the main issues (appropriate communications methods, which are vitally important, are discussed in more detail in Chapter 11).

When to participate

Risk reduction is a long process involving several steps from identification and analysis of problems, through decision-making and planning to action and evaluation. Participation should take place throughout this process, at each of these steps.

Choice of methods

Those wishing to facilitate participatory processes are faced by a huge choice of methods. There are too many of these to be listed here, and so practitioners are advised to consult the literature on participatory methods and to talk to those with experience of this kind of work.[5]

Participatory activities can be grouped, very roughly, into six main kinds:[6]

1. *Spatial – mapping and modelling*. This is particularly useful in risk and vulnerability assessment. For example, it can be used to identify hazards and dangerous locations, map water systems and rainfall, and identify areas affected by erosion, loss of vegetation or pest infestation.

2. *Nominal – collecting, naming or listing*. These activities can collect information about communities and their environment: for example, naming and sequencing coping strategies used in times of food crisis, listing health problems in order of frequency or importance, and identifying the causes and consequences of deforestation.
3. *Temporal – putting events in sequence*. This could be through personal and ecological histories, seasonal calendars, community time-lines or re-enacting events. In disaster work, such methods can reveal the changing nature of vulnerability and the effectiveness of previous preparedness or response measures.
4. *Ordinal – sorting, comparing and ranking*. In disaster work, such methods can be used to identify the most vulnerable individuals and households.
5. *Numerical – counting, estimating, comparing, scoring*. Methods of this kind could be used in assessing disaster losses or quantifying the value of some kinds of livelihood asset.
6. *Relational – linking, relating*. This can help facilitators to understand how different parts of the community relate to each other and to identify power structures. It also allows people to show how their problems relate to one another: for example, how the effects of drought might be linked to land tenure arrangements, or to gender-based divisions of labour.

Entrance points

One of the greatest problems facing facilitators is that of finding an 'entrance point' to the community with which they wish to work. The notion of the entrance point is very important, as it allows facilitators to enter into the social life of the community and start to build participatory processes from the inside.

The choice of entrance point will depend on the nature of the community concerned. In some cases, it might be through traditional local authorities such as village elders, clan leaders or religious leaders, or through traditional forms of association such as forums for regulating water, funeral societies or occupational groups. In other cases, it might be directly through the poorest and most vulnerable – for instance, women-headed households or homeless families.

Decisions of this kind require careful calculation of the likely consequences for the future of the intended initiative. Such calculation must be based on an understanding of the structure of that community, the different needs of its sub-groups, and the likelihood of increasing competition and conflict within the community. Will working through a particular entrance point enable the initiative to reach the most vulnerable, or does it run the risk of the project

being 'captured' by local élites? Will some sections of the community (e.g. traditional leaders) be alienated if the process begins with other, traditionally marginal or disempowered, groups? It is not easy for facilitators to maintain neutrality if it appears to some members of the community that they have taken sides.

In regions affected by political instability and conflict, traditional authority may have broken down completely. In addition, people may distrust outsiders. This can also happen in the aftermath of major natural disasters, to some extent, although the capacity of emergent organisations (see above) should not be underestimated.

Where indigenous social structures are weak or lacking, it is sometimes possible to create new groups to work with. However, a great deal of time, patience and effort is required. In some circumstances, external supporting agencies may need to take a leading role that challenges power structures. This has happened in some initiatives to support women after disasters (see Case Study 6.3, page 87).

Insiders and outsiders

Although participation is community-centred, outsiders do have a role to play. As long as they remain facilitators, and their work is guided by people's needs and aspirations, they can be genuine partners in transformation.

This sounds easy enough in principle, but the practice is much harder. The relationship between outside disaster specialists and local people involves differences in outlook, power and resources. Outsiders have different educational, social and cultural backgrounds, and they work for organisations that may have considerable financial, technical and other resources at their disposal.

The possession of resources, especially funding, conveys enormous power. Because of this power, and the assumption that all participatory efforts are good in themselves, outside disaster specialists may be tempted to intervene without waiting to find out if they are really needed – or wanted – by the community. In such circumstances, the participatory process is likely to be directed by outsiders, and aimed towards seeking confirmation of decisions made externally. This often happens unconsciously. If funds are made available too widely, or easily, this can undermine local initiatives and organisations.

Case Study 8.2
Reshaping local knowledge

PRA methods were used with a community of Bhutanese refugees living in a camp in Nepal. School students were among those trained in the methods. During an early stage of the training, one group of students returned with a neatly copied chart of their work. They proudly claimed that they had listened to a group of illiterate women who were not part of any of the formal programmes within the camp and whose voice, they felt, was often unheard.

However, when the students displayed their diagram, it was in a neat bar chart form, using the Western not the Nepali calendar. Discussion revealed that the students had reinterpreted the information provided by the women, regrouping and relabelling, and presenting it in what they considered a more prestigious manner, which they had learned at school.

R. Hinton, 'Trades in Different Worlds: Listening to Refugee Voices', *PLA Notes*, 24, 1995, pp. 21–26.

Even where there is dialogue, outsiders find it difficult to understand the community's environment, needs and points of view. To be sure, some of this can be blamed on the attitudes and approaches of the outsiders themselves, which are the product of their education, institutional culture and so on. But there is a more fundamental factor too: the impossibility of ever being able to put oneself fully into somebody else's position and see things through their eyes. Trying to fit others' views into frameworks of understanding, filtering the knowledge gained and reshaping it, can have the effect of imposing a kind of conceptual uniformity on the diversity of people and their experiences (see Case Study 8.2).

Reaching the most vulnerable

In development, organisations aim to work with the poorest of the poor. In disasters, they aim to work with the most vulnerable. These two groups are not identical, but will often contain many of the same people, and the

problems in reaching them are similar. They are nearly always the most difficult to see and to hear. They tend to be the most disenfranchised, the least likely to have a long-term vision and to take chances, the least accustomed to expressing and asserting themselves.

The importance of giving the most vulnerable and the victims of disasters a voice cannot be overemphasised. This raises the question of accountability, which is addressed in Chapter 12. Methods that give a voice to the vulnerable are described there.

Reconciliation of aims and priorities

From the point of view both of communities and of those who support them, it is essential to be explicit about the objectives of the participatory process. Different groups may have different objectives. Indeed, relationships between outsiders and local communities usually involve different ends. The process can then be developed to reconcile those objectives. Where objectives are unstated, or unclear, misunderstandings will arise that may prove damaging.

Facilitators of participatory processes will find that the groups involved are often unwilling to declare all their intentions, especially if these involve capturing resources from other sections of the community or from the outside agency. Participation cannot always uncover such hidden objectives and unstated agendas, but those involved must remain alert for indications (see Case Study 8.3).

Information and openness

The more open the process, the greater the likelihood of success. This implies sharing information and knowledge, which does not always happen. For instance, many participatory research processes simply extract information from people, to be used by others for their own research aims. Ownership of the information remains with those who planned the research.

An example of this in the disaster context is the approach sometimes used to carry out community-level vulnerability analysis, in which information about different aspects of the community's social and economic vulnerability is acquired from community members by means of participatory techniques, but the analysis and subsequent disaster management planning is carried out by external agents.

Case Study 8.3
Revealing and reconciling different views

An earthquake in the state of Maharashtra in India in September 1993 affected 67 villages and left 53,000 houses either totally destroyed or seriously damaged: about 10,000 people were killed. Since some of the villages had been reduced to rubble and had become burial grounds, the government decided to relocate 49 villages to safer sites, and promised to provide a plot of land and a basic house to every household that had to move.

This involved designing layouts for the new villages and houses. Official designs produced for both, based on town planning, were different from those of traditional villages and showed no understanding of villagers' needs. Attempts at construction ended in failure, and it was finally agreed to involve people more actively in planning.

In one village of 110 households, facilitators explored how space had been used. Meetings were held with villagers to identify what features they wanted to see in the new village and its housing; this included preparing maps. The groups also visited the new site.

There were heated arguments when the different groups' ideas were shared in a common village meeting. The grid layout prepared by officials was strongly supported by the younger, literate men who had studied in towns, who felt that features derived from town designs would make the village look better. The older men, younger non-literate men and most of the women felt that this design was not suited to their way of life and daily activities. The main reason for not liking the grid design was that houses would not be clustered. Women felt that this would lead to a disintegration of social and cultural ties and of support networks based on kinship and caste groups. One man pointed out how difficult it was to turn a bullock cart in a grid design where roads turn at right angles. When it came to discussing public facilities, the women's plan focused on water points, which had been overlooked by the men.

Despite these problems, the process arrived at a commonly agreed solution, based on a mixture of the cluster and grid plans – and it took only three days.

M. K. Shah, 'Participatory Planning with Disaster Victims: Experience from Earthquake-hit Areas of Maharashtra, India', *Refugee Participation Network*, 21, 1996, pp. 15–17.

The outcomes of participatory appraisal exercises should therefore be shared publicly with all those who take part. This allows knowledge gained from different groups within the community to be shared between those groups, leading to better mutual understanding of each other's views and needs. It also gives community members a chance to challenge the conclusions of the appraisal – and the appraisers. The community may insist on such sharing as a precondition of its involvement in participatory work.

Participation versus implementation

In some cases, participation is an end in itself, enabling men and women to learn, organise, decide, plan and take action without other specific goals in mind. More normally, it is geared to some kind of formal project or programme supported by outside agencies, usually with external funding. Those responsible for such projects and programmes have to make tricky operational decisions about when to stop analysing and start planning and implementation. The process is not crudely linear: good participatory processes involve ongoing reappraisal and willingness to change project design and activity in response to new insights. Nevertheless, the shift from appraisal to operations is significant within the project cycle, and must be managed carefully.

Timetables

The timetable for analysis of problems and opportunities, for methods of research and action and for planning new activities should be based upon a careful consideration of the local context, the specific concerns to be addressed, the institutions involved in collaborative efforts, and the objectives of local and outside actors.

Collaborative actions may be limited to specific initiatives for the immediate future (a few months, one or two years) or they might be viewed as a genuinely long-term programme (ten years or more). Participation works best as a process over long periods of time, allowing for reflection and modification in the light of experience and contextual changes. However, participatory approaches are just as valid in short-term projects. They have been used in post-emergency phases, as well as pre-disaster work.

Monitoring and evaluation

In a participatory project geared towards community action, it follows that the community must be involved in selecting indicators of achievement, and

in collecting and gathering evidence. This works very well in some disaster contexts, for instance in food insecurity and famine early warning, where a number of NGOs have established viable systems to alert communities and outside agencies to deteriorating food and livelihood security, and to generate appropriate responses. Sales of animals, sightings of certain insects and birds, and failure to carry out funeral ceremonies are among the indicators identified and applied by local people in such initiatives.

Nevertheless, it should be borne in mind that the needs of communities in this regard may differ from those of outside agencies – especially their senior management – and of donors, who expect more conventional indicators of success, often emphasising the quantitative at the expense of the qualitative. This problem should also be set against the more fundamental problem of how to monitor the impact of pre-disaster mitigation initiatives, where the result is that something – the disaster – does not take place (see Chapter 18 for detailed discussion of monitoring and evaluation).

8.4 Chapter summary

- Participatory approaches are valuable, helping to identify vulnerabilities and build local capacities.
- Participation should be 'people-centred': it should seek to empower communities by involving them in defining problems, deciding solutions, implementing activities and evaluating the results.
- In practice, participation is difficult to manage and may not produce quick results.
- To be effective, participation must empower and mobilise a community collectively, avoiding dominance by some groups and the exclusion of others.
- A number of operational choices must be made about the time and scope of the process and the choice of participatory methods.

Notes

1 R. Slocum et al. (eds), *Power, Process and Participation: Tools for Change* (London: Intermediate Technology Publications, 1995), p. 3.

2 This chapter is based on J. Twigg et al., 'Guidance Notes on Participation and Accountability in Disaster Reduction', Benfield Hazard Research Centre, London, 2001, http://benfieldhrc.org.

3 N. Leader, *The Politics of Principle: The Principles of Humanitarian Action in Practice*, HPG Report 2 (London: ODI, 2000); M. Herson, 'Putting the "H" Back into Humanitarian Accountability', *Humanitarian Exchange*, no. 24, 2003, pp. 4–6.

4 E. L. Quarantelli, 'Organizational Response to the Mexico City Earthquake of 1985: Characteristics and Implications', *Natural Hazards*, 8, 1993, pp. 19–38; L. K. Comfort, *Self Organization in Disaster Response: The Great Hanshin, Japan, Earthquake of January 17, 1995* (Boulder, CO: Natural Hazards Research and Information Center, Quick Response Report 78, 1996), www.colorado.edu/hazards/qr/qr78.html.

5 For example, R. Chambers, *Whose Reality Counts? Putting the First Last* (London: Intermediate Technology Publications, 1997); N. Wates (ed.), *The Community Planning Handbook* (London: Earthscan, 2000).

6 Chambers, *Whose Reality Counts?*, pp. 130–61.

Chapter 9
Indigenous knowledge and coping strategies

A greatly respected international expert once commented to me that 'the farmers in Bangladesh are fifteen years ahead of the PhDs' – Brian Ward, former Director of the Asian Disaster Preparedness Center.

Even within the Save the Children Fund, we sometimes read reports which say people cannot exist in these places, when obviously they do – Julius Holt, food security consultant, Save the Children Fund.

9.1 Introduction

Knowledge of how vulnerable people respond to a threat is essential. Outside interventions can then be built on these strategies.

Natural hazards are not new and people have been living in hazard-prone areas for centuries – in some cases for thousands of years. They have, inevitably, devised their own methods for protecting themselves and their livelihoods. These methods are based on their own skills and resources, as well as their experiences. Their knowledge systems, skills and technologies are usually referred to under the heading of 'indigenous knowledge'. There are now many studies of this in particular contexts. There are also some useful more general discussions, which this chapter draws on.[1]

The application of indigenous knowledge in the face of hazards and other threats is referred to as a 'coping mechanism' or 'coping strategy' (also sometimes known as an 'adjustment' mechanism or strategy, and in some circumstances as a 'survival' strategy). The choice of skills and resources to be applied varies according to the nature of the hazard threat, the capacities available to deal with it, and to a variety of community and individual priorities that can change during the course of a disaster.

Indigenous knowledge is wide-ranging. It includes technical expertise in seed selection and house-building, knowing where to find certain wild foods, economic knowledge of where to buy or sell essential items or find paid work, and knowledge of whom to call upon for assistance. People's resources also include labour, land, tools, seeds, food stocks, animals, cash, jewellery and other items of value. These can be used up, bought, sold, or

requested by calling upon obligations from family, kin, friends or neighbours, according to circumstances.

The enthusiasm for sophisticated technological methods of overcoming disasters has led specialists to overlook and undervalue the effectiveness of local coping strategies and technologies. Conventional wisdom in disaster management pays little attention to local knowledge as a basis for prevention and mitigation. Now, although there is a better appreciation of their merits in some quarters, they are still under-utilised by agencies, including many NGOs.

Coping strategies have been studied most in the case of food security, drought and famine, where disaster specialists have come to appreciate their value. This came about in part from recognition that agencies' orthodox approaches to fighting famine were less than fully effective in Africa in the mid-1980s. Strategies for coping with other natural hazards have not received so much attention, but there is a growing body of evidence to demonstrate the value of these and the circumstances that affect their adoption.

It is important for development and relief/recovery workers to appreciate the extent of such indigenous skills and practices, and to build upon them as far as possible in order to maximise their value. This approach helps to make communities partners in the risk management process. It can also be cost-effective because it reduces the need for expensive external interventions. It is more likely to lead to sustainable projects, because the work is based on local expertise and resources.

Old skills, knowledge and technologies are not inherently inadequate. New technical approaches are not automatically superior. This lesson has now been learnt by many in the development arena, notably in agricultural and food security work, although it has taken many years. However, the opposite, romantic, trap of assuming that the older ways are always better than the modern must also be avoided. Instead, one must look for what is appropriate in given conditions.

9.2 Forms of coping

It is possible to develop quite complex systems for categorising coping strategies and indigenous knowledge. For operational purposes, a simpler typology should be sufficient.[2]

This divides coping strategies into four broad categories:

- economic/material;
- technological;
- social/organisational; and
- cultural.

Most coping strategies involve elements of all of these, so the typology should not be used artificially to place particular strategies under particular headings. Rather, field workers should regard it as a framework for viewing coping strategies and indigenous knowledge as a whole, thereby ensuring that key elements are not overlooked.

It is also important to remember that coping mechanisms are often used in sequence to respond to different stages of adversity or crisis. This is most apparent during famines, when the emergency is likely to be prolonged (see Case Study 9.2), but it can also be observed in more rapid-onset disasters such as floods (Case Study 9.3). External agency response to slow-onset disasters such as drought often comes too late, when communities have already used up most of their strategies and resources.

Using the four-type categorisation above, the following paragraphs show some features of coping strategies and indigenous knowledge in a range of disaster contexts. This should give some idea of the variety of methods that vulnerable people have been using and refining for generations. In the light of such knowledge, which can be gained from participatory vulnerability and capacity analysis, interventions can be designed that reinforce existing coping strategies and prioritise areas where these are weak or under threat.

9.2.1 Economic/material

One of the principal elements in this category is economic diversification. Having more than one source of income (or food) is invaluable during times of stress, when some economic activities become impossible. Members of a rural household engaged in agriculture may undertake other work, such as making and selling handicrafts, carpentry, building or blacksmithing. With urbanisation and globalisation, a growing number of rural communities are coming to depend on cash remittances from family members who have gone to work in towns and cities, or even in other countries.

Vulnerable households try to store up a ‘buffer’ of food, grain, livestock and cash that they can draw on in difficult times. During periods of food shortage, they will eat food of poorer quality or eat less food, and look for ‘wild foods’,

such as seeds, nuts, roots and berries. If a crisis becomes acute, they will begin to sell their assets, but sale of livelihood assets (e.g. animals, tools, seeds for planting next year's crop or even land) is seen as a last resort.

Even having a large family can be seen as part of an economic coping strategy because it gives a household additional labour. Savings and credit schemes are often an important component of economic coping strategies (see Chapter 13).

9.2.2 Technological

Chapter 10 addresses this subject in more detail. This category is quite broad, including land management systems as well as what is more usually thought of as technology, such as building materials and construction methods.

Management of land for food production is an important element. Poor farmers, especially those working marginal or drought-prone lands, prefer mixed cropping, intercropping, kitchen gardens and other practices that reduce the risk of poor harvests by widening the range of individual crops grown. Traditional seed varieties are selected for drought or flood resistance, and for particular locations. Alternative crops may be kept in reserve to plant where others are ruined by floods. Pesticides made from local plants are applied to crops.

Land use strategies also include avoiding flood- or landslide-prone locations when building a home, and keeping away from hazardous places at certain times of year, such as not taking livestock to pasture up mountain valleys during the spring floods. To check erosion and flooding during the monsoon, villagers in the hills of Nepal convert hillsides into level terraces, create outlets to manage water overflow from one terrace into another, make networks of ponds to slow rainwater run-off and save it for the dry season, and build stone-works and plant trees to stabilise slopes and prevent erosion of gullies.[3]

An obviously technological approach is the way that housing is adapted to repeated floods. Common adaptations include building houses on stilts so that floodwaters can pass underneath, building them on plinths or platforms of mud or concrete so that they remain above flood levels, and building escape areas under or on top of roofs.

Bangladeshis have a range of methods for dealing with abnormally high or prolonged monsoon floods. These are based on accommodating themselves

Village house on a mud plinth in Bangladesh

to the flooding rather than trying to prevent it. They include building on mounds or mud plinths, having homes of light-weight materials that can be dismantled and moved, building false roofs where goods can be stored and people can live, using beds as a living area when water enters the house, hanging belongings from the roof in jute nets, and investing in movable assets such as animals and boats.[4]

9.2.3 Social/organisational

This heading includes indigenous organisations that provide support in countering disasters: kinship networks, mutual aid and self-help groups. Systems of mutual rights and obligations are part of every household and community's social structure, forming what is sometimes called a 'moral economy'. People who are suffering – from shortage of food for instance – often call upon kin, neighbours, or patrons for help. Labour and food sharing during crises is standard in many societies. Work parties (*mingas*) are called up by certain indigenous communities in Latin America to rebuild after floods.[5]

The family is a fundamental social mechanism for reducing risk. Extended kin relations are networks for exchange, mutual assistance and social contact. In times of stress, relatives living outside the immediate community can become particularly important. For instance, some families living on islands in Bangladesh's Jamuna River try to marry their children into families on the mainland so that they will have somewhere to move to should they lose their homes to erosion when the river changes course.[6]

Disaster-affected people may also appeal to the wider community for charity. In many communities, gifts or alms are expected at times of hardship.

9.2.4 Cultural

Cultural factors include risk perception and religious views, which are frequently connected.

Case Study 9.1
Human actions, acts of God

Anthropologists' studies have revealed how people's statements of their views can disguise their actual risk perception and risk-avoidance behaviour.

People who live on the banks and islands of the Jamuna River in Bangladesh are very vulnerable to floods and erosion. Researchers in the late 1980s and early 1990s who asked them about their views of these risks found that a significant proportion explained them as the will of God, and saw prayer as the best response. The researchers concluded that the people were largely fatalistic and that their strategies for managing risk were limited.

An anthropologist on the mid-river islands obtained a similar response when using a standard questionnaire a few years later. However, indigenous knowledge is often not easily expressed in words, and the anthropologist observed something quite different when she lived on the islands during the 1998 floods.

Then, she observed that people were following a variety of strategies that had been used on the islands for generations. They built platforms out of reeds and banana stalks for their animals, fixed beds below the roof, cooked on portable ovens, lived off stocks of food saved from the winter harvest, switched temporarily to other sources of income and referred to their wide networks of relatives.

At the same time, the people expressed their faith in God, interpreting the high floods as his way of showing his power and testing their belief. God was thought to have sent the floods, but he also gave believers the strength to survive them.

H. Schmuck, '"An Act of Allah": Religious Explanations for Floods in Bangladesh as Survival Strategy', *International Journal of Mass Emergencies and Disasters*, vol. 18, no. 1, 2000, pp. 85–95.

Understanding how people view risk is particularly important. The accumulation and application of knowledge are directed by vulnerable people's perceptions of the risks they face. As we have seen, vulnerability is made up of multiple risks, not just the threat of hazards.

Case Study 9.2
Coping with famine in Ethiopia

A survey of a community in Ethiopia's Rift Valley to find out how it had coped during the famine of 1984–85 discovered a variety of coping strategies, deployed progressively as the crisis worsened.

First, normal hungry season strategies were brought into play. Grain consumption was cut back before family grain stores became empty. The men travelled to Addis Ababa to look for seasonal work, returning in the rainy season to plough. Women and some men went to distant markets where grain was cheaper. Women gathered wild plants to supplement family diets.

When these standard techniques were no longer sufficient, more drastic steps were taken. Cattle were sold, then oxen, then household goods and finally houses themselves, piece by piece. If these efforts were not enough, people migrated in search of relatives who could give them food. Some families split up. Finally, members of the community moved into the towns to beg and search for work.

It was not until this final stage, when the people were on the move, that relief operations started to bring food in. The community felt that the food aid brought in at the end did not play a decisive role in controlling the famine; their own efforts were seen as the backbone of the response.

World Disasters Report 1993 (Dordrecht/Geneva: Martinus Nijhoff/International Federation of Red Cross and Red Crescent Societies, 1993), pp. 45–48.

Risk perceptions will vary greatly between and within communities according to culture, experience and (for poor people especially) the pressure to secure their livelihood. It is very difficult to gain understanding of local views of risk. Simply asking questions about how risk is perceived does not always produce useful insights, because outsiders and local communities are likely to think about and describe risk in very different ways. It is often more constructive to talk to communities about what they do to manage a particular hazard than to discuss risks in general, provided that the full range of risks facing a community is covered in this way. But even this method is likely to miss a great deal.

Case Study 9.3
Living with floods in urban slums

Technological flood coping strategies used by slum dwellers in the Indian city of Indore include:

- high internal shelving;
- raised storage platforms;
- electric connections at head height;
- metal floor-level storage and furniture (more durable and resistant to immersion in water);
- storing grain in metal containers on high shelves;
- ceiling platforms (for valuables, food and mattresses); and
- attaching corrugated iron roofing with rocks not nails, for easy removal.

In severe floods people and possessions are moved to higher ground, in the following order:

- first, the elderly, children and animals;
- second, electrical goods;
- third, lighter valuables and cooking utensils;
- finally, clothes and mattresses.

Some families own trunks so that they can carry valuables away more easily.

Water levels are watched carefully and constantly when flood threatens. Houses may be built of wood and mud plaster rather than mud brick, since these are less likely to be severely damaged, yet they may also *appear* to have suffered greater damage, which may help their owners to secure compensation from the authorities.

There are sophisticated community support networks for the most serious times. Wealthy residents, local (religious) welfare organisations, and local businesses may provide food, blankets, clothes and medicines. The slum dwellers are also skilled in using the media and community leaders to press for state compensation.

C. Stephens, R. Patnaik and S. Lewin, *'This Is My Beautiful Home': Risk Perceptions towards Flooding and Environment in Low-Income Urban Communities: A Case Study in Indore, India* (London: London School of Hygiene and Tropical Medicine, 1995), pp. 31–43.

By spending long periods in communities, talking about and observing their daily lives, anthropologists can sometimes acquire a good understanding of the subject. Observation is valuable, as people's statements of their views

can sometimes give a misleading impression of their actual risk perception and risk-avoiding behaviour.

There is a common assumption among disaster management professionals that many people are fatalistic, regarding disasters as acts of God that cannot be prevented. In many cases, this may not be true. Statements of belief in divine power are not incompatible with taking actions to reduce risk (see Case Study 9.1).

Case Study 9.4
Effectiveness and limitations of traditional practices

More than 75% of the land in Nicaragua, Honduras and Guatemala is hilly or mountainous and ecologically fragile. The extensive clearing of forests for timber, ranching and farming, combined with widespread burning, has left much of the region's mountainous terrain in a degraded state.

Hurricane Mitch in October 1998 dropped over 50 inches of rainfall in one week. Barren hillsides could not retain or absorb water, and massive run-off carried away tons of topsoil, rocks and vegetation.

Members of the Farmer to Farmer network, a grassroots movement for sustainable agriculture in Central America, observed that damage to agricultural land was uneven. The network approached the NGO World Neighbors, which agreed to sponsor and facilitate a research project looking at the hurricane's impact on different kinds of farming system.

The study was carried out by 96 local research teams in Nicaragua, Honduras and Guatemala. It compared 'conventional' and 'agro-ecological' farms that were otherwise similar in terms of topography, angle of slope, location, crops grown and the intensity of the storm.

Conventional farming involves clearing and burning before the planting season, ploughing with the slope, and planting extensively. It also involves high levels of artificial fertilizers, pesticides, herbicides and hybrid seeds. By contrast, agro-ecological farming involves working with nature to regenerate and conserve nutrients and other natural resources. It uses such measures as:

- soil and water conservation (including contour barriers, terraces and ditches);
- cover crops (plants grown between crop cycles to fix

(continued)

Case Study 9.4 *(continued)*

nitrogen and protect the soil from the elements);
- agro-forestry (trees on farmland to provide compost, food, fodder);
- in-row tillage (cultivating only in areas immediately around the plants in order to reduce soil run-off);
- organic fertilizers;
- integrated pest management (rotating crops, cultivating beneficial plants and insects, using natural repellents and traps to protect crops from harmful insects); and
- reduced or zero grazing.

A total of 1,804 plots were surveyed in 360 communities. The research was carried out through a participatory process, directly involving nearly 2,000 farmers and promoters and 40 institutions. Data were processed for each of the three countries and the results were confirmed and validated in workshops with participants at the local, regional and national levels.

The main findings of the study were that:

- The sustainably-farmed plots had 28–38% more topsoil than their conventional neighbours. This difference was more pronounced in areas of more intense rainfall and storm damage.
- They also had 3–15% more soil moisture.
- Surface erosion was two to three times greater on conventional plots. Agro-ecological plots suffered 58% less surface erosion in Honduras, 70% less in Nicaragua and 99% less in Guatemala.
- The fact of being members of the Farmer to Farmer network helped individuals work together to resist and recover from the hurricane.
- Overall, the damage from landslides and eroding gullies seems to have been equally severe on both types of plot, indicating that agro-ecological methods may not contribute to resilience in all conditions.

The research concluded that agro-ecological methods increase resilience in most cases, but in some conditions – particularly a storm of Mitch's severity – damage from gullies and landslides is very difficult to withstand. Much of the damage originated uphill from the test sites, on poorly managed, degraded or deforested slopes.

Investigating Agricultural Resilience to Hurricane Mitch (London: British Red Cross Society NGO Initiatives in Risk Reduction Case Study 7, 2001), www.redcross.org.uk/riskreduction.

Communities have their own way of defining when conditions have worsened so much that they constitute a crisis or disaster. This threshold varies between communities, according to their vulnerabilities and the threats they face. Seasonal flooding is not necessarily seen as a disaster in some places. Crop growing may depend on it, and poor families may supplement their diets with fish that are more readily caught as flood water spreads from the rivers over the fields. The Bengali language has two words for flood: one meaning normal seasonal flooding, the other meaning excessive flooding.

9.3 Problems and challenges

9.3.1 Limitations of coping strategies

Coping strategies and indigenous knowledge are important in reducing risk. But like any knowledge system, they have their strengths and weaknesses in different contexts and at different times. Local knowledge, skills and coping strategies must be assessed rationally and scientifically on the basis of their effectiveness. This is not a debate between indigenous/traditional and external/scientific/modern systems in themselves, but a question of finding the most appropriate approach for each situation.

For example, in farming systems work, the value of local knowledge (of crops, soils, food preservation, climate, and protection against pests) is now widely recognised, and successful projects build on this. Similarly, local knowledge of indicators of drought and famine is now used effectively as a component of some famine early-warning systems (see Chapter 15). Research on communities living by the Jamuna River in Bangladesh has revealed the extent, complexity and robustness of indigenous understanding of the river and its behaviour.[7]

However, geological mapping and monitoring are needed to identify fault lines and areas liable to seismic activity – local knowledge cannot manage this. Scientific monitoring and forecasting of cyclones offer a far more reliable basis for planning evacuation than local understanding of precursors (see also Chapter 16.3). It is also unrealistic to expect indigenous strategies to be able to cope with extreme events. A massive earthquake will overwhelm most indigenous construction techniques, for example, just as repeated years of drought will exhaust communities' food and cash reserves, while social support structures can break down under the pressure of the struggle for scarce resources. Traditional coping mechanisms may also be inadequate for events that were not anticipated, and of which there is no previous experience, such as the HIV/AIDS epidemic.

9.3.2 Change

Indigenous knowledge and coping strategies are also affected by wider developments in the economy and society, such as changes in land use caused by population expansion or shifts in patterns of land ownership.

In many parts of the world, farmers are forced onto poor-quality lands or unstable hillsides and, for the sake of economic survival, compelled to use agricultural methods that are unsustainable or increase hazard risk. In Honduras, where the expansion of commercial plantations and ranches has forced peasant farmers onto marginal lands in hills and valleys, trees and other vegetation that stabilise slopes and retain water have been cut back for smallholdings, thereby increasing the risk of flash floods and landslides – as happened when Hurricane Mitch struck in October 1998. In Peru's Rimac Valley, overgrazing, deforestation and the abandonment of traditional terraces and water management systems began centuries ago, with the Spanish conquest, but worsened in more recent times as peasant farmers, struggling to survive in a market economy, left to work in the

Case Study 9.5
Understanding typhoon-resistant housing in the Philippines

A study among a rural community of 5,000 people in the Philippines found that traditional methods of building bamboo houses enabled them to stand up well to typhoons even though the methods were very different from those prescribed in modern textbooks for building timber-framed houses. When questioned on their techniques for countering typhoons, the builders were unable to provide an answer. Only by careful observation of builders actually putting up a demonstration house over two days were the researchers able to see how the structure worked and appreciate its strength.

N. Hall, 'Incorporating Local Level Mitigation Strategies into National and International Disaster Response', in J. Scobie (ed.), *Mitigating the Millennium: Proceedings of a Seminar on Community Participation and Impact Measurement in Disaster Preparedness and Mitigation Programmes* (Rugby: Intermediate Technology Development Group, 1997), pp. 35–45.

towns and their land was turned over to commercial meat and dairy production.[8]

In many places, traditional knowledge of biodiversity, of seed varieties that are resistant to drought and other climatic pressures, has been lost because of the promotion of new 'improved' varieties or even alternative crops by government agricultural extension agents.[9]

Such changes are most obvious in farming, but there are other ways in which socio-economic development can undermine coping strategies and skills. In the 1980s, researchers in the mountains of northern Pakistan discovered that the opening of the Karakoram highway was taking local builders, who were skilled in putting up secure housing, off to the cities of the plains in search of better-paid work.[10] Traditional social support networks and moral obligations also appear to be breaking down under the pressure of market forces and rapid social change.

In addition, governments' systems for dealing with crisis can marginalise or damage local coping mechanisms. It has been argued that this happened in Turkana, Kenya, during the drought of the early 1990s, when government set up a drought monitoring and contingency planning structure in parallel to that of local pastoralists.[11]

9.3.3 Invisibility

It is a major challenge to identify which coping strategies are effective or do not work well, and why. Local knowledge and coping mechanisms are often invisible to outsiders. As with local perceptions of risk, considerable effort may be needed on the part of outsiders to identify and understand them (see Case Study 9.5). This is often difficult for those whose class, upbringing and education have taught them to denigrate indigenous and traditional knowledge as 'primitive'.

It is also important to find out who in the community possesses indigenous knowledge of this kind, and who does not. Where the holders of such knowledge are themselves marginal or less visible within communities – for instance, women or older people – this can be challenging.

Where people are changing or adapting coping strategies rapidly in response to changing events, it may be even harder for outsiders to spot what is going on. This is all the more reason for building up a close relationship with communities during normal times in order to gain a full understanding of how they cope with crises.

But there is also a potential for conflict between traditional and modern knowledge systems and cultures, which is clearly linked to power relationships in society. 'Experts' in positions of authority do not like to be challenged. For instance, the revival of traditional water conservation methods in India has come into conflict with local officials' efforts to demolish unauthorised water-harvesting structures built by communities and NGOs.[12]

9.4 Chapter summary

- People in hazard-prone areas have acquired considerable knowledge and technical expertise for managing risk.
- Indigenous knowledge and coping strategies are often overlooked and undervalued by agencies.
- Coping strategies are very diverse, comprising economic, technological, social and cultural elements.
- It is important to look objectively at all forms of knowledge – indigenous and external – to identify the most suitable approaches for each situation.
- Indigenous knowledge is affected by changes in the economy and society at large, and often undermined by these changes.

Notes

1 C. Clarke Guarnizo, 'Living with Hazards: Communities' Adjustment Mechanisms in Developing Countries', in A. Kreimer and M. Munasinghe (eds), *Environmental Management and Urban Vulnerability* (Washington DC: The World Bank, Discussion Paper 168, 1992), pp. 93–102; J. Sebstad and M. Cohen, *Microfinance, Risk Management, and Poverty* (Washington DC: Management Systems International (Assessing the Impact of Microenterprise Systems (AIMS) Project), 2000), www.dec.org/pdf_docs/PNACJ418.pdf; P. Blaikie et al., *At Risk* (London: Routledge, 1994), pp. 61–72.

2 This is adapted from Clarke Guarnizo, 'Living with Hazards'.

3 N. Dahal, 'Coping with Climatic Disasters in Isolated Hill Communities of Nepal: The Case of Rampur Village in Okhaldhunga', in J. Twigg and M. R. Bhatt (eds), *Understanding Vulnerability: South Asian Perspectives* (London: Intermediate Technology Publications/Duryog Nivaran, 1998), pp. 47–67.

4 R. Hughes, S. Adnan and B. Dalal-Clayton, *Flood Plains or Flood Plans? A Review of Approaches to Water Management in Bangladesh* (London: International Institute for Environment and Development/Research and Advisory Services, 1994), pp. 29–30; R. Shaw, '"Nature", "Culture" and Disasters: Floods and Gender in Bangladesh', in E. Croll and D. Parkin (eds), *Bush Base, Forest Farm: Culture, Environment and Development* (London: Routledge, 1992), p. 204.

5 Clarke Guarnizo, 'Living with Hazards', p. 97.

6 H. Schmuck, *Living with the Floods: Survival Strategies of Char-Dwellers in Bangladesh* (Berlin: ASA-Programm of the Carl-Duisberg-Gesellschaft, 1996), p. 68.

7 H. Schmuck-Widmann, *Facing the Jamuna River: Indigenous and Engineering Knowledge in Bangladesh* (Dhaka: Bangladesh Resource Centre for Indigenous Knowledge, 2001).

8 M. Rodgers, *In Debt to Disaster: What Happened to Honduras after Hurricane Mitch* (London: Christian Aid, 1999), www.christian-aid.org.uk/reports/indebt/indebt.html; A. Maskrey, *Disaster Mitigation: A Community Based Approach* (Oxford: Oxfam, 1989), pp. 13–24.

9 D. Cooper, R. Vellvé and H. Hobbelink (eds), *Growing Diversity: Genetic Resources and Local Food Security* (London: IT Publications, 1992).

10 A. Wijkman and L. Timberlake, *Natural Disasters: Acts of God or Acts of Man?* (London: Earthscan, 1984), p. 88; Blaikie et al., *At Risk*, pp. 28–29.

11 D. Karenga, 'Putting Decision Making Back Into the Hands of the People', *Appropriate Technology*, vol. 19, no. 3, 1992, pp. 5–7.

12 I. Khurana, 'Rainwater Rights', *Down To Earth*, 10(6), 15 August 2001, www.downtoearth.org.in; anon, 'Who Owns the River?, *ibid*., 9(5), 31 July 2001, www.downtoearth.org.in.

Chapter 10
Choosing technologies for disaster reduction

10.1 Introduction

Structural, engineering and related technical measures are used for three main purposes:

1. To control hazards (e.g. building embankments and dykes to protect against floods, terraces to control rapid water run-off on steep hillsides, or dams to provide water reserves during droughts).
2. To protect private and public facilities (e.g. safe construction or strengthening of homes, public buildings and infrastructure).
3. To provide people with places of safety at times of disaster (e.g. flood and cyclone shelters).

Technologies used in risk and vulnerability assessment, communicating information about risk and disaster preparedness are referred to in chapters 4, 11 and 16.

Many different approaches are available, offering planners and project managers a range of technology choices (this issue of *choice* is a fundamental one). How to make such choices is the main theme of this chapter. A simplified view of this question groups risk reduction technologies into two categories:

1. High-tech, large-scale technologies. These include embankments, dams and dykes for flood control, advanced methods of securing buildings against earthquakes and cyclones, irrigation systems that deliver large quantities of water, and walls and banks to restrain volcanic debris such as lava and lahars (mud formed from volcanic ash). They are typically applied in wealthy countries and societies, or in large projects financed by international aid agencies.
2. A contrasting approach encourages the development and use of 'alternative', 'appropriate' or 'intermediate' technologies, principally for the following reasons:
   - they are small-scale, and hence suitable for local-level application;
   - they are low in cost, and hence more affordable by poor households and communities, as well as by technical assistance programmes;
   - they are suited to local people's technical and managerial capacities;
   - they draw on indigenous knowledge and skills;
   - they are owned and controlled by local people; and

- use of such technologies offers poor and vulnerable communities a wider range of choice than do expensive, complex, high-tech solutions.

Appropriate technology has long featured in development programming, so there is a great deal of experience to draw upon.[1] It has been less apparent in disaster mitigation and preparedness projects, although even here there is a growing body of knowledge.

10.2 Technology choice: contexts, applications and issues

The range of technologies that can be applied to disaster reduction is enormous. For this reason, they cannot be covered here in detail. The rest of this section considers some cross-cutting issues in technology choice and application, looking at contexts where technology has a particularly significant role to play, giving examples of practice and drawing wider lessons. Because this Good Practice Review focuses on local-level initiatives, the emphasis of this discussion is on technologies that can be applied by communities, NGOs and other local-level agencies.

10.2.1 Applications

There are many potential applications of appropriate technologies. These include:

- making housing more secure (against a variety of hazards such as floods, earthquakes and high winds);
- building local-level infrastructure (e.g. footbridges and tracks); and
- constructing small-scale hazard mitigation structures (e.g. flood or landslide defences, or rainwater harvesting structures).

Many of the best-known examples of appropriate, community-based technologies for reducing risk come from the fields of food security and housing, where there is an extensive literature, but it is important for project managers to take a very broad view of the opportunities for alternative technologies. The examples in the following paragraphs illustrate the range of possibilities in more detail.

10.2.2 Cost and materials

In developing countries, and especially among poor communities, appropriate-technology approaches are likely to be more viable than high-tech, large-scale technologies. While high-tech measures have helped to protect

many people in wealthier societies, their high cost means that they are not applied or are even inapplicable to poor and vulnerable communities in the developing world.

For instance, ensuring the construction industry follows state-of-the-art standards for earthquake-resistant buildings might be relatively simple in the US. Here there is wealth enough to cover the cost of new designs and additional measures to strengthen existing structures, and there are strong institutions to monitor and enforce compliance. But it is much harder in poorer countries, where government institutions are already stretched to the full to address other social and economic problems.

Smaller-scale technological inputs are more likely to be affordable by households and communities. The materials that are used can often be found locally: stone, for example, is used in a wide variety of hazard-mitigating structures, including dams and water tanks, bunds that hold back water on fields, and retaining walls and gabions (wire cages filled with rocks) to support unstable hillsides or prevent gullies from being eroded by flash floods. In Bangladesh, earth mounds provide shelter for people and animals as the water rises. These can be built cheaply in most villages, using local labour.[2] Hazard-resistant houses can be built from locally-grown wood, bamboo, reeds and other vegetable matter – there are examples of this below.

Recycled materials can also be used. In parts of the Caribbean and South America, old car tyres have been used to stabilise slopes that are vulnerable to landslides. In Rio de Janeiro, tests showed that a particular design of tyre wall filled with compacted earth was as effective as conventional concrete walls at stopping rainy-season landslides. They could easily be made locally – three million tyres are disposed of each year in Rio – at only one-third of the cost of concrete walls.[3]

The photo on page 149 shows simple, low-cost stone-and-timber constructions used in flood and mudslide defences in Peru.

The value of natural features and eco-systems in mitigating hazards should be recognised. In Europe and North America, conventional attempts to control river flooding by building embankments are being abandoned in some places in favour of restoring natural flood plains that absorb surplus water more effectively.[4]

So-called ‘bio-engineering’ solutions based on living trees and plants are often highly effective. Planting trees and grass is a well-established method

ITDG Peru

of preventing rapid water run-off and stabilising hillsides. In Nepal, 'green roads' are being promoted in mountainous rural areas. These minimise soil erosion and landslides by avoiding heavy construction equipment; widening the road in phases to allow for compaction by monsoon rain and exposing it to at least two monsoons before it is opened to traffic; planting trees and other vegetation; and constructing drainage systems that disperse water across the mountain slopes.[5] Section 10.2.9 and Case Study 10.7 (below) illustrate other applications of bio-engineering technology.

However, outsiders often fail to appreciate that many poor people, who may rely on day wages and have little or no savings, cannot afford even relatively simple technical improvements that will make them safer. This is notably the case with 'safe housing' projects, where there are often alternative technologies and building methods available that can make homes more resistant to earthquakes, floods and cyclones, and the additional cost of strengthening existing houses or building new, improved ones is marginal compared to the cost of the house as a

whole – but even this marginal cost often puts the improvements beyond the reach of the intended beneficiaries (see Case Study 10.1).

This raises the question of how poor people are to pay for technical improvements that they cannot normally afford. Simply providing such things free of charge is ineffective, as development experience has proved. People are less likely to appreciate the usefulness of the donations, which means that they are less likely to use them efficiently; and they tend not to look after them properly. There are many stories from 'safe housing' projects of donated houses being adapted by their inhabitants in ways that reduce their structural stability, and of maintenance being neglected.

Case Study 10.1
Housing improvement in Bangladesh

A pilot project in Bangladesh organised a series of action-learning workshops in a village where participants could share ideas about low-cost technical improvements that would make their houses safer. The participants included professional builders, thatchers and homeowners. Care was taken to ensure that women, poor villagers and women-headed households were adequately represented.

The workshops discussed features of homes in the village, the advantages and limitations of particular materials, and alternative forms of design and construction. The final stage of the process was to erect a demonstration building that conformed to standard construction but incorporated a range of relatively simple technical improvements that added only 8% to the basic cost. Eighteen months after the workshops, a survey assessed the uptake of the technical alternatives. It found that 28 of the 38 workshop participants had since undertaken building work. However, only eight had used techniques developed at the workshops. The main reason for the limited uptake was financial: 20 of the 28 had carried out building work in response to damage to their property from natural hazards, but after disasters money is limited and material costs tend to rise.

R. Hodgson and M. Carter, 'Some Lessons for a National Approach to Building for Safety in Bangladesh', in J. Ingleton (ed.), *Natural Disaster Management* (Leicester: Tudor Rose, 1999), pp. 160–62.

Case Study 10.2
Failure to adopt risk-reducing technology

Household fires caused 466 deaths and 14,600 injuries in the United Kingdom in 1999. Installation of battery-operated smoke alarms on ceilings or high up on walls can greatly reduce this risk.

In two London boroughs, where more than half the residents live in council or other social housing and 18% are from ethnic minority groups, over 20,000 smoke alarms were given out free of charge, together with instructions and educational leaflets in English and minority languages. Free fitting of the alarms was available on request. However, a study two years later showed that this had not reduced deaths or injuries due to fire, nor had it reduced the number of fires. This was because few alarms had been installed or maintained.

There were several possible reasons for this. Recipients may not have understood installation instructions and leaflets about the benefits of fire alarms because of illiteracy or poor command of English. Tenants may have lacked installation skills or tools, or may have worried about their landlords objecting to installation. Incorrect siting or installation of devices may have increased false alarms, leading to removal of batteries or disconnection.

A connected study of over 2,000 households that had been fitted with alarms in two local authority housing estates found that nearly half were not working 15 months later; 40% were missing or had been disabled by tenants.

C. DiGuiseppi et al., 'Incidence of Fires and Related Injuries after Giving Out Free Smoke Alarms: Cluster Randomised Controlled Trial', *British Medical Journal*, 325, 2002, pp. 995–97; D. Rowland et al., 'Prevalance of Working Smoke Alarms in Local Authority Inner City Housing: Randomised Controlled Trial', *ibid*., pp. 998–1,001.

Some kind of financing mechanism is generally needed to enable the poor to purchase technical improvements. Soft loans and hire-purchase arrangements can be used, but such schemes have to be managed carefully if they are to be sustainable (see Case Study 10.3). The skills needed to manage them are most likely to be found in development agencies, not among disaster managers.

Case Study 10.3
Financing technology for vulnerability reduction

Moneragala District in the 'dry zone' of southern Sri Lanka has been badly affected by drought in recent years. In 1998, communities in the district approached the Colombo-based NGO ITDG South Asia for assistance. This led to a community-based initiative to build tanks to collect and store rainwater.

The approach taken in the village of Muthukandiya typified that of the project as a whole. Villagers discussed their problems, developed a plan and selected rainwater harvesting technologies. Two local masons were trained to build 5,000-litre household storage tanks: surface tanks of ferro-cement and underground tanks of brick.

The system, including tank, pipes, gutters and filters, cost between Rs 6,500 (underground) and Rs 8,500 (above ground) – equivalent to a month's income for many village families. Just over half the cost was provided by the community in the form of materials and unskilled labour. ITDG South Asia contributed the rest, including cement, transport and payment for the unskilled labour. Households learned how to use and maintain the tanks, and the whole community was trained to keep domestic water supplies clean. A village society was set up to run the initiative.

On a purely technical level, the project was clearly feasible, but financial sustainability proved more challenging. A revolving fund was set up, with the households that benefited first agreeing to contribute a small monthly amount to pay for maintenance, repairs and new tanks. However, the revolving fund concept was not fully understood and it was difficult to induce households to contribute.

M. M. Ariyabandu, 'Food and Water Security through Community-based Technology in Rural Sri Lanka', *Appropriate Technology*, vol. 26, no. 3, 1996, pp. 6–8; IFRC, *World Disasters Report 2002*, pp. 20–21.

It can be cost-effective to use cheaper materials or constructions that will be damaged and require replacement more often, if this can be done easily by local people. In Nepal, for instance, it has been argued that it is better to build stone and brushwood dams in rural irrigation systems than to install stronger steel and concrete structures. Monsoon rains and consequent land-

slides are likely to wreck the stone and brushwood dams every year, but they can be replaced within a few days using materials that are readily to hand. More sophisticated structures are unlikely to fail unless rainfall and landslides are exceptionally severe, but one never knows when exceptional weather will occur, and if they do collapse, money, materials and skills may not be available to rebuild them.

A similar argument is used elsewhere in South Asia to justify retaining seemingly flimsy bamboo and thatch housing. Although such houses are much more vulnerable to floods than houses made of more resilient material such as brick, they can be replaced more easily. Parts can even be dismantled and carried away to safety if sufficient warning is given.[6] In Bangladesh and Vietnam, simple low dykes are built to protect crops against early floods. It is accepted that they will be submerged later in the rainy season and will need repairing for the next year.[7]

10.2.3 Effectiveness

Disaster managers and many of their counterparts in development tend to feel that appropriate technologies are somehow second-rate: at best a compromise, at worst ineffective. Decades of development experience in poor and vulnerable communities have shown such views to be misguided.[8] Appropriate technologies take a wide variety of forms and approaches, drawing on old and new technical ideas as appropriate, and there is plenty of technical innovation in this area. Small-scale, low-cost alternative technologies can also be highly effective in risk reduction.

Like indigenous knowledge generally, of which they are part, traditional technologies are often well adapted to prevailing hazards. Housing illustrates the point particularly well, as in the examples below from Guatemala and Peru (page 154). Another example comes from French Polynesia, which was struck by six cyclones in 1983 that destroyed 10,000 houses. Those that stood up best were traditional island homes with thatched roofs and openings to let the wind through.[9]

10.2.4 Modern versus 'primitive'

Although the view that appropriate technology is second-best or 'primitive' is misguided, the attraction of what is thought to be 'modern' technology is very strong among poor communities. This can hinder the adoption of safe technologies that are perceived to be primitive. It can also lead to the adoption of unsafe technologies that are perceived to be modern.

Case Study 10.4
Participatory technology development in reconstruction

In May 1990, the Alto Mayo district in north-east Peru was hit by an earthquake, and over 3,000 houses were destroyed. Most damage was done to homes built with rammed earth that were poorly built or maintained.

On top of the relief efforts, community groups, local government and NGOs spent two months drawing up a long-term reconstruction plan for the region which covered economic and environmental aspects as well as disaster mitigation. As part of the plan, meetings were held between national and local organisations, and with communities, to identify and select a construction technology that was more earthquake-resistant.

Building a consensus over this took six months. The technology selected was a modified form of a traditional style based on light timber frames, with wall panels of bamboo plastered with mud, on concrete foundations.

In April 1991, when a second earthquake struck the area, only 70 of the new houses had been built. However, all stood up well to the shock, whereas 10,000 other houses were damaged. With this demonstration of its resilience the technology began to take off quickly. About a year later, it was estimated that as many as 2,000 houses had been built in this way, together with 13 community centres, classrooms and schools.

T. Schilderman, 'Disasters and Development: A Case Study from Peru', *Journal of International Development*, vol. 5, no. 4, 1993, pp. 415–23.

A study of the Guatemalan village of Santa Maria Cauque, which was devastated by an earthquake in February 1976, found that traditional timber-framed housing with cornstalk walls and mud-covered slats on the roofs had been progressively displaced by adobe housing modelled on Spanish homes in Guatemala City. Adobe is not well suited to earthquakes, but to the Indians of the highlands an adobe home represented status associated with Spanish culture, and by 1971 85% of the houses in the community of over 1,500 people were built of it. In the 1976 earthquake, all the community's buildings were destroyed except for four made of reinforced concrete. All of the 78 deaths and the serious injuries occurred in adobe homes,

where the heavy blocks used in the walls collapsed. The cornstalk and timber houses also collapsed, but there were no serious injuries: the lightweight walls fell down, but the roof and frame remained intact or only partially collapsed. Two weeks after the earthquake, a survey of the community revealed that only 1% of those surveyed wanted to live in an adobe structure.[10]

Sometimes, the problem can be overcome by creating an impression of modernity, like a reconstruction project in Peru promoting seismically resistant housing, based on a traditional building style of timber frames with mud-and-cane walls, which put cement render on the walls to enhance the houses' appearance and acceptability as well as giving protection against water.[11]

10.2.5 Ownership and control

Owing to their scale, cost and complexity, structural interventions are usually seen as the government's responsibility. In many societies, this means that vulnerable communities have little say when it comes to planning and implementing such projects. Where other actors such as NGOs do become involved, this is often in opposition to large-scale schemes on the grounds that they are ineffective or have adverse social and environmental consequences.

One of the most famous examples of this was the movement that grew up in opposition to the Flood Action Plan proposed for Bangladesh by international donors after severe flooding in 1988. The Plan was a massive collection of programmes to control the country's rivers through dykes, dams and embankments. Many people in Bangladesh and elsewhere believed that such measures were incapable of taming the natural forces involved – some of the world's greatest rivers – and were even likely to increase flood risk in many places. There was also great concern that the scheme's disruption of drainage, water flows and pathways for migrating fish would harm the many poor people who catch fish in floodplains during the monsoon.[12] After years of agitation, most of the plan was abandoned.

10.2.6 Participation

Even supposedly appropriate technologies may have little impact if local people have not been involved in choosing and developing them. The essentially participatory principle of *technology choice* should underpin any efforts to reduce vulnerability through technical measures.

This happens rarely. More usually, technical specialists from outside are deployed to identify problems, develop and test new or improved technologies and promote their use among communities – conventionally through training and public education programmes. Even though these technologies may be relatively cheap, use local materials and be suited to use by local people, they are still generated externally; they are not the result of a participatory process; the people do not 'own' them; they may not be what people want or need; and uptake may be limited.

This problem can be overcome by adopting the approach known as participatory technology development (PTD). PTD gives potential users the decisive role in selecting and developing alternatives.[13] Over the past ten years or so, PTD has been applied in a number of development contexts and also some hazard contexts, particularly food security. It can also be applied effectively to other disasters (e.g. Case Study 10.4).

One of the main characteristics of PTD is that it takes time, as the approach must be inclusive and allow for extensive discussion and testing of different technical options. Gaining the confidence of communities can be time-consuming and difficult. Where the working environment is tough, or there are problems with technical innovations, it may take several years before a project begins to make much impact. Even a project that runs relatively smoothly may take some years to reach a wide number of beneficiaries.

Disaster managers are often under pressure from funding agencies to produce quick results that can be measured easily, in numbers (e.g. the number of earthquake-resistant houses or rainwater harvesting structures built), and they are therefore drawn towards non-participatory approaches. PTD success stories should be used to inform and influence agencies and their donors. However, more case studies and critical appraisals of PTD work are needed to build up a fuller picture of its strengths and weaknesses in reducing risk.

10.2.7 Public facilities: infrastructure and lifelines

Because of the scale and cost involved, the protection of public infrastructure and lifeline facilities (hospitals, power and water supplies) is mostly a matter for national governments and international aid agencies rather than NGOs and local organisations. The Pan-American Health Organization (PAHO), for instance, has a long-running programme to make hospitals in Latin America and the Caribbean more secure. Governments also have an important role in setting design standards, building codes and performance specifications for buildings and engineered constructions – which must be enforced.

However, there are many ways in which local-level projects can protect local infrastructure. One of the most obvious is the protection of local water supplies – wells, irrigation channels and water pipes – which in rural areas at least are usually managed by community organisations.

Schools and other community buildings certainly need protecting. There may be high numbers of casualties if they fail, and they can be used as evacuation or relief shelters in times of disaster. Programmes to strengthen school buildings to withstand hazards have been undertaken in many parts of the world. This approach helps children in two ways. First, it gives them, and sometimes their families, a place of safety during a disaster. Second, it ensures that educational facilities are left intact and schooling can resume more rapidly once the emergency is over. The experience of the Orissa cyclone of October 1999 demonstrates the need for such measures. Estimates for the number of schools damaged or destroyed ranged between 11,000 and 27,000.[14]

Time and skills are needed to carry out vulnerability assessments of buildings, though methods for rapid visual screening do exist. However, the main obstacle for local organisations is the high cost of retrofitting what are often large buildings. The Quito School Earthquake Safety Project in Ecuador, which surveyed 60 schools and drew up plans to retrofit the 15 at greatest risk, using local materials and construction techniques, found that the cost per school ranged between $7,000 and $244,000.[15]

Such expenditure is often well beyond the resources of local governments and NGOs. Funding by national governments or international agencies is needed. International agencies can play a valuable role here. The Organization of American States (OAS) has been working on school strengthening in Latin America and the Caribbean, where one million classrooms are estimated to be vulnerable to natural hazards, promoting collaboration between governments, NGOs, community groups and the private sector. The outcomes of the programme's initial efforts in the Caribbean include national plans for reducing schools buildings' vulnerability, surveys of schools to produce vulnerability profiles, and development of building maintenance plans.[16]

It is commonly assumed that measures to protect transport infrastructure are also purely large-scale, to be taken on by government. This is true for the main lines of transportation, but in rural areas most journeys are off-road on tracks and paths which are important in maintaining livelihoods. Women in particular spend many hours daily fetching and carrying fuel and water. Small hazard events can have a disastrous impact on rural tracks and bridges. The importance

of local-level transport infrastructure in disaster mitigation is largely overlooked. Villages may be several hours' or even days' walk from the nearest road, which is a major obstacle to disaster response as well as economic development.

Such local-level infrastructure can be improved and protected by local institutions including communities, although external agencies sometimes need to provide funds, materials and machinery. For example, relatively simple techniques to protect hill and mountain paths can make these quite resilient to severe hazard impact (see Case Study 10.5). In urban areas, it is common to see raised footpaths that ensure that people can move around during the rainy season.

10.2.8 Scaling up

Another common criticism is that the small-scale character of appropriate technologies limits their outreach and effectiveness. In long-term development work, this argument can be countered with examples of technologies that have been replicated or adopted by governments and other major institutions, thereby achieving extensive outreach and impact; but of course it does not follow that appropriate technologies as characterised above are suitable for all situations.

A similar argument can be made regarding disasters. Small-scale technical interventions cannot address some kinds of hazard threat, for instance volcanic lahars. These bodies of volcanic ash and mud can be massive, laying waste to just about anything in their path. Low-cost technologies are not necessarily most suited to disaster work: remote sensing by satellites and high-tech communications systems are essential for effective forecasting and warning of hurricanes.

Yet community-managed technologies and techniques can be highly effective against a range of hazards, on their own and in conjunction with others, and they do not have to be small in scale (see Case Study 10.7). In addition, being well adapted to community resources and capacities, appropriate technologies are highly replicable and can spread over a very wide area (see Case Study 10.6).

10.2.9 Technology and livelihoods

The chances of short-term success and long-term sustainability are greatly enhanced if technical innovations can directly improve poor people's livelihoods, as this provides a strong incentive for communities to run and maintain them properly. This link is commonly seen in technical measures for

Case Study 10.5
Protecting hillside paths in Tanzania

FARM Africa began an agricultural development project in Babati District in Tanzania in 1992. After the project had been running for some time, communities approached the NGO for assistance in conserving sections of the Rift Valley escarpment, which passes through the project area.

Many years of overgrazing and deforestation had led to erosion, damaging the footpaths that linked the scattered villages at the top of the escarpment to the main trading centres at its base and to the local hospital and church. As a result, the footpaths were unsafe, especially in the rainy season.

FARM Africa sought technical assistance from the National Trust, a conservation NGO in the UK. A consultant was provided, but planning decisions were made by village committees, who allocated community workdays to rehabilitating paths. Stone was the main material used. It is freely and easily available, and durable, with no maintenance costs. Three methods were used:

1. Stone-lined drains, which outlast earth drains and provide a permanent hard surface.
2. Stone paths, created by burying stone to make a hard surface (with steps where needed to ease gradients).
3. Revetment walls to protect the bottoms of gullies from further erosion.

Between June 1996 and December 1997, more than 300 villagers were trained on the job and soon acquired the necessary skills so that they could continue after the consultant left. Four paths totalling 4.5km in length were repaired during the training process, including the busiest local path, used for trade and to take patients to hospital.

Surveys among villagers showed that journey times improved and paths were felt to be safer. Residents of one village at the base of the escarpment stated that the risk of flooding had diminished substantially. Subsequently, the area was affected by torrential rains caused by El Niño. Many bridges were destroyed and there were several major landslides, but the restored footpaths were virtually unaffected.

A. Carling, *Healing the Rift: Footpath Repair Work on the Dareda Section of the Rift Valley Escarpment for FARM Africa – Babati Agricultural Development Project, March 1996–December 1997* (Ambleside: Mountain Path Repair International, 1999), http://freespace.virgin.net/andy.carling/tanzfull.html.

Case Study 10.6
Lines of stone

Most of the inhabitants of Yatenga Province, in the north of Burkina Faso, live from farming, mainly by growing millet and sorghum on small plots. However, the province experiences frequent droughts and has suffered serious environmental degradation over many decades. External agencies' attempts to control water run-off and soil erosion date back to the 1960s and 1970s, but these early efforts were unsuccessful.

In 1979, Oxfam began a pilot project to encourage the construction of simple bunds (*diguettes*) along contour lines. Local farmers found that these stone walls-cum-embankments were effective in trapping water and preventing soil erosion. Sorghum planted along the *diguettes* grew better than sorghum planted further away.

To be effective, bunds have to follow contour lines precisely. In a community-based activity, sophisticated surveying equipment was out of the question. The project therefore copied a very simple technological device, developed in Senegal: a ten-metre transparent water tube, attached at each end to a wooden pole. By matching the water levels in the tube to measuring marks on the poles, held upright, contours could be identified accurately. The water tube technology was cheap and learning to use it was easy. It enabled local farmers to take control of planning and siting the *diguettes*.

After a three-year pilot phase, the project attempted more widespread replication. By 1984, about 500 farmers in over 100 villages had been trained to use the water tube and build *diguettes* – mostly with rocks, sometimes using brushwood or live vegetation. Poor farmers were keenest to take part and more willing than the richer farmers to work collectively.

In the following year, the project, renamed the Projet Agro-Forestier (PAF), was handed over to local staff. It began a more broad-based programme of agricultural support to complement the *diguette*-building. This included encouraging production of compost, establishing tree nurseries, rearing livestock, the introduction of a revolving loan scheme for grain, and other training and research activities. By 1992, PAF was working in ten districts, had trained 5,000 farmers and was reaching 160,000 people indirectly through the village groups that it supported.

(continued)

Case Study 10.6 *(continued)*

Most households in the villages covered by PAF built *diguettes* in some of their fields. Evaluations showed that construction of *diguettes* improved crop yields by 10–90% depending on location and other factors, with increases of around 40% being relatively common. A wider variety of crops was also being grown.

The project's expansion was not without problems. *Diguette*-building is labour-intensive and requires tools such as wheelbarrows and pickaxes. Farmers regarded transporting stones as the largest problem. Increased *diguette* construction used up locally available rocks, forcing farmers to travel longer distances to find them, and there were sometimes conflicts between villages over rocks. Regular maintenance was needed, especially in the wet season.

N. Atampugre, *Behind the Lines of Stone: The Social Impact of a Soil and Water Conservation Project in the Sahel* (Oxford: Oxfam, 1993).

mitigating drought, such as soil and water conservation, multi-cropping and growing indigenous drought-resistant crops. All of these are clearly linked to improving food security, and hence livelihoods.

Case Study 10.7 gives an example of an integrated technology–livelihoods approach in the context of rapid-onset disasters. Another example is the work of a Bangladeshi NGO, the Jamuna Char Integrated Development Project (JCDP), which supports communities living on the *chars* (islands) in the Jamuna River. One of JCDP's main risk reduction activities has been to give financial and technical support to farmers to plant a particular kind of reed. The reeds, which can grow as high as 20 feet, are an indigenous species well suited to the sandy soils of the *chars*. They are useful in hazard mitigation because they collect sediment swept down by the river, thereby adding to the land and helping to protect riverbanks. They support livelihoods because the stems can be used for fuel, roofing and in making fences, while the leaves can be eaten by domestic animals. Land planted with them becomes fit for cultivation by some other crops within 2–3 years. Reeds grown on the *chars* are also sold to buyers from other parts of the country.[17]

Case Study 10.7
Supporting livelihoods while reducing disaster risk

Since 1994, the Vietnam Red Cross has planted and protected nearly 12,000 hectares of mangroves in the north of the country. These submerged coastal forests are effective buffers against the winds and sea surges generated by typhoons (cyclones) and storms. They now protect 110km of the 3,000km sea dyke system that runs along the coastline.

Planning and protecting the mangroves has cost $1.1m, but has helped reduce the cost of dyke maintenance by $7.3m per year. When Typhoon Wukong struck in October 2000, there was no damage to the dykes behind the mangrove forests, whereas in the past waves would often breach coastal dykes and flood poor families' land.

The Vietnam Red Cross also estimates that the livelihoods of 7,750 families have benefited from the project. Poor households are chosen to plant and protect the mangroves, each being allocated 1–5 hectares to manage. The mangroves grow to 1.5 metres in height within three years. Once the forests are established, the families involved earn money by selling the crabs, shrimps and molluscs that live there.

IFRC, *World Disasters Report 2002,* p. 95; I. Wilderspin, Presentation to Netherlands Red Cross International Conference on Climate Change and Disaster Preparedness, The Hague, June 2002.

10.2.10 Technology and socio-economic change

Technology is not static. It is constantly changing, adjusting to new ideas and skills, and to socio-economic pressures. These forces often bring about improvements, but the results of change are not always positive.

Housing provides many instances of this. Traditional wooden housebuilding styles in the Indian Himalayas are often more resilient to earthquakes than more modern designs or modifications. Builders may be less familiar with the modern forms of construction, and the reduced use of wood in building may also be due to increasing demands for it for other purposes.[18] In general, modern building methods are only as good as the builders who use them. Where builders are not adequately trained in the use of such methods, or

construct awkward hybrid buildings using a mix of traditional and modern techniques, there is a strong likelihood of those buildings failing if struck by hazards such as earthquakes or cyclones.

Advanced technology can be undermined by social, economic and political pressures. Modern apartment blocks were prominent among the buildings that collapsed during the Turkish earthquakes in 1999 and the Gujarat earthquake in 2001. Construction methods and building standards should have been sufficient to ensure that they did not fail, but standards and regulations were not enforced. Where demographic and economic pressures are intense, and government mechanisms weak, as in these cases, regulatory systems may prove inadequate.

10.3 Chapter summary

- Project planners and managers need to make informed choices about the most appropriate technologies for risk reduction in particular contexts.
- So-called 'appropriate' or 'alternative' technologies are well-suited to local-level application and community management.
- Such technologies can use a range of materials that are easily obtained locally (such as stone, wood, earth), recycled materials and living trees and plants.
- Traditional technologies are often well-adapted to prevailing hazards.
- Even relatively simple and inexpensive technological innovations may be beyond the reach of many poor households, so thought must be given to financing mechanisms.
- Supposedly appropriate technologies may have little impact if local people are not involved in choosing and developing them.
- Protection of public infrastructure and lifeline facilities should usually be left to governments and international agencies, but there are many ways that local-level projects can protect local infrastructure.
- Small-scale technological interventions can have a significant impact through wider replication and other forms of scaling up.
- Chances of success and sustainability are greatly improved if technological interventions for risk reduction can also directly improve poor people's livelihoods.

Notes

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15 'Summary of "Investing in Quito's Future: The Quito, Ecuador, School Earthquake Safety Project"', *Earthquake Hazard Centre Newsletter*, 1(3), 1998, pp. 5–6, www.ehc.arch.vuw.ac.nz/newsletters/jan98/page5.htm.
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Chapter 11
Education, information, communications

11.1 Introduction

The communication of information to the public is central to risk management. Vulnerable people need to know about the hazards and risks they face, and the measures they can take to mitigate and prepare for potential disasters. Without such knowledge, they cannot easily mobilise to protect themselves. Development and disaster professionals also need to know about the views and priorities of the vulnerable groups they are trying to help.

Many disaster reduction programmes include public education and information for this reason, but a high level of expertise is needed to make such communications effective in changing attitudes and practice. Few disaster managers possess this kind of expertise. Often, information and educational activities are added onto projects rather than being integral parts of them, the methods chosen for communicating are inappropriate, and the communities at risk have no opportunity to present their views. It is likely that many such initiatives have little impact on the public.

There is now a growing body of experience and research around the practice and impact of communications, particularly in development and health education but also in disaster reduction. Drawing on this knowledge, this chapter covers four aspects of communication to the public and other professionals:

1. Principles of good communication.
2. Basic approaches and methods used in public education and awareness-raising (most of the chapter is on this subject).
3. Professional training and education.
4. Using the internet in disaster reduction.

Forecasting and early-warning systems are covered in Chapter 16.

11.2 Principles of good communication

Disaster managers can learn a lot from the experience of agencies working in sustainable development. For many years, development professionals assumed that they could stimulate social and economic progress simply by

distributing information among poor communities. If new ideas and technologies were not taken up by the communities – which often happened – this was because they did not understand them properly, and so the challenge was to find better ways of presenting the information to them.

Although there were debates about the most effective techniques for delivering information, the basic approach was not seriously challenged until the 1980s, when it became increasingly evident that one of the main reasons for projects failing was that the development specialists had themselves failed to understand the communities they were trying to help: their needs, priorities and indigenous knowledge and capacity. The information and ideas that they were promoting were, therefore, often inappropriate.

More recently, there has been a growing emphasis in development circles on dialogue with communities. Development workers now accept that they have to listen to the people, and that problems and solutions must be identified collectively. The emphasis has therefore shifted from one-way *information dissemination* by specialists to genuine *communications* – i.e. dialogue and exchange of information – between specialists and communities. Participatory methods have played a central role in this shift of approach. This way of communicating is not universal, but it is becoming increasingly widespread.

Disaster reduction programmes are still some way behind, and the dialogue approach remains rare. Most disaster managers work from the assumption that people do not fully understand the risks they face, nor how to deal with them. Therefore, the argument runs, they must be better educated about risk, and where existing messages are not understood these need to be repackaged so that they are easier to understand. This approach sees risk education purely as a kind of public relations or communications exercise, where messages are transmitted from small groups of experts to the uninformed masses.

Certainly, there is a need to educate communities about risk and risk management. However, this is insufficient by itself because the communications process is not informed by communities' experiences and perceptions of risk, or the impact of their socio-economic circumstances on the way they see and manage risks. The need for project mangers to understand these experiences and perceptions has already been discussed (in Chapter 9); similarly, Chapters 4 and 8 showed how important it is to involve communities in the entire process if projects are to be relevant and sustainable. However, many disaster management professionals persist in the belief that they alone understand and assess risk objectively (i.e. scientifically), whereas disaster victims' understanding is merely subjective or even irrational.[1]

The dialogue approach to communication is not easy. It involves 'cross-cultural' communication between outsiders (disaster professionals) and people at the grass roots. However, guidance on the methods and principles is available.[2]

There are many difficulties and potential pitfalls here. One is that outsiders and local communities express themselves in very different ways. For local people, visualisation and talk are often most important for analysing and transmitting knowledge; for outsiders, especially educated and professional people, the written word is dominant. For outsiders, precise and quantifiable calculation confers weight and authority on information; for local people, comparison is often more important than measurement, especially for practical purposes.

Professionals also like to arrange their information into definable categories, where it can be subjected to recognised methods of quantification and analysis. It can be hard for them to understand the complex, diverse and dynamic realities of community life. Yet dialogue is necessarily a messy business. It involves discussion, debate and sometimes argument between many different stakeholders. Consensus cannot be guaranteed. Dialogue is also time-consuming – and therefore resource-consuming.

Even where there is dialogue, outsiders find it difficult to understand the community's environment, needs and points of view. Some of this can be blamed on the attitudes and approaches of the outsiders themselves, which are the product of their education, institutional culture and so on. The process of dialogue requires some humility on the part of outsiders, who have to recognise their ignorance of other people and accept that they can never fully understand the vulnerable person's point of view. Vulnerable people can explain their perspectives clearly to outsiders if given an opportunity to do so.

11.3 Raising public awareness about risk and risk reduction

11.3.1 Aims and approach

The importance of public education is obvious. Indigenous knowledge and risk management strategies are valuable and must be factored into programmes, but this does not mean that the extensive scientific, technical and managerial expertise of disaster professionals should be devalued. There will be many instances where the community does not recognise or fully understand local hazards and risks, and does not know about the full range of measures that it can take to protect itself.

Box 11.1

Principal tasks of risk communication

- Identifying aspects of risk.
- Presenting and explaining risk information to relevant target groups.
- Modifying the risk-related behaviour of people exposed to risks.
- Warning individuals and communities.
- Developing disaster management strategies for the authorities.
- Stimulating community participation in disaster mitigation.
- Facilitating discussion between specialists and communities, and joint problem-solving.

Adapted from B. Rohrmann, 'Effective Risk Communication for Fire Preparedness: A Conceptual Framework', *Australian Journal of Emergency Management*, vol. 10, no. 3, 1995, pp. 42–46.

The aim of public education programmes should be to create what is often called a 'culture of safety', where awareness of risk and adoption of risk-reducing measures are part of daily life. It is relatively easy to improve understanding of hazards and risks and how to deal with them, but harder to change people's behaviour so that they take up appropriate measures, individually or collectively.

Obviously, achieving this 'culture of safety' is a long-term process. It cannot be achieved through a one-off intervention. A programme of activities is needed to reach different target groups, explain and reinforce messages (repetition of messages is an important element in successful public education campaigns), and give people opportunities to think about, question and validate the information they receive. It may be a long time – perhaps years – before behaviour change takes place.

Another point to remember is that people must be *encouraged* to act, not simply *told* to do so. As a team of American researchers studying public education programmes on earthquakes noted:

> *Public educators have learned through trial and error that people are generally not motivated by sermons on why they ought to do something. Neither moral exhortations nor discourses on ethical or legal imperatives*

> *produce the desired behaviour change in the average citizen or organization. People are more apt to follow our agenda if they work out a solution themselves, with helpful information from specialists. Not surprisingly, most people are motivated to change their behavior when they think it's their own idea.*[3]

Nevertheless, it is also well-established that people only respond to awareness-raising initiatives by specialists to the extent that they believe the information supplied and those who provide it.

All disaster reduction programmes should include communications and awareness-raising as a central, ongoing element, and should have a clear strategy for doing this. In practice, relatively little time and effort is invested in this area. It is usually no more than a component added to the end of individual projects, undertaken by people without specialist training or skills. Public education therefore becomes fragmented into separate, one-off, short-term interventions, whose impact is rarely assessed.

Box 11.2 sets out 11 steps that ideally should be undertaken in developing and implementing a communications strategy. Note that most of the steps are planning and testing – implementation does not begin until step 10. Pre-testing of methods and materials is essential to ensure their appropriateness and effectiveness.

Box 11.2

Eleven steps in a communications strategy

1. Define the overall project purpose.
2. Define the aims of the project's communications strategy.
3. Identify and prioritise audiences and participants.
4. Determine information needs.
5. Identify barriers and opportunities.
6. Identify communication channels and messages.
7. Plan coordinated timing of activities.
8. Formulate communications material.
9. Participatory pre-testing.
10. Implementation.
11. Evaluation.

A. Burke, *Communications & Development: A Practical Guide* (London: DFID, 1999), p. 25.

11.3.2 Methods

The individual methods that can be used to raise awareness about risk reduction are diverse.[4] They include:

- Production and distribution of public information leaflets and posters. This is still the commonest method because it is relatively cheap and easy to manage, and in theory reaches large numbers of people. However, it is likely that the impact of many activities of this kind is severely weakened because of inappropriate images (see Section 11.3.5 below) or poor presentation.
- Public exhibitions about risks, protective measures and new preparedness and mitigation initiatives.
- Hazard and risk maps. If presented in a clear, colourful format, these are a good way of explaining threats to communities and stimulating action.
- Demonstrations. Many projects promoting alternative ways of building to withstand hazards erect model houses or community buildings, both to raise awareness and provide an informal forum for discussion with community members. Model houses are sometimes put on shaking tables in public displays to show how they stand up to earth tremors. Demonstrations are also often used in food security work.
- Use of print and broadcast media to promote safety messages and share information about new initiatives. These reach large audiences and can be cost-effective if used well and targeted carefully. Mass media communication is most likely to be successful if linked to other actions on the ground and if the audiences can get involved (e.g. through community radio stations, audience feedback or competitions). In risk communication initiatives it is principally the news media that are involved. As discussed in Chapter 12, these can be an unreliable ally because of their stereotyped views of disasters, covering them only when they happen and as tragedies. However, there are examples of the media supporting mitigation programmes before and after crises (see Case Study 11.1).
- Disaster professionals have not made much use of the entertainment media, although several agencies have collaborated to produce a radio soap opera called *Tiempos de Huracanes* (Hurricane Season) that provides practical information to rural communities in Central America. Twenty episodes are broadcast annually, before and during the rainy and hurricane season.[5] The effectiveness of radio and TV soap operas in promoting other kinds of development message, for example HIV/AIDS education in Africa,[6] should encourage more involvement of this kind.
- Participatory vulnerability analysis and community action planning events

Case Study 11.1
Using radio in drought mitigation

Radio can be a cheap and effective tool in the fight against desertification and drought. In the mid-1990s a team from the Cranfield Disaster Preparedness Centre in the UK worked with three radio stations and local broadcasters in Mali, Burkina Faso and Eritrea on a pilot project to find out how the medium could be used most effectively.

Over a period of 18 months, the project partners researched, recorded and broadcast three radio campaigns on aspects of reforestation. The programmes combined education with entertainment, promoting simple and affordable advice in appropriate formats and local languages. A needs assessment was carried out first to identify the themes of most relevance to listeners, as well as their perceptions of the issues. Scheduling of the broadcasts was designed to achieve maximum impact. Local broadcasters were trained during the programme-making process.

The campaigns' impact was then evaluated through a series of small-scale surveys at village level. The results varied in each country, but the surveys showed that carefully targeted, well-made radio programmes could produce changes in attitude and behaviour.

For example, in Mali, after programmes had recommended marking and conserving naturally occurring trees, it was found that the number of farmers in the sample group marking their trees increased from 6% to 43%. Knowledge of the correct distance to plant trees apart from each other rose from 25% before the broadcasts to 80% afterwards. These findings were confirmed by the observations of local foresters and extension workers, who noticed an increase in the number of farmers practising conservation measures. Comparisons between villages inside and outside the radio signal area confirmed that the changes were mainly due to the broadcasts.

M. Myers, G. M. Adam and L. Lalanne, *The Effective Use of Radio for Mitigation of Drought in the Sahel: Final Project Report and Recommendations Plus Guidelines for Broadcasters* (Shrivenham: Cranfield University Disaster Preparedness Centre, 1995).

Figure 11.1
Public information poster

Oxfam/IDEA/Sylhet Disaster Forum

Panel from a poster showing how to respond to river flood warnings in Bangladesh

to develop common understanding and mobilise interest and action at the grass roots.

- Community training in technical skills (such as improved construction methods, soil and water conservation, or putting up flood protection structures) and disaster preparedness and response (for example, evacuation drills).

- Conferences, workshops, roundtables and training courses (usually for professionals) to debate issues, introduce new ideas and experiences and determine policies.
- Emergency services' open days make communities familiar with emergency management systems and personnel, and are an opportunity to introduce risk and safety issues.
- Art and photography competitions on relevant themes are popular, especially with children. They often culminate in public exhibitions and can generate publicity.
- Marking the anniversaries of major disasters through ceremonies and publicity in the media, as a way of reminding people of the hazards in their environment and the damage they can cause. Anniversaries can be potent reminders, as well as having psychological value as rituals of grieving and healing.[7]
- Holding annual events to highlight disaster issues. The UN has designated the second Wednesday in October each year as the international day for natural disaster reduction. Agencies in many countries plan events for this day, which is a good opportunity for them to work together to spread public messages. Other countries may have their own special days annually; Fiji has a national disaster awareness week.
- Simple visual devices in public places give permanent reminders of hazards and disasters and are inexpensive. Warning signs can be put up or painted onto walls. Flood high-water levels are often marked on bridges, telegraph posts or buildings. For instance, in the author's secondary school in the UK, which was in a flood plain, the water mark left by a severe flood many years before had been preserved on the wall of one classroom.
- Exchange visits are often used in agriculture and food security programmes. They enable farmers to see alternative farming techniques and methods of drought mitigation (such as soil and water conservation, inter-cropping and the use of drought-resistant seed varieties) and discuss their strengths and weaknesses with those who are using them (see Case Study 11.2).
- Folk media such as plays, songs, story-telling, dance and festivals are widely used in development programmes, notably in health education. Because they are based on indigenous communications practice and traditions, and use local languages, they are regarded as particularly effective in raising awareness. However, little is known about their use and impact in risk/disaster work.
- Community mobilisers and educators are important channels of communication in development projects. Some are project workers, others are community leaders and local people engaged in projects as volunteers. Projects should be aware of how information is normally shared within

Case Study 11.2
Promoting drought mitigation through exchange visits

ITDG's Chivi Food Security Project in Zimbabwe (described more fully in Case Study 15.2, page 260) made considerable use of exposure and exchange visits to acquire and share knowledge about appropriate farming techniques and practices.

Initially, community representatives were taken to see government agricultural research stations, other NGO projects and innovative farmers in other areas. Representatives were chosen from members of farming clubs and gardening groups. Careful selection ensured that there was a fair gender balance, that leaders and ordinary members were included and that literate and illiterate people took part. The clubs and groups had to agree on who should go on a particular visit. Nobody was allowed to visit twice.

By being shown a wide variety of alternative methods in operation and talking to their users, the community members were able to make informed choices about those that would work best in their own drought-prone district. Subsequently, the project brought farmers and gardeners from other areas to see the methods that the community had adopted as a result of the visits.

The community also instituted 'field days', at which there were competitions to see which plots were using the new methods and technologies most effectively. Farmers from surrounding areas came to watch and talk.

K. Murwira, H. Wedgwood, C. Watson, E. J. Win and C. Tawney, *Beating Hunger: The Chivi Experience. A Community-based Approach to Food Security in Zimbabwe* (London: I. T. Publications, 2000), pp. 61–70.

and between communities. A great deal of information exchange takes place informally, within families, at village meetings, while collecting water at the well, at markets. It is oral, not written. It reaches people who are often not reached by newspapers, radio or government extension workers.[8]

- The internet, which is becoming rapidly more important, is discussed separately below.

11.3.3 Choice of methods

In taking a strategic approach to creating a culture of safety, risk reduction initiatives need to use a mixture of methods according to circumstances. The mix is likely to change over time as some methods are found to be more effective than others, or their effectiveness is diluted as they become familiar to the public.

There is no perfect medium or method for communicating, but in any situation the best will be those that are appropriate to the people who are involved. People the world over have their own preferred ways of receiving and sending information. Communities are not homogeneous, and methods that work well for one group may be inappropriate for others. Communications with poor and marginalised groups can be particularly challenging because they have limited access to standard media and information sources on account of illiteracy, language barriers, physical remoteness and poor transport, social isolation, and lack of televisions and radios. Projects should identify these differences within society and try to use the methods that are most suitable for reaching particular groups.

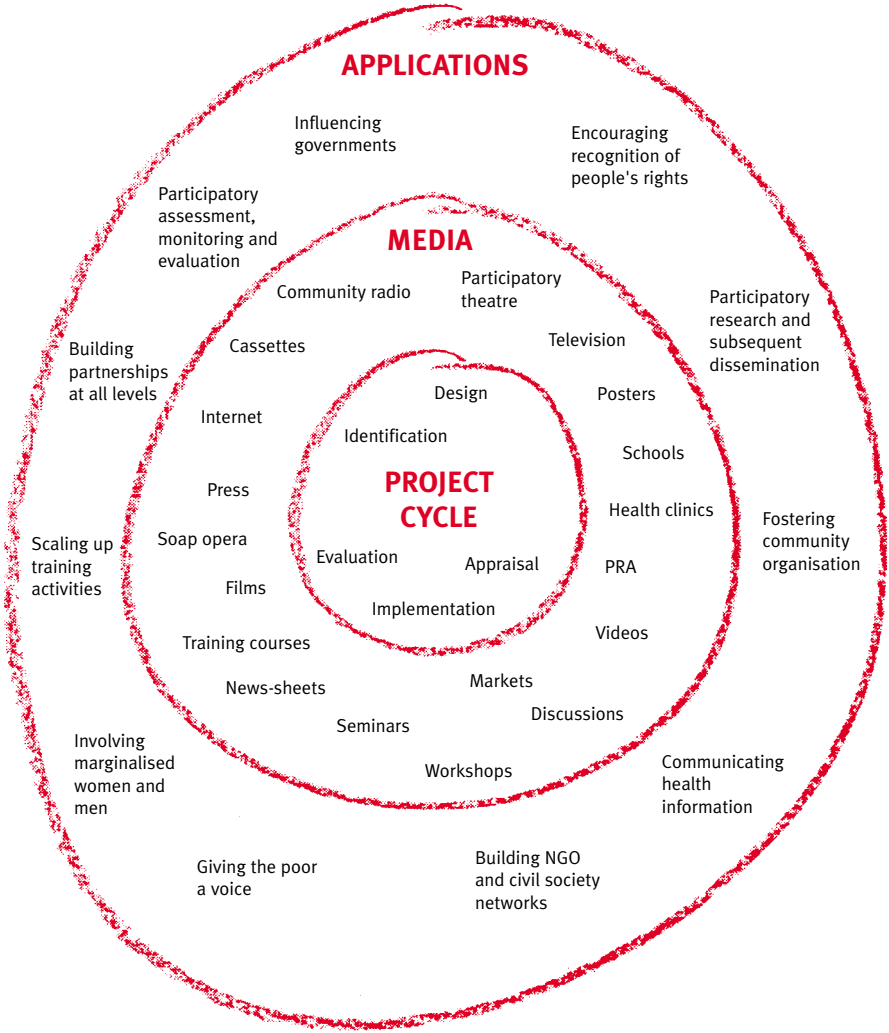
Project workers should be imaginative in their use of communication methods and look beyond the usual channels. An NGO in Peru seeking to raise awareness of its project promoting alternative technologies for self-built earthquake-resistant housing targeted local taxi drivers when it discovered that they played an important role in spreading information.[9]

Many risk communication initiatives are based on 'active' information – i.e. exhortations to people to do something. But it may be just as important to use 'passive' information: making sure that when people do want more information or have questions, the material or answers they need can be obtained easily. A combination of active and passive information is often useful.[10]

Personal experience of a recent disaster is a powerful force in inspiring people to take protective actions. In the Indian state of Orissa, purchases of radio sets by villagers in coastal districts have increased considerably since the October 1999 cyclone. The sets enable people to listen to weather forecasts and storm and flood warnings.[11] This 'window of opportunity' for public education and mobilisation may not remain open for long, as the anxiety about disasters is supplanted by everyday concerns and complacency sets in.

There are obstacles to maintaining public information facilities such as documentation centres and networks for distributing materials. The main one is

Figure 11.2
Communications and the project cycle



Burke, *Communications & Development*, p. 24.

the difficulty of securing ongoing funding. Another problem is that growing demand for information as a result of successful dissemination increases workloads and may require extra capacity. Charging users for materials and services rarely produces enough income to cover costs, and excludes the poor.

Finally, it is always advisable to get help from communications specialists when planning and implementing initiatives.

11.3.4 Controlling information

Many experts emphasise the importance of a single source of information on risk and disasters in order to ensure that messages are reliable and consistent. This is a particular concern with forecasts and warnings of imminent events, where mixed and inaccurate messages can cause chaos and inappropriate responses and, ultimately, magnify the impact of the disaster. But in an age where people have access to more and more sources of information – in the media and on the internet – such controlling and centralising of information supply is no longer feasible, except perhaps under a few authoritarian regimes, where in any case the public may not trust 'official' sources.

Disaster managers will have to work with communities that are increasingly able to choose and question the information they receive. They will have to acquire extensive skills in media management. They will also have to move away from the old supply-side approach to communications, where experts at the top or centre issue information outwards and downwards to target groups. Instead, they will have to adopt a more demand-led approach that sees communities at risk as *consumers* of information from different sources, exercising a right to choose what information to use and where to obtain it.

This will make their task more difficult, without doubt. On the other hand, there is some evidence to suggest that people are able to use multiple sources of information effectively to reduce the impact of potential disasters (see Case Study 11.3).

11.3.5 Images

Visual images have a powerful impact. People are moved by visual messages more than verbal ones, and tend to remember them better. This is obviously likely to be the case in societies with low literacy levels, but it is also true in well-educated communities.

Case Study 11.3
Information and disaster preparedness

A real-time study carried out for the NGO SOS Sahel looked at the dissemination of information on the 1997–98 El Niño event and its likely impact on drought in Sub-Saharan Africa.

Although the researchers looked principally at responses by governments and international agencies, they also found that in some African countries farmers were:

- acquiring information independently from a variety of sources including the internet and cable television;
- forming their own judgements about the validity of that information;
- on the basis of that judgement, making calculated decisions about what type of seed to plant, and when; and
- acting upon those decisions.

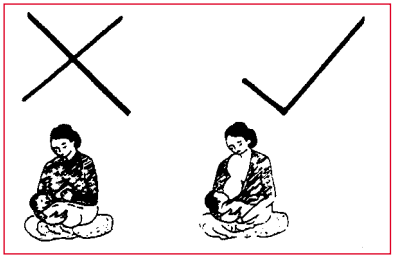
This was despite the fact that it is not easy for the layman to interpret some of the meteorological data on El Niño, and despite African farmers' often sceptical view of the accuracy of weather forecasts.

A. Thomson, P. Jenden and E. Clay, *Information, Risk and Disaster Preparedness: Responses to the 1997 El Niño Event* (London: SOS Sahel, 1998).

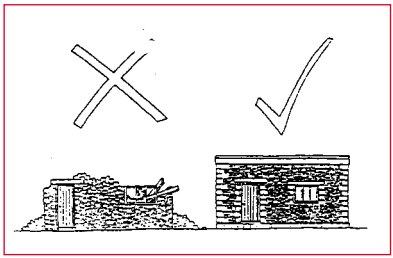
Even top-level decision-makers can be influenced by well-chosen images. Scientists monitoring Mount Pinatubo in the Philippines before its eruption in 1991 used a video with sometimes shocking footage of other eruptions to brief government officials (from the President down to local staff), students, teachers, religious leaders and communities about what was likely to happen. This proved highly effective in overcoming scepticism and persuading people to prepare for the impending event.[12]

However, it is easy to go wrong in producing material based on visual images. Do not assume that images speak for themselves: they must be interpreted. The way in which they are interpreted is strongly conditioned by local cultures and visual traditions. A diagram that is easily understood by a community in one place may not make any sense to another group of people somewhere else (see Figure 11.3).

Figure 11.3
Interpreting images



In a study in Nepal only three per cent interpreted the tick and the cross as indicating good and bad ways to feed a baby.



In this drawing indicating good and bad houses in northern Pakistan, the cross was interpreted as a ceiling fan and the tick as an Urdu 7.

E. Dudley and A. Haaland, *Communicating Building For Safety: Guidelines for Methods of Communicating Technical Information to Local Builders and Householders* (London: I.T. Publications, 1993), p. 43.

Finding the right images, and using them in the right way, requires considerable skill. Trainers and field workers can use images effectively in their work, but they must take time to explain them and answer questions. Their skills as communicators will determine how effective the images will be.

Video is increasingly used, but although videos can now be made quite cheaply and easily a high level of technical and editorial skill is needed to produce good ones.

11.3.6 Evaluation of impact

There is limited evidence for the impact of communications methods on reducing risk. It is difficult to measure impact. Conventional monitoring exercises such as surveys of shifts in attitude and behaviour, and monitoring the performance of practice drills, give some useful insights, but the ultimate test is how people behave when a real disaster threatens or strikes. There is also the problem of attribution: it is hard to tell how much people learned from a specific public information programme, and how much from other sources.

Writing on development communication gives some general recommendations regarding evaluation of communications activities that can be applied to risk communication work:[13]

- Well-established 'audience research' methods can be used to find out how many people received particular information and what impact it had on their thinking and action. These include questionnaires, structured interviews and more qualitative in-depth interviews.
- Valuable information can be collected from informal and relaxed conversation with those receiving messages, or through more participatory initiatives.
- Participatory communications approaches can be applied to evaluation. Folk drama or other community-based methods can be used to give people an opportunity to present their own views on an issue or how well a project is doing. Focus groups are also commonly used. In the broadcast media, listeners' letters and responses to quizzes and competitions provide useful qualitative indicators.
- Rather than carrying out large-scale surveys, it may be easier to work with less direct indicators, relying more on triangulation (cross-checking) of a number of simpler evaluation techniques. This is likely to be cheaper as well as faster, and indicators can be based on verbal or other evidence of change.
- It is often difficult to tell if a communications initiative was genuinely responsible for changes that have taken place. These may be the result of other events, activities and shifts in opinion for different reasons.
- With simple messages, it might be possible to evaluate the extent to which a group of people is aware of a particular message or changes its behaviour. This requires extensive survey work that would need to build on an equally extensive baseline.

It should be noted that the value of impact evaluations is limited if baseline data about attitudes and behaviour have not been collected.

11.3.7 Educating about risk in schools

Many disaster mitigation and preparedness programmes have attempted to introduce disaster issues into schools, in settings ranging from offshore islands in Bangladesh to US high schools. Education on health, safety, hazards and environmental issues is standard in many countries, incorporated to a greater or lesser extent into the formal curriculum with the aim of increasing children's understanding of risk and teaching them how to prepare for hazardous events and react when one occurs (see Case Study 11.4).

Case Study 11.4
Earthquake education in Armenia

Armenia suffered a devastating earthquake in 1988, which killed more than 25,000 people and left half a million homeless. Reviews of the event showed that lack of awareness of basic protection during earthquakes contributed to the high number of casualties.

In 1997, a project was launched by UNICEF, the government's earthquake protection office and an Armenian NGO to train 500 teachers and 10,000 pupils in 56 primary and middle schools in seismic protection skills. A second project, covering 450 pupils from a further 12 schools, began the following year, on the tenth anniversary of the earthquake.

The projects produced educational materials and created interactive games. Children were encouraged to express themselves through drawings. Teachers and parents appear to have found the projects necessary and timely.

A. Mikayelyan, 'Earthquake Mitigation from a Gender Perspective in Armenia', paper delivered at the UN Division for the Advancement of Women/International Strategy for Disaster Reduction Expert Group Meeting on 'Environmental Management and the Mitigation of Natural Disasters: A Gender Perspective', Ankara, Turkey, 6–9 November 2001, www.un.org/womenwatch/daw/csw/env_manage/documents/EP8-2001Oct31a.pdf; A. Mikayelyan, 'Teaching Seismic Protection Skills in Schools', contribution to the ISDR internet conference for the Johannesburg Earth Summit, 2002, http://earthsummit2002.dyndns.org.

Even without formal disaster teaching in the curriculum, individual teachers may choose to introduce particular aspects that are relevant to their community. Schools also arrange educational visits to or by local emergency services. Local NGOs working on disaster reduction could probably be more active in offering to visit schools, talk to pupils and support school preparedness initiatives.

The potential value of the school-based approach is obvious. It can reach large numbers of people who are already gathered to learn and are essentially teachable. Children are believed to be more receptive to new ideas than adults, and it is also believed that they influence their peers and their parents. Nevertheless, projects working with schools should be realistic about what they can expect to achieve. There are potential problems. First, it seems that most school educa-

tional work on disaster reduction focuses on a single issue, such as earthquakes, fire risk or volcanic eruptions. Some educators question if this is the best approach, arguing that disaster preparedness should be presented as a total package equipping children to deal with all emergency situations, which could be carried into a range of core subjects in the curriculum, such as mathematics, science, history, geography and citizenship.[14]

Another issue is how far the formal education system, especially the schools curriculum, can adapt to incorporate different perspectives on disasters. Where the curriculum is relatively rigid, it may be easier to teach about hazards (which fit with standard science or geography teaching) than socio-economic vulnerability or disaster management. A study of teaching about disasters in secondary schools in the UK – admittedly not a very disaster-prone country – found just such a focus on hazards.[15] In some developing countries, where teaching resources and capacity are limited, it is hard to imagine teachers being able to do much to adapt the basic curriculum. In such situations, other agencies such as NGOs or local emergency planners could step in to help.

The outreach of the formal education system may be limited in some developing countries where there is a shortage of schools and trained teachers, attendance rates are low and certain groups such as girls and the children of the poor are likely to drop out at an early age.

Finally, although there is widespread agreement on the value of schools initiatives, there has been hardly any evaluation of their impact. It seems that risk/hazards education through this route does lead to more accurate perceptions of risk and better understanding of protective measures. It can also reduce fear of hazards (children appear to be worried about not knowing how to respond to an event). But it is much harder to evaluate children's subsequent behaviour with regard to risk and its reduction – still less, whether they have influenced the attitudes and behaviour of their families.

Some research suggests that improved awareness of risk and mitigation among school students does not lead to changes in disaster preparedness at home.[16] However, it may be able to change behaviour in some contexts. For example, a project in western Kenya taught primary school children to cultivate traditional vegetable varieties that could provide additional food and nutrition during the hungry period, and there were signs that consumption of these varieties rose in households whose children had been involved in the project.[17]

The lack of evidence makes it difficult for educators and disaster planners seeking to design and implement such programmes to judge which approaches

are most likely to work well in particular circumstances. A few studies and evaluations now beginning should shed more light on this subject

Case Study 11.5 describes an initiative that was able to demonstrate impact in terms of improved response *at school* to earthquake warnings. Disaster preparedness response can be managed relatively efficiently in the controlled school environment, and is very important because of the large numbers of people concentrated there.

11.4 Professional training and education

This aspect of risk reduction has not been studied. It should be, since professional training and education are essential components of capacity-building in organisations.

Case Study 11.5
Educating for earthquake preparedness

After the large earthquakes that struck Mexico City in 1985, scientific agencies and city authorities established an early-warning system capable of giving about one minute's warning of tremors. Linked to this was a school emergency and security programme aimed at improving the response of teachers and students to a variety of hazards.

The schools, which are linked to the early-warning system by special receivers or radios, prepare disaster action plans covering monitoring the state of school buildings, evacuation drills and first aid and rescue. Teachers, parents and students form school security committees and teams responsible for establishing safety zones, training and preventive action.

Emergency drills are carried out at least once a month in more than 6,200 schools in Mexico City, involving over 1.9m students. The speed of practice evacuations varies according to the nature of the buildings, but primary schools average 80 seconds to evacuate and secondary schools range between 45 and 90 seconds.

J. M. Espinosa-Aranda et al., 'The Seismic Alert System in Mexico City and the School Prevention Program', in J. Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 441–46.

There seems to be a high demand for training in the theory and practice of risk reduction among government officials at different levels, and civil society organisations. It is not clear how far this indicates a demand specifically to increase capacity in risk management: it may reflect the generally high level of demand for training in all aspects of sustainable development. Work on NGOs and disaster mitigation indicates that training does influence individuals who take part in courses, but there are still challenges to 'internalising' the training at organisational level, and more attention to long-term follow-up is required. There is a fear in some quarters that NGOs, especially local ones, are placing too much faith in training courses by themselves and not seeing them within the wider context of capacity-building.[18]

The number and range of courses on risk and disaster management also seems to be increasing.[19] There are more MSc courses on offer in universities, and even some undergraduate courses. Hazards, risk or disaster modules are also being added to mainstream courses, although most university courses are still in Europe and North America, and hence focus on disaster management in the North.

Shorter courses are available in a variety of subjects. At one time, most training efforts focused on government staff, with regional and international courses. In the early 1990s, the UNDP and the UN's Department of Humanitarian Affairs developed an extensive disaster management training programme, which has produced modules on nearly every aspect of the subject for other agencies to use.[20] There has also been much more interest in community-based disaster mitigation and preparedness, with courses run in Asia at regional level by the Asian Disaster Preparedness Center (ADPC), and at national levels – for instance, by the Disaster Mitigation Institute (DMI) in India and by the International Institute for Disaster Risk Management (IDRM) in the Philippines.[21] Helpful training materials for project and community workers have been produced, notably the *Reducing Risk* resource book, which is based on participatory learning methods, and which has proved popular with NGO field staff.[22] Distance-learning materials are also available. Such courses originated in North America, where the Disaster Management Center at the University of Wisconsin was a pioneer.[23] Courses that focus more on developing-country contexts are starting to appear. These include the Certificate in Disaster Management run by the Indira Gandhi National Open University in India and the Diploma in Integrated Risk and Disaster Management launched for Latin America by the Centro Internacional de Métodos Numéricos en Ingeniería (CIMNE) and Structuralia SA in Spain.[24]

Little is known about agencies' internal training courses. Some international NGOs have given training to local offices and partners, particularly in Africa. Again, we know little about the nature and extent of these, or their impact. There are many lessons to be learned and shared about this kind of work. Case Study 11.6 illustrates some of them.

Agencies' experiences suggest that the following questions should be asked when considering running training courses or sending staff on other institutions' courses.

- Does the demand for training in your organisation reflect a genuine need, or is 'training' seen as a panacea without proper consideration of its cost or value? Training is costly. Be clear about what it can realistically deliver. Set goals and indicators.
- How will you ensure that the skills and knowledge individual trainees receive are applied and shared across the organisation?
- Do you have a long-term training plan in this area? One-off training is not very effective in changing attitudes and practice, unless there is adequate follow-up in the form of additional training or on-the-job support.
- Are there courses available that meet your needs, run either by specialist training institutions or by other organisations for their staff and partners? If not, is it cost-effective to design your own, or might it be better to collaborate with other agencies in this?
- Are you aware of the training materials that are available? Could you adapt these to your own purposes, as free-standing training or integrated into your existing staff development programmes?
- Is conventional training in risk or disaster management really what your staff need? How useful is it to learn the details of disaster theory and technical terminology, which is a major part of many courses?
- Is formal training the best way for your organisation to acquire new ideas? A lot of information spreads informally in organisations.
- Should your organisation act as an educational 'multiplier', by extending training to community organisations? Is the 'training of trainers' approach the best way of supporting local partners (see Case Study 11.6)?
- Training generates demands from staff and partners, especially for follow-up initiatives (which require resources). Those who provide training, or help others to get it, have a responsibility to support activities that arise from it. Does your organisation have the motivation and capacity to do this?

Case Study 11.6
Training of trainers

Between 1997 and 2001, the British NGO Christian Aid implemented a 'training of trainers' programme in disaster mitigation and preparedness for its partners in eight countries in East and West Africa.

Four eight-day training workshops were held: two regional and two national, each of which was preceded by a training needs assessment. The workshops covered two subjects: disaster mitigation and preparedness concepts, and training of trainers techniques. Ninety-two people took part from 52 organisations. There was an evaluation of each workshop 12–18 months afterwards.

The evaluations showed that the programme had succeeded in raising participants' awareness of how vital risk reduction was to their work. Many participants organised small-scale mitigation initiatives on their return, with seed funding from the programme. These included further training or awareness-raising workshops for local organisations and community groups, measures to improve food production and income-generating projects to strengthen livelihoods against risks. There were many examples of partner organisations and their local partners adopting ideas and techniques from the training.

With hindsight, the training might have been more effective if it had focused on one level (institutional or community) and dealt with fewer topics in more depth. The impact of the training depended greatly on the commitment and capacity of each of the agencies and participants. Training of trainers programmes should not be stand-alone initiatives. Recognition of the need for ongoing support to partners beyond the programme was an important lesson. This would require a variety of supplementary components to build skills.

Another – unplanned – consequence of the programme was that it raised the profile of disaster mitigation and preparedness within Christian Aid itself, and is leading to better integration of risk reduction in the NGO's emergency and development work.

M. Todd, 'Training of Trainers in Disaster Mitigation and Preparedness: West and East Africa. End of Project Report', (London: Christian Aid, 2002).

11.5 The internet

The internet is bringing about an information revolution in risk reduction. This has been so sudden that it is hard to predict where it will lead, but it has already led to greatly improved communications and understanding between professionals and greater capacity to communicate with the public.[25]

11.5.1 Email

The use of email is expanding rapidly among organisations and individuals, and although there are legitimate concerns about uneven access to the internet leading to a growing 'information gap' between North and South, developing-country researchers, government institutions and NGOs are increasingly coming online. There are indications that email's ease of use – leading to greater frequency of messages – and the relaxed style of communication it encourages are improving the quality of relationships between individuals in different agencies.[26]

Electronic list-serves and newsletters are becoming more numerous. These are generally managed by an institution or group. Many agency newsletters on risk reduction merely promote the organisation and its activities, but others take on a more general information-sharing role. These include the UN's Integrated Regional Information Networks (IRIN), which sends out frequent news briefings on potential and ongoing disasters and their background in Sub-Saharan Africa and Central Asia. Another influential newsletter is *Disaster Research*, published by the Natural Hazards Research and Applications Information Center at Boulder, Colorado, which is sent to over 2,700 people worldwide.[27]

In most cases, anybody can subscribe to such services and they are free, but some are limited to members or observers of a particular network, as in the case of the Active Learning Network on Accountability and Performance in Humanitarian Action (ALNAP).[28] There has been little assessment of their impact (IRIN was being evaluated at the time of writing), but the number of subscribers is a good indicator of their perceived value.

Email discussion groups or lists are an effective way of sharing information and creating links between professionals in different countries. They can be set up easily and cheaply, and are usually managed with little effort (unless they are 'moderated' – i.e. all messages have to be screened by a coordinator for relevance before being sent out). Many internet service providers offer facilities for running discussion groups and some academic institutions support them. In most cases, anybody can join. However, few are well-adver-

tised, which makes them hard to find. Some become largely inactive after an initial burst of enthusiasm. Others become dominated by a few individuals, leaving the remaining members excluded. In discussion groups that are not moderated, there is a risk of too many trivial messages being passed around.

Case Study 11.7
Information-sharing through an email discussion group

Established in 1994, *natural-hazards-disasters* is a multidisciplinary email discussion group/network covering the socio-economic, psychological, organisational, scientific and technical aspects of all kinds of disaster triggered by natural and technological hazards. It is open to anybody who is interested, anywhere in the world, by signing up through its website (http://www.jiscmail.ac.uk/lists/natural-hazards-disasters.html).

A review and membership survey carried out in 2000 sought to find out more about the 263 members and how they used the list. Between February 1999 and May 2000, 348 messages were posted. While several members were very active in contributing, 30% of the membership had sent at least one message during the period.

The main kinds of message posted were requests for information and questions to other members, replies to those questions and debates arising from them, and messages sharing information generally. A wide range of topics was raised, including good practice in community participation, hazard/disaster perception and awareness, definitions of vulnerability, and estimating the cost of damage from natural disasters.

Twenty-six per cent of respondents to the questionnaire survey found the network very useful, 65% found it useful and only 9% not useful, although some of these described it as 'interesting'. When asked to explain how it was useful, respondents highlighted the exchange of information (principally about events, websites, documents and professional contacts), keeping up to date with current ideas, debates and issues ranging beyond their own fields, and getting an international perspective on such matters. One member pointed to the value of contributions from members in developing countries.

J. Twigg, 'Natural-Hazards-Disasters: Report of a Review and Membership Survey', unpublished report, Benfield Hazard Research Centre, London, 2000.

Electronic conferences give researchers and practitioners around the world an opportunity to take part in a debate on a particular issue. They can last a few days or weeks – two to three weeks seems to be a good duration, as it allows participants time to read submissions and formulate their own contributions. Some focus on specific issues and are particularly favoured by researchers. Others, such as those hosted by the UN IDNDR and ISDR, have taken on much broader themes and attracted considerable interest among disaster specialists.

Electronic conferences need to be well-advertised to ensure adequate participation, and some research and discussion papers must be commissioned well in advance to stimulate debate. Technically, electronic conferencing is not that difficult, but the management is time-consuming and it should not be undertaken unless there is sufficient staff capacity, nor without good preparation. It makes sense to collaborate with those who have experience of running such events.

11.5.2 The worldwide web

Through the worldwide web it is possible to make great volumes of information accessible to internet users throughout the world. For users in the South, the cost and difficulty of access remain obstacles to using the web regularly, but elsewhere it is becoming a primary source of information for people working on risk reduction.

Many agencies have their own websites. These are often run mainly for publicity and fundraising purposes, particularly in the case of NGOs, but some contain information of value to other professionals, such as studies, reports and guidelines. The Natural Hazards Research and Applications Information Center has a good directory of useful sites.[29]

Larger agencies are starting to develop intranets (websites that are only open to their own staff). For example, the IFRC is developing a Disaster Management Information System (DMIS), which aims to provide a comprehensive set of all documents relevant to the Red Cross/Red Crescent movement at its different levels, including situation reports, background information on countries and disasters, practical guidelines and information on resources available for operational work, and templates for project proposals, reports and other standard documents. In time, part of this site will be made publicly available.

Disaster relief is well served by sites that collect and store situation reports, emergency appeals and background data – notably the ReliefWeb site run by

the UN Office for the Coordination of Humanitarian Affairs (OCHA).[30] The web is also a valuable source of technical information on hazards, and a number of sites provide information for forecasts and warnings, especially of hydro-meteorological disasters such as cyclones, drought and El Niño events: for example, the USAID-funded Famine Early Warning System Network (FEWSNET), the UN Food and Agriculture Organisation's Global Information and Early Warning System on Food and Agriculture (GIEWS), and the site of the US government's National Oceanic and Atmospheric Administration (NOAA).[31]

In the US, which has the highest proportion of internet users of any country, government and non-profit organisations make extensive use of the web, not only for forecasting and warning but also as public education channels giving a wide range of general and specific advice on reducing risk (see Case Study 11.8). The US sites are pointers to the web's potential for educating and supporting the public.

Agencies are increasingly publishing books, guidelines, reports, journals and newsletters electronically as well as in print, and many of these are available free of charge. For example, two major research and information centres in

Case Study 11.8

The web as a resource for risk reduction

The website of the Federal Emergency Management Agency (FEMA) in the US (www.fema.gov) contains a huge amount of information to help the public. This includes:

- information on individual hazards and how to deal with them;
- guidance for families, communities and local officials on various aspects of mitigation, preparedness and response;
- advice on the kinds of assistance available to those affected by a disaster, and how to obtain it;
- details of a range of government mitigation and emergency assistance programmes;
- educational resources for teachers;
- a site designed specifically for children;
- an online library containing official and public information documents, photos and maps;
- information on training courses, seminars and conferences; and
- news and situation reports.

the US, the Disaster Research Center (DRC) at the University of Delaware and the Natural Hazards Research and Applications Information Center (NHRAIC) at the University of Colorado, Boulder, put all their new research reports on the web, as well as many of their old ones.[32]

Much of the online literature is 'grey', and so does not feature in standard library catalogues, although some can be identified through web-based catalogues such as the HazLit database run by the Natural Hazards Research and Applications Information Center (it covers printed and online material) and the eldis gateway site run by the Institute for Development Studies at the University of Sussex, which covers all aspects of sustainable development and has 12,000 documents online.[33]

Email has been used more than the web to facilitate debate, although email conferences are often linked to websites where all relevant documents and communications are posted. When it was launched early in 2001 the Radix (Radical Interpretations of Disaster) website was innovative in seeking to provide a permanent forum where ideas could be posted and discussed, and it continues to present new and alternative perspectives that stimulate lively debate.[34] The Gender and Disaster Network (GDN) is an example of web-centred networking.[35]

There are two main problems facing users of the web in operational agencies. One is the sheer volume of information available. A search for information on a single item, such as El Niño, can produce thousands of websites. The other problem is the lack of quality control. Without a lot of searching and experience, it is impossible to know which sites are most reliable and useful. Little guidance is available on sites dealing with disaster reduction and the rapidly-changing nature of the web, with sites constantly being created, changed and shut down, makes it difficult to keep such guidance up to date. Directories of disaster websites are of limited help, since they usually provide ever-growing lists. This problem has to be overcome if the web is to fulfil its potential as a tool for supporting work on risk reduction.

11.6 Chapter summary

- Communication about risk reduction needs to be approached as a dialogue and exchange of information with vulnerable people, not as one-way information dissemination.
- Disaster managers can learn a lot from the experiences and practices of development agencies.
- All disaster reduction programmes should include communications and

Box 11.3
Checklist of good practice in risk communication

1. Think strategically.
2. Plan and prepare carefully.
3. Devise a series of actions to build up awareness and mobilise communities in the long term.
4. Ensure that you understand how people process and evaluate information about hazards and risks.
5. Focus risk communication on changing behaviour, rather than merely improving understanding.
6. Use methods of communication that are most acceptable to the communities concerned. Be prepared to spend time and effort to find out which methods are most suitable.
7. Where your public is diverse, adapt the information and communications method to the needs and tastes of each target group, and set priorities where you do not have the capacity to communicate with everyone effectively.
8. Ensure that technical information is presented in accessible formats.
9. Check that the materials or advice being given are comprehensible, credible and consistent.
10. Ensure that the actions suggested are feasible and that people will be motivated to act (and not panic).
11. Pre-test materials and methods to make sure they are effective.
12. Acknowledge the likelihood that apathy and information overload will affect people's response to messages.
13. Acknowledge that people's attitudes to hazard risks are influenced by other factors such as cultural traditions or the need to maintain insecure livelihoods.
14. Provide interactive communication and pathways for questions and requests for further information.
15. Reinforce the message over time, and add new information and ideas, as part of an overall strategy.
16. Evaluate your work and share the findings with others.

Based on R. Steen, *A Guide to Information Preparedness* (Oslo: Directorate for Civil Defence and Emergency Planning, 2000); B. Rohrmann, 'Effective Risk Communication for Fire Preparedness: A Conceptual Framework', *Australian Journal of Emergency Management*, vol. 10, no. 3, 1995, pp. 42–46; and S. Nathe et al., *Public Education for Earthquake Hazards* (Boulder, CO: University of Colorado, 1999), www.colorado.edu/hazards/informer/infrmr2/infrm2wb.htm.

awareness-raising as central components, and should have a clear communications plan.
- Creation of a 'culture of safety', in which risk awareness and the adoption of risk-reducing measures are part of daily life, is a long-term process.
- A wide variety of methods is available, some of which are relatively simple. The right mix will vary according to local contexts.
- Evaluation of communications initiatives presents several practical challenges, and little is known about their effectiveness.
- Risk education through schools has considerable potential, if approached pragmatically.
- Opportunities for professional training and education are growing, but careful thought should be given to the appropriateness of courses, especially at the agency level.
- The internet is greatly improving communications between practitioners. The worldwide web could play a significant role in educating and supporting the public.

Notes

1 J. Salter, 'Towards a Better Disaster Management Methodology', *Australian Journal of Emergency Management*, vol. 10, no. 4, 1995–96, pp. 8–16.

2 See, for example, B. Mody, *Designing Messages for Development Communications: An Audience Participation-Based Approach* (London: Sage, 1991); S. Melkote, *Communication for Development in the Third World: Theory and Practice* (New Delhi: Sage, 1991).

3 S. Nathe et al., *Public Education for Earthquake Hazards* (Boulder, CO: University of Colorado Natural Hazards Research and Applications Information Center, Natural Hazards Informer 2, 1999), www.colorado.edu/hazards/informer/infrmr2/infrm2wb.htm.

4 See A. Burke, *Communications & Development: A Practical Guide* (London: DFID, 1999); G. Adam and N. Harford, *Health on Air: A Guide to Creative Radio for Development* (London: Health Unlimited, 1998); *Appropriate Technology* special issue on communications, vol. 19, no. 2, 1992; R. Steen, *A Guide to Information Preparedness* (Oslo: Directorate for Civil Defence and Emergency Planning, 2000); E. Dudley and A. Haaland, *Communicating Building for Safety: Guidelines for Methods of Communicating Technical Information to Local Builders and Householders* (London: IT Publications, 1993).

5 *Living with Risk: A Global View of Disaster Reduction Initiatives* (Geneva: UN International Strategy for Disaster Reduction, 2002), p. 199.

6 M. Myers, *From Awareness to Action: Tackling HIV/AIDS through Radio and Television Drama* (London: Benfield Hazard Research Centre (Disaster Studies Working Paper 5) 2002), www.benfieldhrc.org.

7 A. Eyre, 'In Remembrance: Post-Disaster Rituals and Symbols', *Australian Journal of Emergency Management*, vol. 14, no. 3, 1999, pp. 23–29.

8 P. Mundy and M. Lloyd-Laney, 'Indigenous Communication', *Appropriate Technology*, vol. 19, no. 2, 1992, pp. 1–4.
9 A. Maskrey and J. Vicuna, 'Taxi Drivers – Communicators on Wheels', *Appropriate Technology*, vol. 19, no. 2, 1992, pp. 30–31.
10 Steen, *A Guide to Information Preparedness*.
11 J. Dash, 'Survivors Buy Radios as Cyclone Anniversary Nears', *Indo-Asian News Service*, 25 October 2002.
12 R. S. Punongbayan et al., 'Eruption Hazard Assessments and Warnings', in C. G. Newhall and R. S. Punongbayan (eds), *Fire and Mud: Eruptions and Lahars of Mount Pinatubo, Philippines* (Quezon City/Seattle, WA: PHIVOLCS/University of Washington Press, 1996), pp. 67–85.
13 Burke, *Communications & Development*; Adam and Harford, *Health on Air*.
14 *Living Disaster Preparedness: FEMA Community & Family Preparedness Conference* (Washington DC: Federal Emergency Management Agency, 1991), pp. 37–38.
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Chapter 12
Policy, regulation, accountability and advocacy

An appropriate policy and regulatory framework is an essential part of risk management. This is government's responsibility, but civil society organisations can do much to influence it.

Two main issues are covered in this chapter:

1. How particular policies, laws and regulations can help to reduce risk. This section will be short and mainly descriptive, showing what is desirable and possible.
2. How governments and other agencies can be persuaded to set and enforce appropriate policies and standards.

12.1 Policies and regulations

12.1.1 National frameworks

There are many different ways of reducing risk through policies and regulations that can be built up incrementally. Even so, every country should have an appropriate national policy and legislative framework.

There is no standard model for this, but normally it would comprise the following:[1]

- a disaster (or risk) management policy that addresses preparedness and mitigation;
- a strategy for attaining policy goals;
- a legal basis for actions: this can take the form of acts of parliament creating the necessary administrative structures and financial instruments, and setting relevant laws and regulations (e.g. concerning building standards or land use); and
- administrative structures and systems with the human, technical and financial capacity to implement the disaster management strategy, at all levels of government and integrated with other government departments.

12.1.2 Methods and approaches

Within such a framework, a variety of policies, regulations and procedures can be used to address particular kinds of risk and hazard.[2] They include:

- *Engineering and construction measures*. These comprise design standards, building codes and performance specifications. They ensure that engineered structures withstand particular hazards and forces.
- *Legal measures*. The law can be used to provide penalties and incentives. Enforcement of engineering standards, health and safety regulations or environmental protection will be weak if there is no adequate legal back-up that authorises penalties for non-compliance. Legalisation of land or property ownership, and laws protecting tenants' rights, are good examples of legal incentives. By giving people greater security, they encourage them to invest more in protecting their property (e.g. by strengthening houses or improving drainage systems). Laws can also define rights to protection and post-disaster assistance.
- *Planning regulations*. These can be used to prevent the use of hazardous areas such as flood plains or unstable hillsides for housing or commercial development, and to keep hazardous industrial activities away from population centres. Many urban plans involve 'land zoning' of this kind. Planning should also ensure that public facilities (e.g. hospitals, emergency services, schools, water and power supplies, telephone exchanges, transport infrastructure) are kept away from hazardous zones as far as possible, and that they are not over-concentrated in a few places. For the same reason, regulations may restrict population density in a given area. Ensuring escape and access routes, creation of open spaces as areas of refuge, separation of buildings to reduce fire risk, and creation of green or wooded areas to assist drainage are among other risk-reducing measures governed by planning regulations.
- *Financial measures*. Financial incentives such as the provision of grants, 'soft' loans or tax breaks to companies, communities and individuals can be used to encourage investment in safer construction and mitigation measures, including location in safer areas. Alternatively, financial penalties – fines and taxes – may be used to discourage bad practice. Chapter 13 describes the economic and financial mechanisms that non-governmental agencies can deploy.
- *Economic measures*. These too are discussed in Chapter 13. One of the most valuable measures that can be taken is economic diversification. This reduces risks to the economy as a whole by reducing over-reliance on sectors that may be particularly vulnerable to certain hazards.

12.1.3 Challenges

Each of the approaches outlined above presents its own practical problems, but overall there are three main challenges to disaster reduction through policy and regulatory mechanisms.

1. *Capacity*. The methods described above add up to a comprehensive package of risk-reducing measures. Extensive political and legislative skills will be needed to deal with powerful groups whose interests may be affected, and to design effective laws and regulations. Government capacity to implement the measures will have to be built up. To put such a package in place requires a lot of time – probably decades – and it will need refining frequently in the light of experience. This is a major challenge to any government.
2. *Enforcement*. Laws and regulations are useless if they are not enforced. For example, engineers and builders must be aware of building codes and design standards, understand them, know how to use them and accept their importance. For this to happen, awareness-raising and further professional training may be needed, and there must be a sufficient number of trained officials to ensure that the codes and standards are adopted.
3. *Population growth and poverty*. Land-use regulations in many developing countries are also weakly enforced, for reasons including commercial pressures, rapid growth of urban populations and corruption. However, land zoning generally presents major problems where poor people are concerned. Banning people from settling in hazardous areas, or evicting them when they do, is unlikely to succeed because the socio-economic pressures forcing them to live in such locations are too great.

12.2 Accountability: general principles and approaches

Given that such measures are mainly the responsibility of the state, and of central government in particular, what should the role of non-state actors be? How far can and should they take responsibility for such matters?

Non-state actors have two important roles to play.

1. They can lobby for better policies and regulations, and for the enforcement of those in place. This includes challenging decisions and plans that may increase risk.
2. They can press governments, international aid agencies and NGOs to be more accountable to those who are at risk from hazards, or who are victims of disasters.

This is basically a question of accountability. The principle of accountability lies at the heart of genuine participation and community involvement in disaster reduction. It can be applied to everyone, from village elders to the UN. It applies to state institutions that are expected to be accountable through the democratic process, and to private sector and non-profit organi-

sations which are not directly subject to democratic control. Although a universal principle, it allows for variation in method, from simple transparency at one end to democracy at the other.

The process of accountability can usefully be seen as a cycle with four main stages:[3]

1. Agreement of clear roles and responsibilities of organisations and individuals.
2. Taking action, for which organisations/individuals are responsible.
3. Reporting on and accounting for those actions.
4. Responding to and complying with agreed standards of performance and the views and needs of stakeholders.

Accountability is an emerging issue in disaster reduction work. There are relatively few examples of practical approaches, and there has been little comparative study or analysis. Much more work of this kind is needed before comprehensive guidelines of good practice can be developed. Nevertheless, some of the basic issues and questions are clear enough.[4]

There are two main types of accountability:

1. Functional accountability – this focuses on short-term actions, resources and their use, and immediate effects.
2. Strategic accountability – this looks at the wider and longer-term impact of interventions.

In non-governmental agencies, accountability is not straightforward, for agencies are accountable in many different ways: to the people they aim to help, to donors, to their own mandates and to the legislative frameworks in which they operate.

Accountability generally works in two principal, but very different, directions:

1. 'Downwards' – to beneficiaries, local partner agencies, staff and supporters.
2. 'Upwards' – to boards of management, donors and governments.

In practice, most interventions involve both kinds of accountability, and apply it in both directions, but the balance is crucial. Often, disaster (and other) professionals concentrate on upwards accountability at the expense of downwards accountability. This reflects the dominant influence of donors and governments in disaster and development work, manifested most visibly in

the movement towards rigid formats, bureaucratic reporting, short-term quantitative targets and standardised indicators. The very fact that there are multiple lines of accountability can lead to confusion operationally, and problems often arise from the difficulty of setting priorities and reconciling competing demands.

External forces are not the only drivers of accountability. Many organisations – especially not-for-profit ones – see greater accountability as valuable in itself, because it improves their performance. Value-driven organisations are more likely to adopt accountability for principled reasons.

Accountability should be primarily towards those who are vulnerable to hazards and affected by them. Listening to disaster-affected people is essential in identifying genuine problems and priorities, as well as being an essential step towards letting such people take part in and exercise some control over what the American researcher Kenneth Hewitt calls 'the impersonal processes and citadels of expertise that tend to dominate the disaster community'.[5]

12.3 Models of accountability

Many methods have been used to make risk and disaster managers more accountable to vulnerable people. These vary greatly in approach, from the collaborative to the confrontational. The choice of methods in a given situation must be determined by local circumstances and contexts. The descriptions that follow indicate some of the options available, and comment on their application. The methods are grouped under two main headings:

1. Giving victims a voice. This section surveys ways of allowing vulnerable people to get their points of view across (there is more on this in Chapter 8).
2. Enforcing accountability. This discussion concentrates on methods of pushing decision-makers and practitioners to improve their policies and ways of working.

This coverage is not comprehensive. There is room for much more research on the subject, especially to identify the most effective approaches.

12.3.1 Giving victims a voice

For all the advances in participatory approaches discussed in Chapter 8, the voices of disaster victims and those at risk are often not listened to, valued or

understood. However, a number of innovative techniques are being used to give disaster victims a voice, and so help disaster agencies make their interventions more appropriate.

Auditing disaster response

Some innovations in accountability take the form of an auditing process. Case Study 12.1 is a well-known example.

Case Study 12.1
Social audit after Hurricane Mitch

Nicaragua was badly affected by Hurricane Mitch in October 1998. In February 1999, a coalition of over 320 non-governmental and social organisations carried out a 'social audit' in order to incorporate communities' points of view into reconstruction planning.

The methods used to collect information included reviewing institutional documents, household surveys, interviews of key informants and discussion groups. The audit surveyed more than 10,000 homes in 16 municipalities affected by Mitch. Community leaders, mayors and leaders of other local organisations were also interviewed.

The audit provided evidence of the extent and nature of the losses suffered (both economic and psychological), but was particularly valuable in allowing victims to express their views about the aid they had received. It covered such questions as:

- the coverage of aid (percentage of victims who had received it);
- the value of different items;
- which organisations had helped most;
- the orderliness of aid distribution;
- equity in distribution;
- coordination with external organisations; and
- how far victims' views were taken into account.

Social Audit for the Emergency and Reconstruction Phase 1 (Managua: Coordinadora Civil para la Emergencia y la Reconstrucción de Nicaragua [Civil Coordinator for the Emergency and Reconstruction of Nicaragua], 1999).

Life stories

The life story approach is a standard technique in participatory learning and action. There are many variations on the model. For example, in western India, women affected by disasters – principally drought – have been helped to write their own life stories, which set the disaster event in context as well as revealing their vulnerability and capacities (see also Case Study 6.1, page 83).[6] Videos have been produced for global TV networks that let those affected by disasters and vulnerability present their own points of view.[7]

Methods such as life stories and participatory vulnerability analysis should help to make external actors in disaster reduction more responsive to people's needs before disaster strikes, but they do not guarantee it. For this, more sustained mechanisms are needed.

Victims as consumers?

There is scope for experimenting with other methods that allow vulnerable people to express their views and preferences. The notion of disaster victims as consumers (Case Study 12.2) may be one step in this direction.

Standards, charters and codes of conduct

An encouraging trend is the development of codes of conduct and sets of common standards. Several have emerged during the 1990s, mainly among NGOs working in emergency relief and stimulated largely by problems arising from the proliferation of conflicts and associated complex emergencies. The best known are the International Red Cross and Red Crescent Movement/NGO Code of Conduct (drawn up in 1994: a broad statement of principles), the People in Aid Code (1997: setting standards of good practice in the management and support of aid personnel) and the Sphere Project (1998: minimum quality standards in disaster response). Others have addressed practice in particular emergencies. Sphere and People in Aid are multi-agency initiatives.

By laying down common standards and regulatory frameworks, the codes and standards are explicitly intended to make their signatories more accountable. The Red Cross Code of Conduct states: 'We hold ourselves accountable to both those we seek to assist and those from whom we accept resources'.[8] Those adopting Sphere's Humanitarian Charter 'expect to be held accountable to this commitment and undertake to develop systems for accountability within our respective agencies, consortia and federations. We acknowledge that our fundamental accountability must be to those we seek to assist'.[9]

Case Study 12.2
A 'Flood Aid Fair'

After severe floods in 1997, a 'Flood Aid Fair' was held in Raciborz in Poland, as part of a larger assistance and reconstruction programme funded by USAID. The fair was planned in response to problems arising during the reconstruction period, when aid was being distributed in an inequitable and inefficient manner because victims of the floods did not have access to information about sources of aid (supplied by donors, the government and commercial firms). The fair's aims were to stimulate an intensive exchange of information between donors and victims, and to promote market responses to the demand for goods and services created by the flood.

The fair was modelled on commercial trade fairs. There were 146 exhibitors: food aid organisations, government institutions, municipal associations, consulting firms, building materials firms, new-technology firms, financial institutions and others. The event lasted only eight hours, but was attended by more than 4,000 people: homeowners and representatives of NGOs, municipalities, regional development agencies, commercial firms and government.

The exchange of information appears to have resulted in additional resources becoming available for flood victims, such as product discounts, information about credit and access to technologies. It also exposed gaps in available resources, helped to build capacity among indigenous organisations and strengthen relationships between different actors involved in the reconstruction effort, and led to the creation of a multimedia flood aid information system.

M. Mikelsons and K. Chmura, 'The Flood Aid Fair in Poland: A Method to Promote Information Exchange', *Natural Hazards Observer*, XXIII(1), 1998, www.colorado.edu/hazards/o/sept098/sept098.htm.

Some of these initiatives are in their infancy. There are practical obstacles to overcome, concerning implementation and particularly compliance. Agencies may sign up to codes as a token gesture to keep donors happy, while continuing to operate just as before. A few organisations remain critical, for reasons related

mainly to the protection of humanitarian principles, and have chosen to distance themselves from such developments. Nevertheless, the codes and standards represent an important step forward and in the long term they may provide an opportunity to promote pre-disaster mitigation and preparedness activities.

Transparency in monitoring and evaluation

Transparency in monitoring and evaluation is a key element in making operational agencies more accountable. It can be achieved by making reports and evaluations public. The need for improved and open monitoring and evaluation has been widely acknowledged in development circles only since the early 1990s and in humanitarian assistance circles since the Great Lakes crisis of 1994–95 – and there is continuing resistance within many agencies to making such material available to the public or other professionals.

Sometimes, such resistance has a reasonable basis – for instance, the need to protect operational activities or vulnerable people against military or political interference. However, in many cases marketing and public relations considerations prevent publication of material that may reveal weaknesses or incompetence. Lack of transparency means that agencies are unable to learn lessons from each other and are frequently reinventing the wheel.

Initiatives to promote improved monitoring and evaluation and greater transparency have been confined largely to the development and humanitarian assistance sectors. In the area of disaster mitigation and preparedness, monitoring and evaluation have generally been neglected (see Chapter 18).

Research and advocacy on good practice

This area remains neglected, at least by NGOs. Much of the advocacy to date has been generalised, addressing broad issues and without a solid research base. Operational agencies need more than general statements if they are to improve their approaches: they need practical guidance, based on experience.

HelpAge International's guidelines for best practice on supporting older people in disasters provide a model approach for this. With funding from the UN High Commissioner for Refugees and the European Community Humanitarian Office, HelpAge researched older people's needs during disasters and how humanitarian aid agencies perceived those needs, and found significant differences between the two viewpoints. A concise report, containing the research findings and the guidelines, has been widely distributed and publicised.[10]

Networks

The growing number of networks, especially involving NGOs and researchers, has also provided a platform for research and advocacy on policy and practical issues (see Chapter 5.2.5, page 72). Objective and in-depth evaluations of the impact of such efforts would be useful.

12.3.2 Enforcing accountability

The initiatives described above are voluntary: those who subscribe to or take part in them wish to make themselves more accountable. But what happens when key actors in disaster management are not interested in accountability or even dialogue? In such circumstances, more forceful or even confrontational approaches may be adopted.

Bringing pressure to bear on the political system

In democratic states, accountability is best established through the political system and structures. Vulnerable people can hold their elected representatives to account through the electoral process and other means. The political system is multi-layered, allowing people to influence decision-makers at different levels. But even in democratic states, risk reduction is rarely a priority for politicians unless either the risk is perceived as immediate (and therefore a potential threat politically, if action is not taken) or pressure can be brought to bear by lobbying or influencing public opinion.

Over many years, disaster workers have been engaged in activities that bring pressure to bear on governments and politicians. The long and intense campaign by many local and international NGOs and researchers against the Flood Action Plan in Bangladesh is one of the best-known examples (see Chapter 10.2.5, page 155).

'Report cards' on the quality of government performance have been used in some cities in India to support lobbying for improvements to infrastructure and public services. This method has also been piloted in relief operations, where disaster victims evaluate the performance of the agencies that come to help them.[11] Other methods being explored in India involve scrutinising government relief codes and budgets, to bring issues of cost effectiveness and accountability into the open and expose weaknesses in planning and gaps between plans and practice.[12]

More direct action to bring government officials and victims together has

Case Study 12.3
Facing the people

Following sea floods at Dhandhuka on the coast of Gujarat in 1993, local NGOs launched a community-based process to plan more effective disaster mitigation. This involved a series of planning sessions in the affected villages.

Officials from several state government departments took part in the meetings. They included the Minister of Health, who came to several meetings – unusual for someone of that rank. Although the officials took part in the debates, they did not exercise any control over the process, which appears to have been harmonious and collaborative, and led to government commitments to carry out a range of recovery and mitigation measures.

By contrast, after the Kobe earthquake in January 1995 Japanese government officials appeared on a national television programme where they faced a chorus of complaints that they were not doing enough to provide food, emergency shelter, medicine and money for reconstruction. The Governor of Hyogo Prefecture, of which Kobe is the capital, was obliged to admit that the authorities had been slow and lacked coordination.

M. R. Bhatt, 'Participation, Planning and Mitigation in Dhandhuka', *Appropriate Technology*, vol. 22, no. 4, 1996, pp. 12–15; *The Guardian*, 30 January 1995.

been attempted. Sometimes this is harmonious, at other times confrontational (e.g. Case Study 12.3).

Effective advocacy in this field requires good information on hazards, risk and vulnerability. As noted in Chapter 4, in many cases such information may not have been collected, or if collected is inadequate or not available to the public. For example, hazard maps may be out of date or deemed to be confidential for military or other reasons. Statistics on the impact of previous disasters are often unreliable and almost never disaggregated by age, gender and other socio-economic features. Data on vulnerability are likely to be restricted to physical vulnerability (buildings and infrastructure) rather than covering communities. If information has been gathered by private organisa-

Case Study 12.4
Raising public awareness of man-made hazards

Friends of the Earth UK, an environmental education and campaigning organisation, runs a website called Factory Watch to raise public awareness of industrial hazards and encourage campaigning against pollution in the UK. The website is at: www.foe.org.uk/campaigns/industry_and_pollution/factorywatch. Visitors to the site type in their postcode, and can then see a list of major industrial plants in their district, with official figures for the types and amounts of pollutants released by these factories. Factory Watch gives the name of the Member of Parliament (MP) for the district concerned, and will create letters for electors to send to their MP. The site also provides more general advice and information on campaigning against polluting factories.

tions such as insurers, it will be considered commercially confidential. Access to relevant information is an essential element in improved accountability.

Accountability by proxy

Disaster agencies are rarely directly accountable to disaster victims or potential victims. Although in the case of government agencies a degree of accountability can be achieved indirectly through the democratic process, the vulnerable and powerless – who make up the bulk of disaster victims in much of the world – are often not strong enough to call such agencies to account. They have to rely on others with more power and influence to speak out on their behalf. This can be called 'accountability by proxy'.

NGOs or other disaster professionals may take it upon themselves to speak out on behalf of disaster victims. This is a role that they have been encouraged to adopt, but the nature and extent of their involvement in advocacy of this kind has not been studied. They may believe that there is a need to become involved in such work, and may be able to argue with justification that they have a responsibility to do so on behalf of those whose voices are not heard by decision-makers. However, they do not necessarily have a

mandate for this role (community associations and other membership-based organisations, on the other hand, can speak with some legitimacy). The issue is particularly important to NGOs, who are always vulnerable to challenge from elected authorities on this count. All non-state actors considering involvement in processes of this kind need to think about this carefully.

The media form an important proxy group, although their role in promoting disaster reduction is the subject of some debate.[13] Sometimes they are clearly beneficial, for example in highlighting the failure of official relief services to reach those most in need, and in disseminating forecasts and warnings.

However, the media tend to take a stereotyped view of disasters. They are only interested when a disaster takes place, they prefer stories of human tragedy to human ingenuity, and they like to find people or organisations to blame for the disaster rather than considering the real causes of vulnerability. They are also often influenced by other agendas: their own and those of other interest groups. They are unreliable allies.

There has been much talk about educating the media to cover disasters in a more balanced and responsible manner, but the commercial pressures of international news-gathering are so great that such moves can make only slow headway. Significant, sustained efforts are needed to change media attitudes. Few NGOs are likely to have the resources to undertake this.

Alternative news services run by non-profit organisations can take a more principled and strategic approach to the subject, but their outreach is likely to be limited in comparison to that of the commercial media sector.

Litigation

In an editorial soon after the January 2001 earthquake in Gujarat, the London *Times* newspaper commented: 'Whatever the population pressures in India, Turkey or China, disregarding the seismic risk is tantamount to manslaughter'.[14] The law provides a potentially valuable tool for enforcing accountability. Legal action is obviously of value in gaining redress after a disaster, for example to ensure that victims are treated fairly in the allocation of relief resources, and to secure compensation from those whose actions have led to disasters (notably in industrial or environmental accidents).

It is not clear how effective legal action can be as an instrument to ensure greater safety by reducing a potential risk. However, this may be possible through what is known as 'public interest litigation' – i.e. seeking to remedy

Case Study 12.5
Communities using the law

Following the Loma Prieta earthquake in the San Francisco/Oakland area of California in 1989, several community-based organisations complained that disaster recovery plans did not take account of the special problems faced by poor and vulnerable communities. A variety of methods was used to force reconsideration of those plans. One was to invoke the law. When it was learned that the American Red Cross intended to transfer unspent contributions for the disaster to its national disaster fund, a lawsuit was threatened. In the face of this, and the loss of community trust, the Red Cross revised its plan and created a substantial fund for local planning, community organisation and training.

B. Wallrich, 'The Evolving Role of Community-Based Organisations in Disaster Recovery', *Natural Hazards Observer,* XXXI(2), 1996, www.colorado.edu/hazards/o/novo96.html#CBOs.

an actual or potential public grievance through the courts. In some countries, this has been used to tackle issues such as human rights, environmental destruction, the handling of hazardous substances, pollution and the social and environmental consequences of development projects.[15]

The extent to which the law has been invoked to enforce accountability and raise standards is unknown. Further research in this area would be valuable. Clearly, the law is a potentially formidable tool, and it is probable that the number of lawsuits brought by disaster victims and those who feel that they are being exposed to hazards will increase. This has serious implications for disaster managers and operational agencies, who may be deemed legally liable for their action – or inaction.

However, legal action may also be an obstacle to more sustained, comprehensive disaster reduction because its adversarial nature can undermine opportunities for collective efforts.

Accountability and rights

The subject of rights occupies an important place in the debate about accountability. Many organisations working in international aid and develop-

ment are committing themselves to a 'rights-based' approach. Conceptually, this is an important step, but for many field-workers the practical value of rights-based thinking has yet to be proved.

The rights-based approach tends to encompass both human rights (i.e. those that are internationally accepted through international agreements) and other rights that an agency believes should be accepted as human rights. In such contexts, the language of rights may be used vaguely, with a risk of confusion.

Those advocating rights-based approaches to development tend to avoid definitions and instead focus on frameworks for analysis, discussion and action. Terms such as 'basic rights' and 'equal rights' are often used in the development context to cover issues of access to aid and participation in decision-making.

Security against disasters is not generally regarded as a right, although it is addressed in some international codes, usually indirectly. The idea of a 'right to safety' is being discussed. This appears to be consistent with international human rights agreements, but poses the following problems in practice:

- Safety is difficult to define, since notions of acceptable risk and security levels are relative and often subjective.
- Decisions about risk and safety may have to be taken where the precise nature, magnitude and extent of a hazard or risk are unclear or disputed.
- The concept of a right to safety is likely to be challenged by those who fear it will increase their own liability (e.g. government and the private sector).

The 'right to safety' also raises the question of who is ultimately responsible for ensuring the safety of the public and mitigating hazards (natural as well as man-made). There is no simple or clear answer to this.

Threats and dangers

Lobbying is difficult and requires sustained effort. Many calls for change go unheard. Residents of the Santa Tecla district of San Salvador, many of whom lost their lives and houses to earthquake-induced hillside collapse in January 2001, had previously tried unsuccessfully to stop deforestation and development on the slopes above their homes.[16]

In some countries, advocacy can prove dangerous for those involved, especially if they challenge powerful vested interests. For example, Afro-Honduran

Garifuna communities on the north coast of Honduras have failed to stop the erosion of their traditional land-use practices by commercial plantations and road construction – changes that have destroyed rainforest cover, affected watersheds and apparently led to much greater vulnerability to flooding. Moreover, their campaigns, which have challenged the landowners who sponsor and benefit from the changes, have been met by threats, violence and arson.[17]

12.4 Chapter summary

- Every country should have an appropriate national policy, legislative framework and administrative structures for risk reduction. This is government's responsibility.
- The effectiveness of such measures is weakened by insufficient capacity to implement them and socio-economic pressures that increase vulnerability.
- Non-state actors can play an important role by lobbying for better policies and regulations and for stronger enforcement. They can also press organisations of all kinds to be more accountable to vulnerable people.
- There are many methods of accountability. These are of two main kinds: giving victims a voice, and enforcing accountability.
- Many of the methods are new and need further evaluation, but there are signs that some can be very effective.

Notes

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Chapter 13
Economic and financial mechanisms for risk reduction

13.1 Economic mechanisms

Economics is a central issue in disaster reduction because poverty can make people vulnerable to many different hazards, and certain patterns of socio-economic development can expose people to greater risks. It follows that appropriate economic development and the reduction of poverty are essential elements of any risk reduction strategy.

13.1.1 Livelihood diversification

Economic diversification is central to poor people's strategies for reducing their vulnerability to external shocks. They seek to do this primarily by increasing their sources of income, building up a strong and diversified asset base, managing their money well and maintaining access to multiple sources of credit. This increases income overall and reduces dependency on individual sources: such dependency is a major contributor to vulnerability.[1]

Many coping strategies are based on this principle. Multi-cropping improves farmers' chances of being able to produce some food for consumption and sale should the rains fail. Male migration from the countryside to towns to seek labouring work during droughts provides an alternative source of income to compensate for falling crop production.

Possession of wealth and assets gives households a wider range of options in times of crisis, and speeds their recovery from disasters (see Case Study 13.1). Many disaster mitigation programmes pay no attention to this, considering it a task for development agencies. The mitigation programmes implemented by members of the Citizens' Disaster Response Network in the Philippines are an exception. They address a wide range of livelihoods issues, focusing on food security and nutrition and including: crop and livelihood diversification, propagation of disaster-resistant crops, supporting seed banks and plant nurseries, improving post-harvest facilities, encouraging better land-use management and sustainable agricultural practices, training community health workers, establishing village pharmacies and medicinal herb gardens, holding literacy classes and improving paths and footbridges.[2]

Case Study 13.1
Poverty and disaster: a cyclone in India

A wealthy and a poor family live 100 metres apart near the coast of Andhra Pradesh in south-east India. The wealthy family has six members, a brick house, six cattle and three acres of land. The head of the household owns a small grain business and a truck. The poor family – husband, wife and two children – has a thatch-and-pole house, an ox and calf, half an acre of poor land, and sharecropping rights to another quarter of an acre.

When the cyclone strikes, the wealthy farmer has received a warning on his radio and leaves the area with his family and valuables in the truck. The storm surge (flood) brought by the cyclone partly destroys his house and the roof is taken off by the wind. Three of his cattle are drowned and his fields are flooded, destroying the crops. The youngest child of the poor family is drowned. The family's house is destroyed. Both animals are drowned. The fields are flooded and the crops ruined.

The wealthy family uses its savings to rebuild the house within a week. The lost cattle are replaced, and the fields ploughed and replanted. The poor family does not have savings and has to borrow money for essential shelter from a local money-lender, at exorbitant rates of interest. It manages to buy a calf, but has to hire bullocks to plough the field – which is done late, since many others are in the same position and draught animals are in short supply. As a result, the poor family goes through a hungry period eight months after the cyclone.

P. Blaikie, T. Cannon, I. Davis and B. Wisner, *At Risk: Natural Hazards, People's Vulnerability and Disasters* (London: Routledge, 1995), p. 47.

13.1.2 Protecting assets

'Pro-poor' development is not necessarily synonymous with vulnerability reduction, and greater wealth may not by itself reduce risk.

The Kobe earthquake in 1995 is a good illustration of this point. Although Japan is a prosperous, technologically advanced country, which has invested heavily in mitigation and preparedness, there was a degree of complacency in government and society about the level of preparedness and safety, and disaster planning and management systems were inadequate. Many of the

5,500 deaths and much of the more than $100bn in economic losses could have been avoided.[3]

Assets do not protect themselves against hazards: they have to be protected. Any project seeking to build up vulnerable people's livelihoods must take the hazard context into account.

When poor people borrow money to buy livestock, tools or raw materials that can be used for income-generating activities, they are increasing their livelihood assets, which, in the long run, will help them to become more resilient to many external shocks. But drought, floods or other hazards can wipe out these assets before they have been able to generate much return on the initial investment. In such cases, those concerned actually become worse off: not only are they without assets, as before, but they also have a loan to pay back.

Similar scenarios can be drawn for other development interventions – investment in a new house or workshop where there is a risk from severe flooding, for example, or construction of concrete irrigation channels across an unstable hillside. In some cases, poor and vulnerable people may make a conscious decision not to invest too heavily in particular items, choosing those that can be replaced cheaply and easily. This is an important factor in technology choice (see Chapter 10).

Economic development and poverty alleviation programmes need to take the hazard context into account if they are to have a meaningful impact on vulnerability reduction in the long run.

13.2 Financial mechanisms

Two kinds of financial instrument will be discussed in this section: insurance and other forms of micro-finance (especially micro-credit).

13.2.1 Insurance

Insurance is a standard and effective method of sharing risk, especially in developed countries, where it has been in use for over 300 years.

Nature and benefits of insurance

In theory, everyone benefits from insurance. Individuals and organisations buy it so that they can be compensated when hazards lead to death, injury or ill-health, and loss of property or income. Claims are paid quickly and without

conditions attached. This gives policy-holders the promise of some financial stability, and hence the confidence to invest (e.g. in home improvement) or expand (e.g. a business enterprise). Insurance companies protect themselves against major catastrophes by basing insurance premiums on sophisticated calculations, spreading their own exposure across many different areas and types of risk, and buying their own insurance cover (reinsurance).

Although the industry operates in a volatile environment, has suffered severe blows in developed countries – most famously from Hurricane Andrew in Florida in 1992, which forced several US insurers out of business – and is becoming very concerned about the likely impact of climate change, it has until now proved fairly robust, even when faced with major crises. Insurance funds transferred rapidly to the US following the terrorist attacks of 11 September 2001 helped to reduce the country's balance of payments deficit and gave the economy some stability when it was urgently needed.[4]

Insurance is predominantly commercial. Decisions about whether to buy and sell insurance, what kinds of cover to provide and what premiums to set, are determined by market forces. Governments sometimes intervene, either through state schemes (to protect farmers against crop losses, for example) or by making some kinds of insurance cover compulsory (such as employers' liability or motor insurance). Other institutions can also force people to take out insurance: companies making loans to people to buy houses usually insist that they are insured.

Insurance can stimulate other risk reduction measures. Insurers may only provide cover in high-risk areas if governments ensure adequate mitigation measures and emergency management systems. State crop insurance schemes may allow farmers to take the risk of planting different crops, leading to greater diversification and security against individual hazards. In the US, the National Flood Insurance Program is a partnership between public and private sectors that links the premiums paid to the level of protection: once government emergency management specialists have certified that communities and households have put particular mitigation measures in place, they are eligible for lower rates from the commercial insurers involved in the scheme.[5] In Fiji, houses must be certified by a structural engineer that they have features making them cyclone-resistant before they can secure cyclone insurance cover and mortgages.[6]

Because of the size of the global insurance industry and its obvious value in reducing risk through risk-sharing and stimulating mitigation, disaster agencies have become interested in its potential for protecting the most

vulnerable. However, because the industry is market-driven, its success is based on confining its coverage to places where the risks can be calculated with some accuracy and certain minimum standards such as building codes can be enforced, and to people who can afford to pay. In effect, this means that coverage is limited to developed countries and to wealthy people and larger businesses in developing countries. Commercial insurance is unavailable to the people who arguably need it most: the poorest and most vulnerable in developing countries. Insurance companies have shown hardly any interest in extending their coverage to such groups.

The market impact of major disasters has driven companies to raise premiums substantially, or even withdraw cover in high-risk areas such as the hurricane-prone Caribbean and south-east US. State insurance is available in many developing countries, but premiums tend to be high and policies are aimed at the professional classes in urban areas.

Even in wealthy societies, many people may not take out insurance. Only 3% of homeowners in the areas hit by the 1995 Kobe earthquake in Japan had insurance cover: 147,000 affected homes were uninsured.[7] In such circumstances, the burden of financing recovery is passed on to governments. Many people eligible for reduced premiums through the US National Flood Insurance Program do not take out insurance cover, believing that in the event of a disaster the national government will be obliged to compensate them for their losses anyway.[8] All insurance schemes have to face the problem of 'moral hazard', where the sense of security and confidence that insurance cover provides leads to people failing to take steps to reduce risk, or even to take greater risks.

Initiatives to develop more flexible insurance tools to support poor and middle-income countries are at an early stage; many work at national rather than local levels, and they do not necessarily encourage greater emphasis on measures to reduce the impact of future disasters.

Insuring the poor against disasters

There has been little attempt to develop wholly commercial insurance programmes targeted at poor and vulnerable people. Experience so far is not encouraging (e.g. Case Study 13.2). Some experts question if it is even possible to provide insurance cover to the poor on a commercial basis.

Where insurance schemes for poor groups and individuals have been successful, they have generally originated in development programmes that

Case Study 13.2
Developing disaster insurance in Cambodia

In 2000, Cambodia experienced its worst floods for 70 years. More than three million people were affected, mostly poor farmers; half a million were displaced and nearly 400 killed. Direct costs were estimated at $160m – equivalent to half the government's recurrent budget for that year.

In consultation with the government, international agencies, the private sector and communities, a World Bank team drew up a proposal for a project to investigate how private insurance might be used to provide relief to poor farmers. The project documented current and historic flood data, climatic conditions and rice yields, and looked at ways of collecting and managing premiums, assessing claims and giving out payments. Surveys were also carried out to determine the impact of past floods on the poor, how farmers had coped, their capacity to save and how they used savings. Farmers were prepared to save, albeit only very small amounts, and communities welcomed the idea of insurance.

However, commercial reinsurers were unwilling to take on the risk of insuring poor communities likely to be affected by floods every two or three years. It was found that damage assessments would be costly and time-consuming, which would delay compensation payments. There was a risk of farmers having no incentive to take measures to protect themselves because they would expect the government or insurers to cover their losses anyway. To make premiums affordable and spread the risk would have required widespread participation by farmers, and it was felt that this might not be possible without some compulsion.

The project therefore looked at alternative ways of spreading the risk. These included government-supported insurance pools, local catastrophe funds, and building on local savings and credit schemes or informal mechanisms for self-insurance.

World Bank, *Cambodia Disaster Insurance (Project 1071): First Interim Progress Report, 21 September, 2000; Cambodia Disaster Insurance (Project 1071): Second Interim Progress Report, 16 February, 2001; Working to Develop Disaster Insurance in Cambodia*, 2001–2002, www.developmentmarketplace.org/report1071.html, www.worldbank.org/developmentnews/stories/html/010802a.htm.

have aimed at financial sustainability rather than profit. Although there is still a lot to learn about how to make such schemes work effectively, and many of them are fairly new, recent research on the subject has documented some of these experiences in detail and provides valuable lessons.[9]

Such schemes are run mainly by micro-finance institutions but also by NGOs, cooperatives, governments and even companies. Business involvement is often in partnership with non-profit organisations, where the business – usually an insurance company – typically provides technical expertise (e.g. actuarial calculations regarding risks and their likely costs), assistance with marketing, or underwriting. Some schemes have an outreach of a few hundred families, but they can reach large numbers of people – millions, in a few cases. Terms and conditions vary widely, as do the administrative and financial structures used, but life insurance, which is the main form of insurance on offer, tends to be compulsory: people who wish to borrow money or open a savings account with the organisation concerned have to buy an insurance policy. The other main kinds of coverage are health and, to a lesser extent, property insurance.

The evidence available indicates that insurance programmes for poor people, especially life insurance, can be financially viable, though the impact of major disasters on programmes has yet to be studied. In any case, insurance is a risky business. To maintain financial stability, life policies generally exclude high-risk groups such as the elderly, and certain causes of death such as epidemics. Health insurance may exclude health care costs for AIDS-related treatment or injuries arising from involvement in riots or other civil unrest. All-risk coverage for property has largely been abandoned after unsuccessful attempts in the 1970s and 1980s to provide all-risk crop insurance to farmers.

The insurers have to put considerable effort into marketing their schemes to people who are poor and unfamiliar with the concept and workings of insurance. One health insurance programme in Colombia claimed to have enrolled 16,000 members in seven months, but others have encountered considerable resistance.[10] Local-level approaches involving community meetings and regular discussions with field workers appear to be most successful. Once households understand insurance, interest seems to be strong. Where there is already a relationship of trust between the insurer and the community – notably where the insurer is an established micro-finance institution or NGO – a base of policy-holders can be built up quickly.

As this is still a new field, lessons are being learnt all the time. Schemes may have to be amended repeatedly to achieve the right balance between effec-

tive coverage of poor and vulnerable people on the one hand, and financial sustainability on the other. This is particularly true of health insurance services, whose financial performance is much lower than that of life insurance. It may be advisable to take a long-term approach to sustainability.

A major challenge is to find commercial partners who are willing to work with low-income people. This is a particular problem in reinsurance (as in Case Study 13.2 above), although a few non-profit agencies have been able to obtain it. The availability of reinsurance is the main factor affecting market growth throughout the insurance industry.

Another problem is delays in settling claims. This is partly the result of bureaucratic slowness, but partly inevitable where claimants live in remote villages or communications break down because of technical failures, environmental hazards or civil unrest.

There are examples of successful mutual benefit societies, where insurance funds are set up by groups to provide cover for their members. For example, in Mexico there are 200 mutual insurance funds (*fondos*) for farmers, with nearly 70,000 members. Each member pays an annual premium, which provides cover against crop failure due to drought, flooding, pests, disease or other emergencies. Surplus funds at the end of the year are used to provide services to members. The government provides technical support and subsidises the premiums, but the *fondos* have performed well financially and the intention is to raise private finance in due course. However, admission to membership of a *fondo* depends on its perception of a farmer's capacity, and the scheme has been criticised for excluding poorer, more vulnerable farmers.[11]

Micro-insurance can be used to stimulate mitigation activities. Health insurance is often linked to preventive and primary health care programmes run by the insurer concerned (if an NGO) or a partner organisation, and policy-holders may be expected to use such services. A scheme in Colombia offered regular group meetings for policy-holders to teach them how to protect their property against common hazards.[12] SEWA (see Case Study 13.3) provides fruit and vegetable vendors with umbrellas, having concluded from its life insurance data that spending long hours sitting in the sun might be increasing the risk of illness.[13]

As well as running insurance schemes, NGOs provide technical support to schemes run by other agencies. Médecins sans Frontières, for example, has provided a doctor as part of a rural health insurance scheme in Cambodia.[14]

Case Study 13.3
Insuring the vulnerable

In western India, the Self Employed Women's Association (SEWA), with a membership of over 220,000 poor women, provides a range of services including organising members into trade organisations and cooperatives, providing loans, training and technical assistance, legal aid, child care and education.

SEWA's integrated security insurance scheme, which began in 1992, covers 70,000 members. It is run in collaboration with two national insurance companies and the German government's aid agency GTZ, and is administered by SEWA Bank, which manages the Association's extensive savings and credit programme.

An annual premium of Rs75–360 provides different levels of life insurance and coverage for the costs of health care and property losses arising from floods, fires and communal riots. A small maternity benefit is also available. An alternative payment is by fixed deposit, the annual interest from the deposit being credited as the annual premium.

The two insurance company partners provide the coverage for life, health and asset insurance (life insurance is partly subsidised by the government). Maternity benefits and administrative costs are paid out of a fund established by GTZ. Another GTZ grant supports the programme's training and educational work.

By 2002, the insurance scheme had paid out claims totalling over Rs14m to more than 10,000 women.

S. Sinha, *Strength in Solidarity: Insurance for Women Workers in the Informal Economy* (Ahmedabad: Self Employed Women's Association, 2002).

Non-profit and community organisations could also play a part in lobbying governments and others to establish non-profit insurance schemes or to create the conditions that will encourage the spread of commercial insurance cover – if not for the poor, then at least for lifeline facilities such as hospitals, schools, power plants and bridges.

Informal insurance and social security systems are widespread among the poor in disaster-prone societies, though mostly in rural areas. Borrowing and

sharing are part of the social fabric in good times and bad. They comprise an important coping strategy during crises, when those who are suffering can call on neighbours or kinsfolk for food, materials or other support. Exchanges of food form an important part of famine mitigation strategies in Sub-Saharan Africa. Funeral or burial societies are found throughout the world, their members pooling funds to cover expenses related to the death of another member.

Custom on some of the *chars* (silt islands) in the Jamuna River in Bangladesh allows people who have lost their homes to erosion by the river to rebuild on anyone's land. It is understood that the favour will one day be returned: at some stage during their lifetime, most if not all of the islands' inhabitants will be forced to move as the river changes course.[15] In Uganda, self-help groups known as *Munno Mukabi* (Friend in Need Associations) save money that can be lent to members whenever a crisis strikes. Members also promise to make their labour available to others during a crisis or for a celebration.[16]

13.2.2 Micro-credit and other forms of micro-finance

Micro-finance programmes are numerous and widespread in many developing countries, with a massive outreach numbering millions of people. Many NGOs run savings and credit schemes, which often form an important element in their development programmes. Such organisations are also developing a wider range of financial services for poor people. Although there are debates on the extent to which micro-finance contributes to poverty reduction and its influence compared to other factors, it is generally acknowledged to play a significant role.

Micro-finance is also important in reducing vulnerability before disasters and supporting post-disaster recovery. Its considerable strategic potential in these areas is only now becoming understood and utilised. Organisations that manage savings and credit programmes for the poor – usually referred to as micro-finance institutions (MFIs) – should be more fully integrated in risk reduction initiatives.

Research shows that loans, which are primarily invested in productive enterprises that generate income, are also often used to cope with present or potential crises that threaten livelihoods – by laying in stocks of food, making improvements to farmland, repairing houses, buying tools or other productive equipment, digging wells and irrigation systems, acquiring new skills, or making gifts to family and friends so that reciprocal favours can be asked later. After a disaster, credit is used by victims to speed recovery by replacing

lost assets and helping them get back to work. Loans are often taken out to deal with household crises – especially those caused by sickness or death in the family (which has both emotional and economic consequences), but also by such shocks as food shortages, sudden price increases, loss of employment or theft.

Until recently, MFIs did not pay much attention to hazards and disasters. This position altered rapidly in 1998, when flooding in Bangladesh and Hurricane Mitch in Central America caused widespread death, injury and loss among members of savings and credit programmes – and, as a result, damaged the programmes themselves. In Bangladesh, more than 30% of MFI clients lost their houses or moved to safe places; 65% suffered losses or damage to business assets; and over 90% had to suspend income-generating activities for more than three weeks. Loan recovery rates fell from 92% to 43%; MFI staff could not locate borrowers or mobilise them for group meetings.[17]

Since then, MFIs have begun looking at how to protect themselves and their clients against risk. A number of studies and good practice guidelines are now available.[18] Most interest to date has been in dealing with the consequences of disasters. MFIs use a variety of methods to help those who are affected. Rescheduling loans has become a common practice. Writing off loans is undesirable, because it undermines long-term commitment by clients to repay as well as being a loss to the microfinance scheme itself. The terms of rescheduling have to be varied according to a number of factors including the nature and timing of the disaster, the community's cash flow patterns and the MFI's own financial situation.

Some MFIs provide emergency loan facilities to their clients to meet immediate needs for food, clean water or medicine. These too are made at lower interest rates or even without interest, although it seems that many clients prefer to borrow informally in such circumstances – from friends or relatives if they can, and from money-lenders if they cannot. Even where savings and credit programmes are available, informal borrowing remains important in poor communities, especially if it is to be spent on consumption, rather than invested in productive activity (at times of crisis, families go to great lengths not to use up their savings or sell off their other livelihood assets). They are more likely to take up emergency loans from MFIs if these can be made rapidly and come with few or no restrictions on the purpose for which they can be used.

Some post-disaster loans are made to replace or repair physical assets: equipment for income-generating activities such as cooking utensils or sewing machines; and rebuilding business premises. The objective of such

loans is to help households reconstruct their businesses and livelihoods. They tend to be relatively large amounts and are usually made once the relief period is over, at normal interest rates and with a longer repayment period. Only large MFIs can afford to make a large number of asset replacement and housing loans, and there is some evidence of higher than usual failures to repay. For this reason, few MFIs are prepared to make such loans. Some feel that the standard short-term working capital loan is best suited for disaster recovery.

MFIs need to react quickly in a disaster, in assessing the situation and planning their response. This is not always easy, for communications may break down. During the 1998 floods in Bangladesh, many local branches of MFIs were inaccessible and it was not until the water receded that disaster victims could withdraw savings, take out new loans or renegotiate old ones. Branch staff need training to manage in such circumstances, crisis management plans should be drawn up, and clear guidance is needed on lending policy and practice. MFIs should be linked to early-warning systems, and ensure that their clients are informed about potential disasters.

In the absence of other relief agencies, MFIs often undertake short-term relief work, especially if they are part of NGOs normally involved in other development and humanitarian activities. This can cause problems for staff who are not trained as aid workers. MFIs engaged in relief also need to communicate clearly to their clients that their efforts are temporary and one-off, and do not influence their primary role as providers of finance.

MFIs can prepare for disasters in many ways. In Bangladesh, it is common practice for MFIs to put a percentage of clients' 'compulsory savings' into an emergencies fund, which can be made available quickly to disaster-affected borrowers in the form of emergency loans (compulsory savings are regular deposits made by borrowers to build up collateral against their loans: normally they cannot be withdrawn while loan repayments are still outstanding). The Grameen Bank reported that 95% of its compulsory savings were withdrawn during the 1998 flood, while two-thirds of the clients of another large lending NGO withdrew more than half their compulsory savings. Such rapid, large-scale withdrawals caused problems for smaller Bangladeshi MFIs which had reinvested compulsory savings in their standard loan programmes: some could only release 25–50% of clients' savings.[19] The stricter the conditions attached to the use of compulsory savings, the more likely it is that poor people will turn to other sources of loans, including money-lenders.

MFIs may introduce preparedness and mitigation initiatives for their clients. This is more likely where the micro-finance programme or institution is part of

a larger NGO's portfolio. Some MFIs in Bangladesh have made subsidised loans for emergency preparedness purchases such as food, fuel, water purification tablets and rehydration tablets. Housing loans may be provided in normal times to help clients build in safer locations.

MFIs can encourage their clients to form insurance funds. In India, a federation of self-help groups called Vaigai Vattara Kalangiyam, encouraged by an MFI called PRADHAN, operates its own welfare/disaster insurance fund linked to the insurance scheme operated by the state insurance company and similar to the SEWA scheme described in Case Study 13.3. In Mali and Burkina Faso, MFIs have arranged for their clients to rent space in seed and grain banks to store cereals as a reserve during droughts and famine. Some MFIs insist that their members develop a contingency plan to deal with disasters. In Burkina Faso, this is reported to have been effective in reducing arrears in loan repayment during drought in 1995.[20]

Evidence of MFI-stimulated disaster mitigation activity is patchy. It seems that such initiatives have not been widely replicated. The potential appears to be considerable, however, which highlights the need for more dialogue between MFIs and other development and disaster management agencies about collaborative efforts to reduce risk.

One important lesson from the 1998 Bangladesh floods was the need to protect the MFIs themselves, which soon found themselves critically short of funds as their disaster-affected borrowers failed to make repayments. The practice of putting money aside into emergency reserves is becoming more widespread in areas with regular disasters such as monsoon floods, but this means that less money is available to lend to the poor on a regular basis, and it is harder to justify in places where disasters are less frequent. An alternative is to make savings and credit groups pay a percentage of their own loans into an emergency fund. In both cases, questions arise over ownership, rights of access, decision-making, and terms and conditions.

Like insurers, MFIs can spread their risk, by making sure that they serve poor clients in areas less likely to be affected by hazards, or by lending to people involved in more than one sector of the economy. For this, they need to undertake their own risk assessments. But even well-prepared MFIs are unlikely to be able to cope with disasters on the scale of those that hit Bangladesh and Central America in 1998. For such events, additional support is needed, which is why MFIs and international donors have begun to experiment with donor-backed reserves that can be released quickly in an emergency.

Case Study 13.4
Adapting micro-finance to disasters

Ashrai (the name means 'shelter' in English) was set up in 1991 to improve the social and economic conditions of tribal people in the Barind Tract in north-west Bangladesh. It works with some 1,200 village societies representing 25,000 families. The main activity is establishing and supporting savings and credit groups, mostly women's groups. It also has its own revolving loan fund, from which established societies can borrow in equal proportion to their savings.

From late 1997, a series of emergencies led Ashrai to establish and build up emergency loan funds. The first was set up in January 1998 to help 5,773 families affected by a severe cold spell to buy clothes and blankets. The Swiss Agency for Development and Cooperation (SDC) made a grant to establish the fund. Loans were to be repaid within 18 months, at an interest rate of 6% per annum.

However, many of the families were subsequently hit by the exceptional floods later that year. The previous emergency loans had to be rescheduled, and 2,794 new emergency loans were made to repair houses and buy seeds, tools and fertilisers. To do this, a second emergency loan fund was established with a second grant from SDC, again at 6% interest per annum but this time with a two-year repayment period that reflected the severity of the disaster. As in the preceding winter, the local Ashrai savings and credit societies and their umbrella organisations helped to identify the most needy.

In 1999, Ashrai and SDC decided to merge the two emergency loan funds into a single permanent fund for future major events.

Because of the impact of the disasters, people's capacity to repay the emergency loans was limited. By December 2000, the emergency fund had recovered 91% of the amount disbursed because of extreme cold, and 67% of its loans to flood victims.

Micro-finance in Disasters (London: British Red Cross Society (London: NGO Initiatives in Risk Reduction, Case Study 17, 2001), www.redcross.org.uk/riskreduction.

There is also potential for using non-financial credit – loans of seeds, tools or materials – to help reduce risk. This does not appear to have been explored

widely, other than in the case of grain and seed banks (see Case Study 15.3, page 264).

13.3 Chapter summary

- Economic development and poverty reduction are essential elements in any risk reduction strategy.
- Livelihood diversification is central to poor people's coping strategies, but is generally overlooked in disaster mitigation programmes.
- Greater wealth reduces risk by giving households more options at times of crisis and speeding their recovery from disasters. But livelihood assets do not protect themselves: they must be protected against hazards.
- Insurance is a standard and effective method of spreading risk, but commercial insurance is confined to richer countries and people, and insurers are reluctant to cover poor, high-risk groups.
- Insurance schemes for the poor run by micro-finance institutions and NGOs can be financially viable, but this is a new area of work and there is still much to learn about how to make such schemes effective.
- Micro-finance has the potential to play a significant part in reducing vulnerability before disaster, and supporting recovery.
- Most interest among micro-finance institutions has been in dealing with the consequences of disasters (e.g. through rescheduling loans or making emergency loans), although some work has been done to stimulate pre-disaster measures (e.g. creation of emergency funds, lending for specific disaster preparedness activities).

Notes

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7 J. R. Heywood, 'Natural Hazards as Problems for Insurers', in *Preventing 'Natural' Disasters – The Role of Risk Control and Insurance* (London: UK National Coordination Committee for the International Decade for Natural Disaster Reduction, 1995), p. 16.

8 D. R. Godschalk et al., *Natural Hazard Mitigation: Recasting Disaster Policy and Planning* (Washington, DC: Island Press, 1999), pp. 68-9.
9 W. Brown and C. F. Churchill, *Insurance Provision in Low-Income Communities, Part I: A Primer on Insurance Principles and Products* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 1999), www.mip.org/pubs/mbp_def.htm; W. Brown and C. F. Churchill, *Insurance Provision in Low-Income Communities, Part II: Initial Lessons from Micro-Insurance Experiments for the Poor* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 2000), www.mip.org/pubs/mbp_def.htm; Adamsdale, *Transferring Risk*.
10 Brown and Churchill, *Insurance Provision in Low-Income Communities, Part II*, p. 49.
11 Adamsdale, *Transferring Risk*.
12 Brown and Churchill, *Insurance Provision in Low-Income Communities, Part II*, pp. 66, 70.
13 *Ibid.*, p. 89.
14 Adamsdale, *Transferring Risk*.
15 H. Schmuck, *Living with the Floods: Survival Strategies of Char-Dwellers in Bangladesh* (Berlin: ASA-Programm of the Carl-Duisberg-Gesellschaft, 1996), pp. 70–71.
16 Sebstad and Cohen, *Microfinance, Risk Management, and Poverty*, p. 58.
17 *Rapid-Onset Natural Disaster Technical Briefs*, Brief 1 (Washington DC: Development Alternatives (Microenterprise Best Practices Project), undated), www.mip.org/pubs/mbp_def.htm.
18 *Ibid.*, Briefs 1–8; G. Nagarajan, *Microfinance in the Wake of Natural Disasters: Challenges and Opportunities* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 1998), www.mip.org/pubs/mbp_def.htm; J. Parker and G. Nagarajan, *Can Microfinance Meet the Poor's Financial Needs in Times of Natural Disaster?* (Washington DC: Development Alternatives (Microenterprise Best Practices Project), 2000), www.mip.org/pubs/mbp_def.htm; Sebstad and Cohen, *Microfinance, Risk Management, and Poverty*.
19 *Rapid-Onset Natural Disaster Technical Briefs*, Brief 3.
20 Nagarajan, *Microfinance in the Wake of Natural Disasters*, pp. 22, 27.

Chapter 14
Managing urban risk

14.1 Hazards, risk and vulnerability in urban areas

Half the world's population lives in towns and cities. Within 30 years, this proportion may rise to two-thirds. The rate of urbanisation is greatest in the South. About two-thirds of the world's current urban population – 1.9bn people – live in low- and middle-income nations in Africa, Asia, Latin America and the Caribbean. At least 600m of these are so poor that their income and other assets are not enough to provide their essential needs.

The causes of urban growth are varied and complex, but among the main ones are economic and environmental pressures driving poor people from the countryside to seek a living in the towns. Poverty and poor urban management mean that many cities in the South are expanding rapidly and in an uncontrolled way. This has led to severe social, economic and environmental problems. It is also putting ever-greater numbers of people at risk from natural and technological hazards.

The themes discussed in this book apply just as much to urban as to other settings. At the same time, managing urban risks presents several distinct challenges. These arise from the specific features of urban hazards and vulnerability, and from the socio-economic and institutional environment in towns and cities, which has a profound influence on the capacity of communities and municipal authorities to address risk effectively.

The following discussion draws heavily on the work of the International Institute for Environment and Development's Human Settlements Programme on urban environmental problems.[1]

14.1.1 Urban hazards

Environmental hazards are the main cause of ill-health, injury and premature death in urban areas of the South. People living in towns and cities in developing countries face a large number of environmental hazards. They include:

- *Biological hazards:* diseases caused by unclean water and poor sanitation.
- *Chemical hazards:* polluted water, indoor and outdoor air pollution from fires, chemicals, industrial processes and vehicles, dumped garbage and hazardous wastes.

- *Physical hazards:* fire, floods, housing on slopes at risk of landslides, earthquakes, cyclones, extreme temperatures, accidents due to inadequate infrastructure or facilities (e.g. open drains, missing manhole covers, lack of pavements and places to cross roads).

Many of these hazards are also present in rural locations, but they become particularly threatening in densely-populated urban areas. There is a strong likelihood of major urban disasters in future, especially in mega-cities, many of which are sited in earthquake zones or along coastlines struck by cyclones. Earthquakes in major urban centres were responsible for some of the greatest disasters in the 20th century – Tokyo in 1923, with 143,000 killed, and Tangshan in China in 1976, where the death toll was probably 250,000. The economic effects even of far less severe earthquakes can be colossal: damages resulting from the 1995 Kobe earthquake amounted to over $100 billion.

Man-made and technological hazards such as fires, pollution, industrial and road accidents assume much greater importance in towns and cities, where there are also particularly acute public health problems arising from pollution and inadequate sanitation in high-density settlements.

Air pollution presents particular problems for the elderly and children. This is a largely urban hazard (apart from indoor cooking fires, which are a hazard anywhere). Large numbers of people and vehicles and concentrations of industrial activities produce considerable volumes of air pollutants. Where these become trapped in the atmosphere, their concentration increases and people are exposed to them for longer. This is a particular problem in high-altitude cities: Mexico City is notorious for its air pollution; in Kathmandu the problem is growing rapidly. Air pollution is normally treated as a public health issue rather than a problem for disaster managers, but its consequences can be severe. An estimated 130,000 premature deaths and 50–70m incidents of respiratory illness occur each year due to episodes of urban air pollution in developing countries.[2] In Santiago, Chile, a $911m, 15-year programme to reduce severe air pollution from particulates, carbon monoxide and ground-level ozone was launched in 1998. It aims to prevent 11,000 premature deaths and 65m medical visits resulting from smogs in the city.[3]

Cities also tend to be much warmer than the surrounding countryside, and night-time cooling is lower than in rural areas. This 'heat island' effect is caused by the concentration of large heat-retaining structures, asphalt and concrete landscapes, physical obstruction of cooling breezes by buildings, and heat produced by industrial and domestic activities. In Mexico City, for instance,

temperatures can be 10°C higher than in surrounding areas.[4] Many cities are not well designed to deal with this problem. Ventilation and heat management are rarely considered seriously in urban planning, or taken into account in emergency planning, even in developed countries (see Case Study 14.1).

Case Study 14.1
Impact of an urban heat wave

Heat waves claim an estimated 1,000 lives each year on average in the US. A severe five-day heat wave in July 1995 caused 525 deaths in Chicago. In this as in other heat waves, older people were the prime victims: 73% of those who died were people aged 65 or more. African-Americans were nearly twice as likely to die from the heat as whites. Most deaths were in the inner city, where temperatures did not fall off much at night, and in homes without air conditioning or where residents did not operate air conditioning or fans because they could not afford to. There were suggestions that older people without air conditioning were afraid to leave doors and windows open at night to cool their homes down because of the perceived threat of crime.

Energy use for air conditioning and other cooling increased rapidly, leading to a power failure affecting over 40,000 people. Highways and railways were damaged by heaving and buckling of joints and rails. Many companies indicated that work efficiency was greatly reduced.

The municipal authorities did not respond well. Officials did not declare a heat emergency – which would have activated the city's heat emergency plan – until four days into the heat wave. This was a major factor in the high death count. Without advance warning, few inhabitants used Chicago's five 'cooling centers': places with air conditioning and other facilities for people to relax and rest. Thousands of heat-afflicted people had to be taken to hospital during the heat wave, but there were not enough ambulances available and fire engines had to be used. Hospitals could not handle the high number of admissions. In response to sharp public criticism, the city's mayor was forced to appoint a commission to discover what had gone wrong and what should be done in future. This led to a new, more comprehensive, warning and emergency plan for dealing with heat waves.

S. A. Changnon et al., 'Impacts and Responses to the 1995 Heat Wave: A Call to Action', *Bulletin of the American Meteorological Society*, vol. 77, no. 7, 1996, pp. 1497–1506.

Urban food security presents a potentially serious risk, especially in mega-cities. The level of urban populations' dependence on food brought in from outside and purchased in markets is very high and will remain so, especially in the largest cities. Serious problems can arise where food supplies are cut or prices rise beyond the reach of the poor, and this may happen suddenly as the result of political and socio-economic factors or natural hazards such as droughts and floods.

Little attention has been paid to this risk in disaster management circles, despite the obvious social and political consequences of food insecurity, the difficulty of identifying vulnerable groups in this context and the considerable operational challenge in obtaining large amounts of food and distributing it to the most needy.[5]

14.1.2 Urban vulnerability

Poverty, gender, class, caste and ethnicity are powerful influences on urban vulnerability, as they are in rural areas; but urban life adds new dimensions. Poor and marginalised people are likely to live in poor-quality housing, in neighbourhoods without clean water, drains and paved roads, where sanitation systems, garbage collection and public health services are inadequate. This makes them vulnerable to a variety of environmental hazards.

Poverty forces people to live in the most polluted and dangerous areas: river valleys, flood plains, hillsides, next to roads, waste dumps and hazardous industries. Where they lack legal title to their property – as in many urban settlements – and live in fear of eviction they have little incentive to invest in private or communal mitigation measures, and in any case have little money for doing so. Landlords are often unwilling to invest in their properties, and may raise the rents of those improved by their tenants. Local governments may refuse to provide services to informal settlements on the grounds that this will imply recognition of the inhabitants' right to the land where they have settled.

High housing and population densities magnify the effects of pollution and disease. Domestic fires, which are a significant risk in houses made of materials that burn easily, such as wood, thatch and cardboard, can, where homes are packed tightly together, easily get out of control. Industrial accidents can be devastating. According to official figures, the explosion at a chemical factory in the Indian city of Bhopal in 1984 resulted in nearly 3,000 deaths and 100,000 injuries; more than 200,000 people had to be evacuated.[6]

Case Study 14.2
Overcoming a food crisis in a mega-city

Indonesia's food security structures came under great pressure during the 1997–98 El Niño event, when drought reduced rice production and additional imports were needed. The government had sufficient operational capacity and access to financing to ensure that food was purchased and distributed, while donor agencies also embarked on food assistance programmes in rural areas, and large-scale severe food insecurity was largely avoided.

However, the Indonesian economy began to break down from mid-1998, largely as a result of rapid political change and insecurity. This put large numbers of people out of work, pushed up food and other prices and made it difficult for the government to obtain foreign credit to finance food imports. In the capital, Jakarta, levels of malnutrition increased, and it became clear that a large proportion of the population was suffering from food insecurity.

The Indonesian government's programme to provide food at subsidised prices to those in need was put under considerable pressure. NGO-managed food distribution was not a realistic alternative, because of the scale of the operation and the fact that the NGOs with relevant experience were working in rural areas.

The alternative supported by one international donor was to use existing commercial channels. Indonesian firms ground imported wheat into flour and used it to produce noodles, which are an important part of the urban diet. These were sold through normal outlets – retailers and pavement stalls and restaurants frequented by the poor – with prices fixed at levels that were affordable but nevertheless commercially viable. Although it took time to get the project going, it was able to reach approximately a million people per month over a period of eight months.

C. Kelly, *Acute Food Insecurity in Mega-Cities: Issues and Assistance Options* (London: Benfield Hazard Research Centre (Working Paper 7), 2003), www.benfieldhrc.org.

Uncontrolled urban development damages the environment and increases risk. Deforestation, land clearance and subsequent construction may expose hillsides, making them more vulnerable to landslides. Natural drainage is impeded

Urban vulnerability: a hillside urban slum in Lima, Peru

when flood plains are built upon. Unregulated construction leads to unsafe buildings, and here the middle classes are also likely to be vulnerable: many of the fatalities in earthquakes have been in badly-built apartment blocks.

Urban life has a profound impact on livelihoods and coping strategies. Town-dwellers rely on cash income from their labour to a much greater extent than those who live in the countryside. Livelihood strategies are therefore heavily based on finding paid work. Moreover, the poor are more likely to undertake dangerous work.

Social capital in the form of community organisations and support networks may be weak in new, relatively unstable urban communities, especially those that comprise many different social groups. Newcomers are likely to lack experience and understanding of specifically urban hazards and avoidance strategies.

Dependence on public support systems and structures (power, water supplies, public transport infrastructure and emergency services) and external food supplies is much greater in urban areas. Politicians and officials have to be lobbied to make improvements to services, but the poor tend to have the least political influence. City and municipal authorities often lack the resources and political will to control pollution, provide adequate infrastructure and services, make suitable land available to poor people and implement large-scale mitigation measures.

14.2 Urban risk reduction: constraints and opportunities

14.2.1 Local-level mitigation

The preceding discussion suggests that options for reducing urban risk through local-level initiatives are limited. It is true that only action by municipal authorities can reduce pollution and other sources of risk on a significant

Box 14.1

Physical vulnerability to natural hazards in urban areas

Buildings and physical infrastructure which may be vulnerable to the effects of natural hazard events include:

- Older residential buildings in densely-populated areas, which have been poorly maintained, altered or extended, or are overcrowded.
- Buildings erected before adequate standards and controls were designed, or that have been built without observing standards and regulations.
- Unplanned, 'informal' settlements in marginal, hazard-prone areas, where houses do not incorporate safety features.
- Modern buildings of poor design or construction quality.
- Communication and control centres concentrated in one area.
- Hospital facilities that are insufficient for treating large numbers of casualties or which may not be accessible in a disaster.
- Schools and other community buildings that have been built to low construction standards or which cannot be used as emergency shelters.
- Poorly designed or badly built roads, railways, bridges and viaducts, embankments and culverts, whose collapse could prevent access by the emergency services, movement of relief supplies and evacuation of casualties.
- Narrow streets that become blocked with debris and stalled traffic, also impeding emergency assistance.
- Water mains that are liable to rupture, resulting in pollution and disease.
- Sewers that flood, spreading disease.
- Electrical supply lines and systems, which are liable to failure.
- Gas mains that rupture, with the risk of fires.
- Industrial facilities that are damaged, leading to leakage of hazardous chemicals or to fires and explosions.

Institution of Civil Engineers, *Megacities: Reducing Vulnerability to Natural Disasters* (London: Thomas Telford, 1995), pp. 17–18.

scale, ensure the resilience of public infrastructure, manage mass evacuations and maintain emergency services, and – with additional support from national governments – reduce the pressure from the many underlying socio-

economic forces that make urban dwellers vulnerable. Nevertheless, it is possible to make a difference at local level, and even relatively small-scale interventions can have a meaningful impact. The kinds of improvement that can be made at this level include the following.

Better water and sanitation

Reliable supplies of clean water and adequate sanitation and sewerage systems are essential to reduce water-related infections. Low-cost technologies for putting up stand-pipes and building latrines and drains have long been available and, with full community participation, extensive water and sanitation systems can be installed (see Case Study 14.3).

The importance of making such facilities disaster-resistant is sometimes overlooked, but this too is relatively simple in technical terms. For example, in areas regularly visited by floods, water pipes and pumps can be raised above anticipated water levels, latrines can be sited where they are less likely to be flooded, drains and sewers can be designed to cope with large volumes of water, and regularly-spaced manholes can give easy access to drains and sewers if they need to be unblocked.

Improved storm and surface water drainage

This reduces flooding and the risk of water-borne diseases, and eliminates breeding sites for mosquitoes and other disease vectors. Blockage of drains by plastic bags and other rubbish is a major cause of urban flooding, but can easily be resolved through community action.

Technical improvements should be planned with careful thought to their consequences. For example, slum dwellers in Indore, India, interviewed in 1994, reported that flood drainage had worsened since the replacement of open drains with closed ones. The open drains were larger and less easily blocked, and rubbish and excreta left on the streets were washed into them to be taken away. Some of the new – blocked – drains 'backed up', depositing water and sewage in people's homes.[7]

Management of solid waste

The main element of this is removal of garbage to reduce the risk of disease and prevent blocked drains. Some activities, such as sorting household waste, can be managed relatively easily at community level.

Case Study 14.3
Community-based sanitation

The Orangi Pilot Project (OPP) in the city of Karachi, Pakistan, is well-known internationally as an example of a large-scale, long-term initiative based on the skills and resources of the urban poor. Established in the 1980s in Orangi, one of Karachi's poorest districts, the OPP's programme of building low-cost underground sewers had, by 2001, benefited over 92,000 families (almost 90% of the settlement) and the community had invested over 82m rupees (approximately £924,000) in the system. With the elimination of the old open sewers, infant mortality rates fell greatly (from 130 per 1,000 live births in 1982 to 37 per 1,000 in 1991), mobility was easier and the cleaner open spaces in front of houses created safer play areas for children and space for social contact and recreation.

Although Orangi's sloping terrain helped drainage and hence made construction of the sewerage system easier and cheaper than it would have been on flatter ground, the main reason for the initiative's success has been OPP's firm insistence on making community organisations the primary players and refusing external funding, which it believes would make communities dependent on outsiders and make projects less cost-effective. Although OPP provides technical advice and encouragement, community organisations direct the projects, which use local labour and materials. The communities are responsible for raising the funds to pay for the work.

OPP's achievements have attracted considerable interest from aid agencies and led to many attempts to replicate the approach elsewhere, with varying degrees of success. OPP has provided training and advice to municipal government and other projects. It has also achieved some striking successes in lobbying against proposals for donor-funded sewerage schemes and presenting lower-cost alternatives.

A. Zaidi, *From the Lane to the City: The Impact of the Orangi Pilot Project's Low Cost Sanitation Model* (London: WaterAid, 2001), www.wateraid.org.uk/site/in_depth/in_depth_publications.

Flood and landslide defences

A number of appropriate-technology measures can be implemented at local level. For example, many urban households and communities implement small-scale structural improvements, temporary or permanent, to protect against flood water and the pollutants it carries: houses are put on raised plinths, or where this is too costly doorsteps and house fronts are raised; concrete slabs or rubble and other landfill materials are used to create paths through standing water; inside houses, there are shelves and raised platforms to store goods safely, and electricity connections are put at head height.

Flooding can also be curbed by planting trees and other vegetation to absorb rainwater; the creation of open spaces assists this. Landslides have been controlled by building retaining walls out of old car tyres (see Chapter 10.2.2, page 147).

Creating safer living environments

This can take many forms. Within the home, use of alternative household fuels can reduce the risk of indoor air pollution and fires. Better-quality housing provides greater resilience to certain types of hazard. Less crowded settlements minimise risks to large groups of people and provide escape routes and safe places, but this can be difficult to manage where pressure on land is great.

Relocation, and avoiding hazardous areas

These measures are often suggested as a solution to disaster risk, but there are serious problems associated with them. Relocation to less hazardous areas is highly effective in reducing physical risks, but overlooks the centrality of livelihood security to vulnerable people and the intensity of the socio-economic pressures that drive them to occupy hazardous land.

People settle in hazardous locations for a variety of reasons, but the main ones are livelihood-related:

- rents are cheaper;
- they are closer to places of employment and job opportunities;
- there is access to markets (for buying and selling), health services, schools, electricity and water; and
- in central locations, they are more visible to the public, which means that there is a better chance of receiving funds for improvements.

Relocation schemes, on the other hand, tend to involve sites on the edges of cities. Land may be more readily available and affordable here, but jobs and many other facilities are not. For this reason, relocation is often resisted by vulnerable groups, although pressure can be brought to bear on them to move. In some cases, there are suspicions that relocation of communities is a pretext for land to be cleared for more commercial development.[8] Handled sensitively, and with full community participation, relocation can bring benefits, but it is a complex process (see Case Study 14.4).

Better working environments

Improved health and safety practices reduce the risk of disease and injury from unsafe working conditions and exposure to hazardous materials.

Lobbying for better environmental management

This includes calling for improved water and sanitation, health and safety at work, and curbs on polluting industries and practices. It means targeting private-sector polluters as well as public authorities. This is a necessary task but a difficult one, as the private sector is powerful and resistant to pressure, while public authorities may be unable or unwilling to support community groups to challenge industrial practices that create risk.

There are instances of community organisations fighting successfully against pollution and commercial developments that threaten them, but there are many more examples of failure. For example, one-third of industrial enterprises surveyed in the city of Lahore, Pakistan, had received complaints about pollution from local groups and people, but none had made any significant efforts to improve their practices.[9]

Urban agriculture

Towns and cities largely depend on actions at national and even international levels to ensure adequate and affordable supplies of food; NGOs do not have the capacity to manage acute, large-scale urban food crises (see Case Study 14.2). However, local-level agencies can play a role in food monitoring and distribution.

They are also well placed to exploit the potential of urban agriculture, which is surprisingly extensive, especially in Africa and on the edges of towns and cities, and has grown significantly since the late 1970s in response to need. Globally, about 200m urban dwellers are also urban farmers, providing food and income to an estimated 700m people. Evidence from cities across the

Case Study 14.4
Community participation in relocation

The city of Santo André, with 62,500 inhabitants, is part of the metropolitan region of São Paulo, one of Brazil's largest industrial centres. About 15% of the population lives in slums located in flood- and landslide-prone areas.

In 1997, under its slum upgrading programme, the municipality identified the Sacadura Cabral settlement, where 780 families lived, as a priority area. The settlement was prone to flooding every year and was very densely populated (853 people/hectare). To achieve upgrading and reduce flood risk, it was necessary to level the area with earth and relocate some 200 families to nearby areas.

The initial top-down, random-selection method for identifying families to be moved was strongly resisted by local people, so it was dropped and replaced with a series of meetings with communities and their leaders. A new proposal was then developed jointly, which comprised:

- construction of 200 apartments in a housing complex one kilometre from Sacadura Cabral, and the relocation of 200 families to live in them (at the end of 1998);
- subsidised credit for the families that acquired the apartments;
- demolition of the relocated families' homes and levelling of the land, followed by a process of internal relocation within the settlement and levelling of the rest of the flood-prone area;
- reconstruction of homes by the people concerned, with technical assistance from the local government.

Selection of the families to be moved was undertaken in consultation with the community, on the basis of agreed criteria including income levels and family size. Several planning meetings were held throughout the settlement.

M. G. G. Oliveira and R. Denaldi, 'Community Participation in Relocation Programmes: The Case of the Slum Sacadura Cabral in Santo André – Brazil', *Open House International*, vol. 24, no. 3, 1999, pp. 24–32.

South has shown that urban agriculture can have a considerable impact on local food production and consumption, as well as livelihoods. There is

probably much that can be done to promote and develop it. At the same time, urban agriculture can bring its own hazards, such as creating breeding sites for mosquitoes through irrigation, exposure to pesticides, contamination of crops from the presence of lead and other heavy metals in the soil, and contamination from the use of human excrement as fertiliser.[10] The potential gains and risks of urban agriculture projects should be considered carefully by organisations working at local level.

14.2.2 Community-based approaches

Formal and informal social organisations exist in every part of a town or city where people live and work. But the notion of a 'community' may be quite different from rural areas, because in an urban district there is often a complex mix of very different social groups within a small area. The locus of organisation for people may be their neighbourhood – the district where they live – rather than a social community.[11] This presents problems to NGOs and other agencies trying to establish locally-based mitigation initiatives. The mutual suspicion that often exists between officials and people living in informal settlements adds to the difficulty.

Nevertheless, many communities are willing to undertake risk-reducing measures collectively where they are able to do so. For example, a survey of households in the Albouystown district of Georgetown, Guyana, found that, even though relatively few people were members of community-based organisations, 63% of those interviewed cleaned drains with their neighbours, and 53% cleaned streets with their neighbours.[12] The Orangi Pilot Project (Case Study 14.3) and other schemes inspired by it in Pakistan demonstrate that community-based action is possible on a relatively large scale.

Participatory initiatives (see Chapters 7.4 and 8) can help to break down barriers between social groups as well as identifying opportunities for local-level action. Community vulnerability analysis and action plans can be used in advocacy, and other stakeholders – city government departments, NGOs, academic institutions – can be brought into urban action planning processes.[13] There are indications that such approaches have galvanised community action in risk reduction, and stimulated greater cooperation with officials (see Case Study 14.5), but more thorough documentation and analysis are needed to understand how this process works in different contexts.

It is useful to distinguish between 'private' and 'public' space when implementing community-level risk reduction measures in urban areas. Most

Case Study 14.5
Building bridges in Lima

The Caqueta district in Peru's capital, Lima, grew rapidly in the late 1980s, and by 1999 was estimated to be housing 15,500 people living in buildings ranging from wooden shacks to constructions of adobe and concrete. A 30-foot-deep ravine formed by the Rimac river crosses the district. Landslides at its edge are frequent, damaging and destroying squatter housing.

Several initiatives have been discussed to solve the problem of the ravine. They include covering it with a lightweight structure on which industrial enterprises could be built, and relocating residents and removing all buildings and infrastructure. But none of these essentially large-scale, technological approaches has been implemented, owing to their complexity and cost, lack of political will and administrative coordination, and failure to consult with local people, who do not want to move away from their places of work.

A different approach was attempted by a local NGO, Instituto Para la Democracia Local (IPADEL), with support from external consultants. The project team carried out an evaluation of local hazards, vulnerabilities (physical and social) and capacities, based on surveys, questionnaires and participatory workshops with market and housing association representatives.

The evaluation's findings fed into a three-day planning workshop attended by representatives of municipalities, traders' and residents' associations, local NGOs and the fire services. Several ideas for reducing risk were put forward. Two were accomplished by the project. The first was to improve the pedestrian bridge across the ravine by installing protective sides high enough to prevent children from falling off.

The second initiative was to reduce fire risk in the local markets. Several planning and training workshops were held involving traders and firemen. One consequence of the work was an improvement in relations between the two groups. Fire-fighters had previously been seen as part of the municipal authority and, given a tradition of tensions between the authority and market traders, as hostile to the traders.

D. Sanderson, 'Implementing Action Planning to Reduce Urban Risk', *Open House International,* vol. 24, no. 3, 1999, pp. 33–39.

people will take steps to protect their own homes, as far as they are able, but the extent of their responsibility for protecting public space may be less clear. Urban residents are likely to feel that it is the municipal authorities' responsibility to take care of streets, drains and other communal facilities. Yet the boundary between private and public space may be drawn differently in different areas. In one community, keeping lanes clear of refuse and debris may be seen as a community responsibility; in another, it may be seen as the authorities' task. A community's willingness to take on responsibility for managing environmental risks also depends on how far it feels government should, and can, do so.

14.2.3 Partnership

Local-level activity must be linked to town- or city-wide measures to improve services and mitigate the impact of hazards. Without this, local initiatives will always be threatened by external pressures. Towns and cities are affected by pressures coming from beyond their boundaries, but local organisations can only address these through advocacy. This makes it particularly important to develop risk management partnerships between communities, grass-roots organisations, NGOs, municipal authorities and others (see Case Study 14.6).

The introduction of Local Agenda 21s – programmes for addressing environmental problems, mandated by the Agenda 21 programme agreed at the Earth Summit in Rio in 1992 – has created space for better partnerships by moving environmental planning into the public arena, providing for more extensive public consultation and partnerships. Local authorities are being encouraged to think less about doing everything themselves, and instead to put greater effort into creating 'enabling frameworks' that facilitate partnerships between groups. Within its comprehensive environmental coverage, Agenda 21 includes problems of human settlement planning and management in disaster-prone areas.[14]

A number of other international initiatives address aspects of urban risk reduction, focusing particularly on municipal authorities (see Box 14.2).

Much of the attention being given to disaster risk in urban areas has concentrated on the problems of cities. Here, the scale of the problems makes involvement of municipal and even central governments particularly important. But most of the urban population in developing countries does not live in cities but in smaller market towns and administrative centres. It is in such places that most urban growth is taking place. Here, it can be easier to create the partnerships needed to tackle problems at local level – and it is arguably

Case Study 14.6
Collaborative action planning for earthquakes

The Kathmandu Valley Earthquake Risk Management Project (KVERMP) is one of a number of initiatives in South and South-East Asia under the Asian Urban Disaster Mitigation Programme (see Box 14.2). The Kathmandu Valley, with a population of over a million people, is vulnerable to earthquakes. It has not suffered a major earthquake since 1934, but many experts believe that another is long overdue.

KVERMP has addressed several aspects of risk reduction by developing a scenario and action plan, making schools safer by retrofitting, raising public awareness and building the capacity of local institutions.

The first step was to assess the valley's earthquake risk. The project did not attempt to develop a new, improved assessment of this risk, which would have been a complex, costly exercise. Instead, it chose to present what was already known about that risk in a form that was understandable to officials and the public. This made it easier to involve a range of groups in the subsequent action planning. About 80 different organisations, mostly from government but also including NGOs, academic institutions, businesses and donors, were involved in creating the action plan. Many different risk reduction measures were proposed, and project staff visited participating organisations to discuss these, and the feasibility of including them in the plan. A draft plan was then distributed to all the stakeholders for comment.

The final draft was presented at a two-day workshop attended by 85 representatives of all the organisations involved, who discussed its approach and contents and helped to set priorities. The agreed action plan was printed and launched by the Prime Minister at an event to mark the country's annual Earthquake Safety Day, and distributed widely. It is used regularly in training and orientation programmes, and has generated considerable debate and feedback among local inhabitants, policy-makers, administrators and scientific and technical specialists.

A. M. Dixit et al., 'Mitigation Planning and Implementation: Experiences of KVERMP', in *Proceedings: Regional Workshop on Best Practices in Disaster Mitigation. Lessons learned from the Asian Urban Disaster Mitigation Program and Other Initiatives, 24–26 September 2002, Bali, Indonesia* (Bangkok: Asian Disaster Preparedness Center, 2002), pp. 181–87.

Box 14.2
International initiatives in urban risk reduction

The Healthy Cities Programme, run by the World Health Organisation (WHO), attempts to improve public health through better control of environmental and other hazards. It seeks to put health higher on decision-makers' agendas, build up a lobby for better public health and develop popular, participatory approaches to dealing with health problems. At town/city level, it is implemented by local teams drawn from government, NGOs, communities and other organisations, with technical back-up from WHO offices. Several hundred towns and cities have received the 'Healthy City' designation – i.e. they are undertaking or planning new initiatives involving collaboration between government and community organisations. These have included upgrading poor people's housing, improving sanitation in informal settlements, improving drainage to prevent flooding, better waste management, and more integrated planning.[15]

The Asian Urban Disaster Mitigation Programme (AUDMP), managed by the Asian Disaster Preparedness Center in Bangkok, is a six-year initiative covering eight countries in South and South-East Asia. It aims to establish sustainable public and private sector mechanisms for disaster mitigation, and to promote the replication and adaptation of successful approaches. Its activities comprise demonstration projects in each country to assess, design and implement measures to mitigate a number of natural and technological hazards, information-sharing and networking, and training.[16]

In 1998–99, the UN ISDR's Risk Assessment Tools for Diagnosis of Urban Areas against Seismic Disasters (RADIUS) project worked in nine cities to develop risk assessment methods, raise public awareness and produce action plans. Post-project evaluations have provided examples of the action plans being used for emergency training, urban development planning and updating official disaster management structures. The assessment tools are also being adopted by other towns and cities.[17]

Local Authorities Confronting Disasters and Emergencies (LACDE) is a worldwide network of local authorities and other organisations seeking to increase local government's understanding and capacity to deal with disasters of all kinds. Its main activities are well-attended annual conferences and a newsletter.[18]

more vital to do so, in view of the relative neglect of this issue in such towns and the often limited capacity and resources of local government for managing disaster risk.

Environmental deprivation is increasingly being recognised as an important dimension of urban poverty, which means that poverty reduction programmes are considering environmental issues, including hazards. Local Agenda 21s have furthered this process. Opportunities to bring the poverty, environmental and risk management agendas closer together are probably better here than in other contexts.

14.3 Chapter summary

- Rapid and uncontrolled urbanisation is putting ever-greater numbers of people at risk from natural and technological hazards.
- Environmental hazards are the main cause of ill-health, injury and premature death in urban areas in developing countries and there is a significant risk of major urban disasters in future.
- Man-made and technological hazards are particularly important in towns and cities.
- Poor and marginalised people are more likely to live in unsafe areas and housing, and in densely populated districts where the impact of hazards and disease is magnified.
- Urban vulnerability is distinctive in terms of the composition of livelihood and coping strategies, the nature of social capital and the level of dependence on public support systems and structures.
- Only action by municipal authorities can reduce risk on a significant scale, but it is possible to make a difference at local level in, for example, improving water, sanitation and drainage systems, constructing flood and landslide defences and creating safer living environments.
- Avoidance of hazardous areas and relocation to safer ones are often suggested as a solution, but are rarely feasible given the intensity of the socio-economic pressures that force people to live in dangerous locations.
- There are many opportunities for partnerships between communities and other groups.

Notes

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5 C. Kelly, *Acute Food Insecurity in Mega-Cities: Issues and Assistance Options* (London: Benfield Hazard Research Centre (Working Paper 7), 2003), www.benfieldhrc.org.
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15 *WHO Healthy Cities: A Programme Framework* (Geneva: World Health Organisation, 1995), www.who.int/hpr/archive/cities/docs/hc_framework.pdf; *Building a Healthy City: A Practitioners' Guide* (Geneva: WHO, 1995), http://www.who.int/hpr/archive/cities/docs/hc_guide.pdf.
16 The AUDMP's website is: www.adpc.ait.ac.th/audmp/aboutaudmp.html.
17 RADIUS' website is www.unisdr.org/unisdr/radiusindex.htm.
18 LACDE's website is: www.ulai.org.il/lacde.htm.

Chapter 15
Slow-onset disasters

15.1 Introduction

Writing on disasters usually distinguishes between rapid-onset events and slow-onset events. The critical factor here is said to be the nature of the hazard concerned.

Hazards that arise suddenly, or whose occurrence cannot be predicted far in advance, trigger rapid-onset disasters. Earthquakes, cyclones and other windstorms, landslides and avalanches, wildfires, floods and volcanic eruptions are usually categorised as rapid-onset events. The warning time ranges from seconds or at best a few minutes in the case of earthquakes and many landslides, to several days in the case of most storms and floods. Some volcanic eruptions may be preceded by weeks or months of activity, but predicting volcanoes' behaviour remains very difficult and the warning time for the eruption itself may be only days or hours. Most disasters are rapid-onset events.

Most discussion of slow-onset disasters concentrates on one hazard: drought. It can take months or sometimes years for the results of drought to become disastrous, in the form of severe water and food shortages and, ultimately, famine. Drought is not the only relevant hazard, though. Pollution of the environment can also be considered a slow-onset disaster, particularly in cases of growing concentrations of toxic wastes, which may build up over years. Human activities that degrade the environment and damage ecosystems – deforestation for instance – also contribute to disasters. Their cumulative impact may not be felt for decades, although the hazards that they make more likely, such as flash-floods and landslides, may be sudden-onset events.

To some extent, the distinction between slow- and rapid-onset disasters is artificial. Hazards certainly can be categorised in this way. Disasters, on the other hand, are the product of hazards and human vulnerability to them. The socio-economic forces that make people vulnerable may act quickly or slowly, but in most disasters it is likely that long-term trends will be more influential. When viewed in this light, it could be argued that all disasters are slow-onset. This Good Practice Review argues for a long-term, holistic approach towards managing risk that also breaks down the distinction between slow- and rapid-onset disasters.

Why then have a separate chapter on slow-onset disasters? There are two related reasons. First, because real-life disaster management often does distinguish between rapid- and slow-onset events. The approaches that have been developed for dealing with slow-onset hazards such as drought may differ from those used against other hazards. The documentation of such work is generally much better here than in other disasters, and there is a greater volume of high-quality research and analysis.

The second reason is that, in the management of drought and food security, and in environmental renewal initiatives, development agencies play a much more significant role than they do in sudden-onset disasters. This may offer lessons about how to get the development community more involved in disaster management generally. Mitigation of drought and food security is more advanced than mitigation of many other types of disaster in integrating livelihood issues with disaster management, adopting participatory and community-level approaches, and building upon indigenous knowledge, coping strategies and appropriate technologies.

15.2 Environmental degradation and pollution

15.2.1 Environmental degradation

There is a strong link between environmental degradation and increased risk from natural hazards. Bad management of natural resources and destruction of the eco-system make disasters more likely. For example, the removal of trees, bushes and other vegetation in the course of building, farming or other commercial activities can create hazardous conditions. In agricultural areas it accelerates the loss of fertile topsoil to wind and water erosion. Water is no longer held in the soil by vegetation and so runs away rapidly, which increases vulnerability to drought. On hillsides, rapid water run-off can cause flash-floods and landslides. In coastal zones, the destruction of mangrove forests removes a natural barrier to the winds and sea surges created by tropical cyclones.

In all these cases, environmental protection or renewal is technically feasible. Natural resources can be managed and replenished through such measures as reforestation and other planting, waste management, environmentally sustainable farming and grazing practices, terracing, and building protective stone and earthworks to prevent rapid water run-off. Countless projects of this kind have been undertaken. Complementary activities include environmental education.

Attempts to protect the environment often challenge powerful interests that stand to gain from its destruction: timber companies from logging; ranchers

from stripping land of woods, hedges and bushes; shrimp farms and hotels from tearing up mangroves. The example of the Afro-Honduran Garifuna communities in Chapter 12 illustrates how difficult and even dangerous it can be to make such challenges. More generally, economic and demographic pressures on poor countries, coupled with entrenched political and cultural attitudes, inhibit an effective response to recognised environmental crises. The failure of the Soviet Union and the post-Soviet Central Asian republics to deal with the drying up of the Aral Sea is a good example of this.[1]

15.2.2 Pollution

Major industrial disasters are often rapid-onset: the result of industrial or transport accidents causing explosions and fires of flammable material or the release of oil, chemicals or radioactive material. The chemical leak at Bhopal in India in 1984 and the accident at the Chernobyl reactor in Ukraine in 1986 are the best known recent examples. Although the number of such industrial disasters remains low and there are still relatively few casualties compared to those from natural hazards, their numbers are rising with the spread of industrialisation in developing countries.[2] However, the impact of pollution may not be felt for decades as volumes of waste accumulate and growing numbers of people are exposed.

Although local-level management of some forms of waste and pollution is feasible, significant reductions in pollution and improvements in waste management require the involvement of the state in setting and enforcing standards and providing adequate public facilities. Communities and their organisations can encourage this through vigorous advocacy (see Chapter 12). In many instances, specialist scientific and engineering expertise will be required, especially in the case of extremely toxic wastes.

Community organisations, NGOs, researchers, governments and other agencies should work together to tackle major problems of this kind collectively – the 'partnership' approach to disaster management set out in Chapter 5. The difficulty of creating successful partnerships should not be underestimated, especially in the case of industrial pollution where the demand for better protection may conflict with business aims. Case Study 15.1 shows how agencies have responded to a major crisis resulting from groundwater pollution.

The connections between climate change and hydro-meteorological hazards such as droughts and cyclones are becoming apparent, backed up by a growing body of scientific evidence.[3] Although climate change specialists and

Case Study 15.1
Arsenic pollution in Bangladesh

In the early 1990s, high concentrations of arsenic were reported in groundwater in western Bangladesh. Arsenic is a cumulative and potentially fatal poison, and many of the more advanced symptoms of poisoning are incurable. About 25m people have been exposed through drinking water from tube wells, and over 7,000 cases of arsenic poisoning have been confirmed. Fifty-nine of the country's 64 districts have some arsenic-contaminated groundwater.

There has been considerable debate about the source and release mechanisms. It is now widely accepted that the arsenic is of natural, geological, origin, although it is less certain how it gets from sediments into groundwater.

In response to a potentially massive disaster, international agencies, the government of Bangladesh, scientists and local NGOs have put considerable effort into researching the problem and identifying and implementing solutions. The costs of this work run into millions of dollars. Activities undertaken to date have included:

- testing water supplies (using specially developed field test kits) and monitoring cases of arsenic poisoning;
- data collection and analysis based on geochemical surveys and further research on the mechanisms by which arsenic is released;
- promoting methods of removing arsenic from water (e.g. filters) and researching new methods;
- finding arsenic-free sources of water (e.g. digging deep tube wells that go beneath the arsenic-bearing sediments, rainwater harvesting);
- training doctors and health workers to identify and treat arsenic poisoning, and developing patient treatment protocols;
- public education; and
- information dissemination and networking among professionals.

E. Jones, *Arsenic 2000: An Overview of the Arsenic Issue in Bangladesh* (Dhaka: WaterAid Bangladesh, 2000), www.wateraid.org/site/in_depth/research_centre/groundwater/183.asp.

disaster managers have begun talking to each other, the way forward in coping with the threat remains far from clear.

At a global level, advocacy to reduce greenhouse gas emissions is essential, and there is already a substantial alliance of scientists, environmentalists and some businesses (notably insurers) engaged in this. At local levels, disaster managers are unsure what they can do about climate change beyond what they are already doing to minimise risk. How can they calculate the increased risk due to this problem? How far should their existing disaster planning be stepped up to counter the threat from climate change? As yet, there are no answers to these questions, but they are needed urgently.

15.3 Drought, food security and famine

More than 70m people died in famines during the twentieth century.[4] There have been many major, high-profile food crises over the past 30 years. Most have been in Africa. Many have been triggered by drought, but other hazards including floods, harsh winter weather and diseases that affect crops and livestock can also act as triggers.

©ITDG/Annie Bungeroth

Sudan: harvesting aubergines grown in holes to collect water, reduce evaporation and provide shade

Natural hazards are only one factor in food crises. Political, economic and social factors, including conflict, can be powerful contributors. The macro-economic policies of governments and international agencies have played a considerable role in creating food insecurity and famine (see Case Study 2.2, page 18). In some countries, food aid has become a regular, even continuous, component of government development plans and programmes: Ethiopia and Iraq are prominent examples, though for different reasons. The food crisis in Southern Africa in 2002 revealed the influence of the HIV/AIDS pandemic on food insecurity. Research on the likely consequences of global warming indicates that areas already prone to drought are likely to suffer even more severely in future.

These are massive challenges to overcoming famine and food insecurity. Many argue that the challenges are growing and becoming more complex. However, understanding of the causes of food insecurity

and famine has advanced greatly in the past 30 years or so. Also during that time, numerous advances in practice, from local to international levels, have greatly enhanced the capacity to improve food security and predict and prepare for crises. The adoption of community-based approaches, appropriate technologies and indigenous knowledge is significant, as is the growing integration of food security initiatives with those seeking to support livelihoods more broadly.

Food security is complex, and the literature on the subject is extensive. Experience is widespread among development agencies. There is plenty of good general guidance on issues and operations for project planners, on which much of this overview is based.[5]

15.3.1 Understanding 'food security'

There is no fixed yardstick for measuring food security. It is not simply a case of people having enough to eat; rather, it is:

> *when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.*[6]

This depends on people being able to buy food or obtain it in other ways, such as in exchange for their services (e.g. labour) or borrowing from members of their extended family or community. This, in turn, depends on them having sufficient income, savings and other material assets, skills or social connections to obtain food. It also depends on external factors such as the price of food in the market.

Control of the supply and distribution of food is another important dimension. Some members of a household have little influence over how food is distributed. Children depend on the food they are given by adults. Male children and adults often get more food than females. Providing adequate food for elderly family members may not be a priority when times are hard. Sometimes decisions about food distribution are made on the basis of economic rationality – for instance, a family member who brings in a regular wage may get priority – but power relationships and cultural practice are also influential.

There can be pockets of food insecurity almost anywhere – within countries, communities and families. Hence, monitoring and analysis of food insecurity should take place at different geographical and social levels, as well as at different times of the year (see Section 15.4, below).

Food security is not a mere question of there being enough food *available* – rather, it reflects the fact that people do not have equal *access* to food because of differences in the resources they possess and other economic, social and political factors. This theory of people's differing 'entitlements' to food, first advanced by the economist Amartya Sen in the 1970s, has transformed the way many aid and development agencies view food insecurity and famine, and has two important implications for any agency seeking to reduce the risk of food insecurity.

First, it shows that there are many different ways of overcoming food insecurity by improving people's ability to obtain food. These include conventional food production practices (e.g. promoting improved farming techniques), standard drought mitigation practices (e.g. soil and water conservation), and better management of natural resources such as forests and watersheds. They can also include measures to support livelihoods generally, such as projects to create jobs and increase incomes, savings and credit programmes, improving the quality of water supplies and sanitation (poor health is an important contributor to malnutrition), better education for women (known to be an important factor in reducing malnutrition at household level), helping local markets for food and other products (through better access roads and footpaths, or better methods of packaging and preserving perishable products for sale), and encouraging wider community participation in economic and social development initiatives to improve the situation of marginalised groups. This opens the way for development agencies to combat food insecurity – and many are doing so.

The second point is that such initiatives can be undertaken locally, be it to tackle pockets of food insecurity or to contribute to more widespread programmes. There is ample opportunity for local-level organisations to become involved.

15.3.2 Drought and food security

Although the causes of food insecurity include political, social and economic factors, natural hazards, especially drought, remain important.[7]

Scientists and geographers distinguish between three kinds of drought:

1. Meteorological drought is when rainfall drops below a certain level.
2. Hydrological drought involves a reduction in water resources such as rivers, lakes and underground water: this too is the result of lower rainfall, but it may take some time to be felt, and in the case of river systems may be the result of a drop in rainfall far away from the area in question.

©ITDG/Orlando Arnold

Constructing a traditional hand-dug reservoir (*hafir*) in Sudan

3. Agricultural drought is the impact of the other two kinds on crop yields.

Whilst it is obvious that places that receive little rainfall are drought-prone, drought can also occur where rain is normally sufficient – for example, parts of Bangladesh have suffered a number of droughts, some quite severe. A few weeks with little or no rain at a critical time of the year for crop growth can be devastating, even if the rest of the year is not dry. The important point is whether the amount of rainfall is sufficient for agriculture, livestock and other human needs at the time in question.

Drought's impact is felt on different geographical scales. Climatic conditions can vary widely within a country. At local level, changes in land use can have a significant impact on watersheds, and hence the amount of water available through run-off or from rivers and ponds.

Some of the measures needed to mitigate water shortages and their effects are outlined below. Here, a more general problem should be noted: the difficulty of assessing the relative importance of drought on food insecurity compared to socio-economic factors. It can be hard to disentangle these causes, because they interact with each other. For example, a fall in crop yields may be due to lack of water (i.e. agricultural drought), but may also be the result of such factors as a lack of fertilisers or weeding, pests and crop diseases, labour shortages at critical periods and low prices for crops in the markets.

Drought can trigger other hazards: in Ethiopia in 1984, it contributed to an infestation by army worm that greatly increased crop damage.[8]

15.3.3 Coping with food insecurity and famine

Seasonal food insecurity is normal in many poor households, which suffer from a hungry period shortly before the harvest, as food gathered from the

previous harvest runs out. This problem is known as 'chronic' food insecurity, as opposed to one-off food shortages, which are classified as 'transitory' food insecurity.

When food insecurity is acute and prolonged, it can lead to starvation and finally to famine (famine is where there is a significant increase in sickness and death rates resulting from starvation and associated factors). The descent into acute food shortage and thence into famine can take weeks, months or even years. Except where conflict is a major contributing factor, famine should not be seen as inevitable because of the range of measures available at all levels to improve food security and strengthen livelihoods in the long term.

Take, for example, the mitigation strategies used by communities to protect themselves against drought and the food insecurity that results from it. These can be divided into two main types: agricultural and non-agricultural.

- Agricultural mitigation strategies are measures to maintain crop and livestock production. They include sowing again after a crop has been ruined by drought, sowing alternative crops, or moving livestock to other locations.
- Non-agricultural mitigation strategies include seeking off-farm employment in the locality or elsewhere, eating seeds or roots that were saved to be sown in the next growing season, reducing the amount of food consumed, eating wild food such as berries and roots, postponing social functions such as weddings, using up savings and selling assets (such as livestock, household goods and personal possessions), buying on credit, borrowing money or calling in favours from communities and kin.

Families only sell their livelihood assets when they have to, which is when other methods such as growing alternative crops or finding alternative employment are insufficient. Sale of assets is a good indicator of how severe the consequences of drought are. Poor families, those with small landholdings and the landless, are the first to resort to such methods. Only when all else has failed will whole families and communities migrate in search of food (e.g. Case Study 9.2, page 137).

The severity of a food crisis can therefore be judged by looking at food and livelihood coping strategies as well as at food supplies. Food insecurity among a particular population is likely to be acute if:

- People experience a large reduction in their major source of food and are unable to make up the difference through new strategies.
- The prevalence of malnutrition is abnormally high for the time of year, and this cannot be accounted for by health or care factors.

- A large proportion of the group is using marginal or unsustainable coping strategies.
- People are using coping strategies that are damaging their livelihoods in the longer term or incur some other unacceptable cost such as acting illegally or immorally – stealing, for instance.[9]

The most effective way to protect communities against food insecurity and famine resulting from drought is to strengthen these diverse mitigation strategies well in advance, especially those that enable them to preserve their productive assets, such as animals, seeds and tools.

Despite this, most external intervention is still in *response* to drought, not in helping to create more drought-resistant communities. Moreover, it often comes at a late stage, when communities are in crisis and may already be destitute, having been forced to dispose of productive assets. Typical interventions in such circumstances are to provide food, seeds, fertiliser, animals and agricultural equipment to replace that which has been used or sold, and to lend money. Where a crisis has become acute, with widespread starvation and migration, aid agencies' interventions focus on emergency response, especially feeding and health care. Food-for-work and cash-for-work schemes are also common responses.

The boundary between disaster preparedness and response is blurred in food crises, because they can develop over such a long period. Some would argue that an emergency begins when hungry people are forced to dispose of their livelihood assets; others put it at the point where destitute, starving people leave their homes to beg for food, or even where large numbers begin to die of starvation. In this chapter, emphasis is placed on longer-term mitigation measures to maintain food production and incomes.

15.3.4 An integrated approach

The ideal approach to drought-related food insecurity addresses the different dimensions of the problem, using a range of methods.

An example of this range is given in Table 15.1, which highlights the main interventions in a joint UNICEF/WHO project that covered 600 villages in Iringa, Tanzania, in the 1980s. The project was a response to persistent food insecurity and malnutrition rather than to an individual disaster, and specifically nutritional aspects are emphasised in the interventions, but the basic approach is risk management, seeking to limit the likelihood of future disaster. Measures to combat chronic food insecurity are an important element of anti-famine initiatives.

Table 15.1 Interventions against malnutrition in Tanzania

Problem	*Possible causes*	*Programme interventions*
1. *Inadequate food in households (most severe a few months before the harvest)*	• lack of household planning • choice of wrong crops • failure of rains • poor crop management • storage losses • shortage of agricultural inputs • lack of income to buy food	• training of trainers in household food planning • promotion of drought-resistant crops • improved storage
2. *Inadequate nutrient intake (especially in children)*	• poor economic resources • nutritionally poor diet • shortage of fuelwood • shortage of fruits and vegetables • scarcity of meat • scarcity of beans and other legumes • too much workload for mothers	• promotion of income-generating activities • nutrition education, especially to mothers, through health workers • training and other inputs for village forestation and home gardening • training and inputs for small animal keeping • promotion of grain milling and appropriate technology
3. *Lack of awareness of good weaning practices*	• lack of awareness of children's nutrient needs • inadequate feeding frequency • scarcity of energy-dense foods (e.g. groundnuts, cooking oil) • dietary bulk	• provide weaning recipes based on local foods • mobilise communities to provide extra food at child care posts • campaign on use of *kimea* (flour with high nutritional value)

M. Hubbard, *Improving Food Security: A Guide for Rural Development Managers* (London: IT Publications, 1995), pp. 30–31.

Interventions should be linked as far as possible to the coping strategies that households use. As affected people are likely to employ a variety of strategies, and may alter the type and mix of coping methods in use quite rapidly, agencies need to be flexible in their approach.

Some of the components that might make up an integrated approach are outlined in the following sections.

15.3.5 Protecting food production

Drought mitigation and food security projects often used to focus on irrigation or soil and water conservation techniques. Nowadays it is usual to attempt a broader mix of activities that support all aspects of agricultural production, but irrigation and soil and water conservation remain important elements of such work.

There are many different methods of protecting the soil against erosion from wind or water and preventing water run-off. These include terracing, digging furrows and ridges, planting grasses, bushes and trees, building walls of stone or earth, planting in holes and pits, and mulching. The most appropriate method for each location depends upon its physical features (the nature of the soil, the terrain and climatic conditions) and local capacities (the materials, skills and other resources available).

Intercropping (mixing different crops in the same plot) is a traditional coping strategy that has been undermined in some places by the advance of monoculture. Where the crops chosen differ in their resilience to drought, diseases or pests, intercropping is a way of spreading risk, since it increases the probability that some crops will survive. It can also be beneficial to growth: some plants give shelter or shade to others, or provide nutrients to the soil. Other agricultural practices that can be encouraged include alternative systems of crop rotation, manuring and composting. Integrated pest management, based on intercropping and the use of insect-repelling plants and crops or pesticides (including those made from traditional recipes using local plants), is another feature of many successful food security initiatives.

Farming should be considered as a process. In real life, agricultural methods are not fixed; the type and mix of crops vary. Farmers do experiment, if the risks of doing so are not too great. Supporting organisations should therefore aim to give food-insecure communities more livelihood options and greater flexibility. Initiatives that begin as narrow technical interventions often find that they have to widen their scope in order to become more effective, as well as sustainable.

Government agricultural extension services and some NGOs have promoted new, hybrid versions of staple food crops at the expense of traditional varieties. The newer varieties give higher yields, but usually only in favourable conditions with ample water and fertilisers. Traditional varieties tend to be more resilient to environmental stresses such as drought. This alone should

be a sufficient caution against using newer crops in drought-prone areas, but their heavy – in some cases, coercive – promotion has also threatened biodiversity and undermined traditional knowledge of alternative varieties.

Research in the past 10–15 years has uncovered extensive indigenous knowledge of agricultural plants and how to grow them.[10] Many food security projects have found that, by protecting and sharing such knowledge, and the traditional seed varieties concerned, they widen the options open to communities and increase their resilience to hazards such as drought. Seed banks, fairs and demonstration plots are effective methods of preserving, promoting and sharing (e.g. Case Study 15.2).

Case Study 15.2
Improving food security in a drought-prone area

Chivi District, in Zimbabwe's Masvingo Province, is an area of poor soils and low rainfall. In 1990, the Intermediate Technology Development Group (ITDG) began to explore methods of working with communities and local organisations in the district's Ward 21 to improve food security among the 1,300 households there. This coincided with a period of drought that killed many cattle in Chivi.

ITDG intended a strongly participatory approach from the start, but still had to overcome considerable local cynicism about the value of outside agencies, while many villagers were puzzled that it had not come with a pre-formulated programme and was not offering financial or material support.

An extensive assessment process carried out with the community identified a wide range of problems in producing food and sustaining livelihoods. Only after this period of consultation, which took six months, did the project begin to set priorities and make plans – again involving the community, many of whom had never gone through a participatory process of this kind. The project worked with two main local institutions, farmers' clubs and women's garden groups, as these were most directly involved in food production.

The first phase of implementation, from 1992–95, addressed three needs: water for fields and gardens, pest and disease control, and fencing to protect gardens from animals. At the same time, over 1,800 community members took part in training to improve their capacity to identify problems and solutions, communicate, and manage their own organisations.

(continued)

Case Study 15.2 *(continued)*

During the first two years, a range of technologies were tried out by the farmers and gardeners through experimentation in their own fields. Those found to be most effective were quickly taken up by other community members. They included sub-surface irrigation using clay pipes, pots and bottles; terracing, rock catchments, 'tied' ridges, infiltration pits, mulching and the use of underground plastic sheeting to increase water retention; digging and improving wells; winter ploughing, intercropping, and the use of termite soil as a fertilizer and moisture retainer; growing 'live' fences of sisal and introducing two machines to make wire fencing at half the price of ready-made products.

Indigenous knowledge, often disregarded by outside experts, was used wherever possible. Seed fairs were held to revive local crop varieties, share information on them and demonstrate their value. Surveys and discussions showed that many farmers knew of local plants that could be used to make effective pesticides, but were reluctant to tell others because they feared their knowledge would be thought old-fashioned in an age of modern chemical pesticides. The project made sure that their knowledge was recorded and shared.

All of these methods were widely adopted and effective in boosting production. However, as the project progressed it was clear that it needed to pay more attention to marketing. Women gardeners carried out surveys of demand and prices for various vegetables, and as a result the groups began diversifying their production to meet these opportunities.

As the project took off, with widespread adoption of the various techniques and growing numbers of local people taking part, it also expanded into other wards. Reviews and evaluations over the years have found increased and more reliable crop yields and a steady growth in the variety of crops being grown. Buyers began bringing trucks into the area to buy up surpluses, and women began sending their husbands to neighbouring areas to sell the produce from their vegetable gardens. Some garden groups set up a revolving loan fund, and community organisations were seen to be far more confident not only in managing their own affairs, but also in their relationships with outside agencies and government agricultural extension workers.

K. Murwira et al., *Beating Hunger: The Chivi Experience. A Community-based Approach to Food Security in Zimbabwe* (London: IT Publications, 2000).

Food production is inseparable from issues of access to land and land ownership. Many of the problems faced by poor communities in drought-prone areas arise from unequal distribution of land and natural resources, which is the product of historical, political and socio-economic forces. Some developing-country governments have attempted land redistribution, but this approach has fallen by the wayside with the current dominance of market-led economic policy. On the other hand, the protection of common property resources such as forests and grazing lands is definitely a 'live' issue, for which determined advocacy may be needed.

15.3.6 Preserving food: crop and seed stores and banks

Many drought mitigation projects include crop and seed storage among their interventions, and there is now plenty of guidance on this subject.[11]

Storage falls into two main categories: household stores and community grain and seed banks. Where people are poor and agricultural output is low or highly vulnerable to climatic variations, it is important to maximise crop preservation. Inadequate storage can lead to crops rotting, becoming diseased or contaminated, or being eaten by pests. The amount of grain and seed lost because of this varies greatly according to location, but in many cases may be as much as a third of the crop.

Crop stores and seed banks help to ensure that there is food to eat during the lean season, and that there are seeds to plant. They offer security against rising food prices during the hungry period. By storing a wide variety of local seeds, they maintain biodiversity. They can also protect crops and seeds against other natural hazards such as floods.

Appropriate technologies come to the fore here. Low-cost techniques and materials can often be used to make stores, while in some instances traditional knowledge and methods can be adopted, or adapted. Examples of appropriate technologies include sealed clay pots, baskets lined with clay or plaster, plastic sheeting, sacks, metal bins and some forms of underground storage such as lined and covered pits. Stores can be raised above the ground on wooden poles to protect them against rats and mice (with guards made of old tin cans on the poles to prevent the animals from climbing up). Certain varieties of crop and seed may be more resistant to pests and disease than others, and it is useful to explore traditional knowledge of this. Traditional pesticides such as ash, some types of edible oil, and certain local plants may preserve crops against insect attack. Some crops can be

preserved for longer by drying or smoking them. In other cases crop processing – into flour, oil, jams or pickles, for instance – is an effective preservative, as well as creating a product for sale. Exchange visits enable farmers to see different storage and preserving practices and discuss their effectiveness.

A few words of caution are needed, nevertheless. First, it is important to identify whether crop losses in storage result from poor storage itself, or from harvesting and post-harvest preservation practices. If the latter are inadequate and introduce disease or contamination into the crops, good storage systems will make little difference.

Second, community seed or grain banks present storage and management challenges that are quite different from domestic stores. The storage challenges are technical, arising from the scale on which produce has to be stored, but in many cases similar technologies to those employed by households can be used.The real challenge is management. A seed or grain bank is a *bank*, not merely a store. These banks can be run in different ways but the principles are standard: usually they buy grain from their members and sell it back at below market rates, or they run as savings and credit schemes. Procedures governing how households deposit seeds or grain with the stores, how to sell or lend seeds and grain back to them, and how to deal with defaulters must be worked out carefully, and they must be transparent.

Grain/seed banks must be planned with communities, built by them and managed by them – crucially, they must be run on behalf of the whole community. This may require training in organisational development, literacy and accounting procedures. Projects dominated by outside agencies are prone to failure. However, start-up funding may be needed to build stores and purchase initial grain stocks, and top-up funds or grain may be necessary if a drought hits before the scheme is securely established or at times of severe crisis. Any outside organisation attempting to introduce such schemes needs a high level of skill and experience in community development, in the broadest sense, and if it lacks this should bring in the relevant expertise. Moreover, there has to be a high level of trust between the community and the development or disaster organisation that is helping it, which may take years to build.

A further important point is that community seed or grain banks should be part of an integrated food security or rural development programme. On their own, they cannot provide complete food security. Other factors affecting success are outlined in Case Study 15.3.

Case Study 15.3
Cereal banks in Burkina Faso

Cereal banks were introduced to Burkina Faso in the mid-1970s. By 1986, there were an estimated 1,177 banks supported by government and NGO programmes. They had three basic elements in common: a storage facility; a 'rotating fund' in grain or cash that allowed the bank to buy, sell or lend grain; and a managing committee chosen by villagers.

In a 1987 study of nine banks supported by three NGOs, villagers were asked to identify their achievements and weaknesses. Among the benefits were: a measure of food security even during prolonged drought; reducing drought-induced emigration; savings in time because villagers no longer had to go to market to buy grain; enabling farmers to escape the high prices imposed by grain merchants; improved management skills that could be applied to other local projects and stimulating mobilisation of community members for such initiatives; facilitating emergency relief assistance; and generating funds for other community activities. The bank meetings often served as a forum to discuss other village matters.

Difficulties included: maintaining high rates of reimbursement (in several locations the pressure of a severe drought in the mid-1980s greatly reduced farmers' ability to repay the bank for borrowed grain); the amount of time and effort needed to manage schemes; finding adequate ways of compensating the banks' managers for their time; and tension when people were refused credit. The need to constantly remind villagers about how credit works was noted.

The study concluded that the cereal banks were best suited to dealing with yearly grain shortfalls during the planting and growing periods, and highlighted the increased organisational capacity of villages resulting from the initiatives. There were more questions about the banks' ability to respond to prolonged drought and famine. They were able to blunt the impact of drought and mitigate or even prevent famine. However, they risked their long-term financial stability by doing so since farmers were often unable to reimburse them adequately after the crisis had passed. To protect them against this risk, special donations of grain or funds were needed to provide emergency supplies or replenish stocks.

M. B. Anderson and P. J. Woodrow, *Rising from the Ashes: Development Strategies in Times of Disaster* (London: IT Publications, 1998), pp. 185–205.

15.3.7 Preserving water supplies

Water shortages affect crops, livestock and people. Town-dwellers rely on large-scale water infrastructure. In the countryside, communities may have access to a variety of sources: rivers, ponds, wells and small dams. The extent of access depends on distance, ownership of the water resource, and the cost and technical difficulty of collecting or extracting water.

During a drought, rural communities rely on local water sources, or move out of the area altogether. In some emergencies, governments and aid agencies may use tankers, but these are a costly, short-term response to the problem and are unlikely to reach the most remote communities.

There are two main options for improving water supplies. The first is to improve access to underground water sources, for instance by deepening wells or digging new boreholes. Such measures may be beyond the financial resources of many poor communities. If the water is fed into irrigation schemes, then the cost of installing and maintaining irrigation pipes and channels must be added, although in many locations these may be able to connect to traditional irrigation networks.

The second method is 'rainwater harvesting'. There are many different ways of harvesting rainwater for agricultural and domestic use. They include:

- building water-storing dams and percolation dams (dams that slow the rate of rainwater run-off and so increase absorption into the soil, thereby recharging local groundwater);
- building community or domestic storage tanks;
- lining ponds with plastic to improve water retention; and
- putting up stone or earth bunds to improve absorption and reduce soil loss (brushwood and strips of grass or other plants can also be used).

Many of these methods are traditional, and hence the knowledge and skills needed to build and maintain them are present in the community. In other cases, the relevant technical expertise is easily acquired (see Case Study 10.6, page 160).[12]

Most rainwater harvesting methods are cheap compared to digging wells and pumping water from more remote sources. Communities can provide labour and in some cases building materials – bunds and some dams use just stones and earth. Many readily available materials can be used to catch, channel and store rainwater. A recent inventory of materials employed in Sri Lanka for

domestic rainwater harvesting listed tin sheets, palm leaves, plastic sheets, the stems of plants such as bananas and bamboos, tree trunks and rock cavities, as well as more conventional gutter pipes and tanks.[13] Nevertheless, the cost to poor people is not always small (see Case Study 10.3, page 152). Even where freely available materials are used and labour is voluntary, the task of constructing larger-scale structures such as tanks and dams is substantial. Collective action is needed in such cases.

Rainwater harvesting can be highly effective. India, where there has been a considerable revival of traditional methods in the past decade, appears to have had considerable success. The expansion of rainwater harvesting there was assisted by the existence of centuries-old traditions and techniques, coupled with technical support and vigorous advocacy from Indian NGOs. It was further stimulated by prolonged drought. Case Study 15.4 illustrates the potential of rainwater harvesting, and the challenges to implementing successful schemes.

The choice of approach to water provision varies according to location, and may vary over even a small area according to such factors as the topography, the level of dependence on irrigation compared to rainfall, and the moisture-retaining capacity of different soils.

In some cases, the problem may be one of access to water, not its physical availability. Equitable water distribution is the goal. Communities in drought-prone areas often have sophisticated systems for this. Local management structures should be reinforced where necessary.

15.3.8 Preserving livestock

In many remote areas, poor people's livelihoods depend on livestock. This is most obviously true in the case of nomadic pastoralists. However, farmers may also rely heavily on livestock if they work arid or hilly land that does not support intensive crop farming. Livestock are a valuable asset, providing food, income and agricultural inputs (manure, pulling ploughs and carts). Herds grow as new animals are born. They can be moved easily and looked after by children.

Some livestock, such as goats and camels, are good at withstanding water shortages. A one-year drought may have little effect on the size of a herd since the animals can be moved. But when the drought is prolonged, poor people are often forced to sell animals to raise money for food (usually, breeding animals are kept and others sold). If this happens on any scale, it drives livestock prices down, generally at the same time as grain prices are

Case Study 15.4
Rainwater harvesting in Kenya

A severe famine in 1979–80 in Turkana District in north-west Kenya led to a number of long-term development initiatives. Several agencies became interested in rainwater harvesting as a way of supporting the Turkana people, who, though essentially pastoralists, had traditionally grown crops, principally sorghum, during the wet season.

Many of the early schemes did not work well, for both technical and operational reasons, and in 1985 a group of NGOs began collaborating on a project in Lokitaung Division to test alternative approaches, based on simple construction and surveying technologies.

Local people were soon able to survey sites, and design and build water-retaining bunds of earth without assistance, but it took time to overcome other technical challenges. For example, although many rainwater harvesting methods were known, there was no consensus about the most appropriate techniques in particular geographical and socio-economic contexts. It was difficult to build structures that would hold enough water to flood a garden site in a year of poor rains, but that would also not be swept away by the pressure of floodwater when rains were heavy.

Digging water-retaining earthworks is time-consuming and labour-intensive. The project promoted the use of animals (especially donkeys and oxen) to help move earth, but had to develop suitable scoops and harnesses, and overcome resistance from herders who refused to let their own animals be used. Later, less labour-intensive methods such as stone lines and grass strips were introduced.

At the same time, understanding of the role of the sorghum gardens deepened. It was realised that, although rainwater harvesting could improve sorghum yields in some years, it could not provide the whole livelihood for any group of local people, even if they wished to give up their nomadic way of life. Improved gardens were now viewed not as a means of support for people made destitute by the earlier famine, but as a means of complementing existing pastoral livelihoods.

The project was handed over to local management in 1988, and a sister project in Kakuma Division was set up in 1989. The two projects support garden improvement through provision of local technicians

(continued)

Case Study 15.4 *(continued)*

(*fundis*) to design structures, the sale or loan of tools, seed and grain storage facilities, and technical assistance for repairs.

In 1997, an evaluation of the Lokitaung and Kakuma initiatives observed that more than 2,000 people were involved in rainwater harvesting in the two projects, with 340 gardens covering 170 acres. There was a gradual increase in the number of gardens in most locations, even though food-for-work had long since ceased to be available for labour on construction. In years of medium and poor rainfall, the improved gardens increased sorghum yields by up to four times more than traditional plots. The reliability of crops was also much greater.

Most of the work on the gardens was carried out by women, but they had relatively tight control over the use of the harvest. The sorghum grown was used mostly to boost household food supplies, to buy goats and as an investment in social networks (i.e. through giving or lending to other members of the community).

A. Cullis and A. Pacey, *A Development Dialogue: Rainwater Harvesting in Turkana* (London: IT Publications, 1992); C. Watson and B. Ndung'u, 'Rainwater Harvesting in Turkana: An Evaluation of Impact and Sustainability', unpublished report (Nairobi: Intermediate Technology Development Group Kenya, 1997).

rising with scarcity. This can result in the severe depletion of herds, from which it may take many years to recover.

Agency interventions to protect livestock-dependent communities during drought crises are generally of the following main kinds:[14]

- Increasing grain and fodder supplies to the area (the former to help keep grain prices down, the latter to keep animals fed).
- Removing surplus animals (e.g. by buying, slaughtering and processing them).
- Giving broader support to communities' livelihoods, so that they do not have to sell their breeding animals.
- Where herds are severely depleted and their owners destitute, restocking with new animals.

Case Study 15.5
Pastoralists' coping strategies

The Gabra are a pastoralist tribe herding camels and goats over arid lands in northern Kenya and southern Ethiopia. Their economy depends on animal products. Like many other pastoral groups in the region, the Gabra were badly hit by drought and animal disease in 1991. Many animals died.

Owing to the severity of the crisis, community meetings were held to agree collective coping strategies. Rich families agreed to give goats to the poorest and to send them milk daily; meat from slaughtered camels was also distributed periodically. Traditional reciprocal relationships with another pastoral group, the Borana, were invoked because of the emergency: the Borana were asked to give cattle.

In some cases, rich relatives and friends from other districts loaned animals to replace those lost to disease, until the herd could be built up again. In other cases, herders travelled far to meet relatives and friends and offer services in exchange for animals. Some children were sent to live with distant relations who were less badly hit.

B. J. Linquist, 'Caring for the Poor, Gabra-style: Indigenous Relief and Development Strategies', *Appropriate Technology*, vol. 21, no. 4, 1995, pp. 6–8.

Most of these interventions are closer to the emergency response end of the disaster management spectrum than to disaster preparedness. Long-term livelihood support is needed to give greater security.

Pastoralists in particular have long-established methods of coping with drought, based largely on moving animals to other areas and partly on livestock sales (see Case Study 15.5). But with traditional grazing lands increasingly under threat from privatisation for ranching or other forms of development, coupled with conflict in African countries in particular, it is becoming harder for them to put these coping strategies into practice.

Where communities are heavily dependent on livestock that cannot easily be herded elsewhere (e.g. dairy cows), collective schemes might be established to maintain fodder supplies during droughts through bulk purchase and

Case Study 15.6
Supplying food to remote villages

In the dry rural district of Banaskantha in Gujarat, SEWA and the Disaster Mitigation Institute (DMI) set up a programme in 1993 to purchase basic foods wholesale in local markets. The food was given to the poorest members of SEWA's local groups, who paid for it then or later out of the money they earned from their involvement in other income-generating activities supported by SEWA.

The scheme, known as Shakti Packet, was targeted at remote villages where government distribution systems were absent or ineffective. One of its aims was to reduce women's indebtedness to shopkeepers. Another was to give them greater choice of foods. SEWA's local women's groups chose the products to be purchased. These included millet, rice, pulses, sugar, edible oil, spices, tea, salt, sugar and green vegetables, as well as non-food items such as soap and even contraceptives.

Early results from five villages where the Shakti Packet scheme was piloted showed that it was reducing women's indebtedness and allowing children to eat green vegetables more regularly. The initiative was seen as complementary to SEWA's wider development programme for poor women in the district, which included savings groups, dairy cooperatives and other income-generating activities. Challenges to expanding the scheme were the rising price of food in the markets, limited working capital at village level, and difficulties in linking it with the government's public distribution system.

M. R. Bhatt, 'Shakti Packet: Increasing Food Security and Nutrition of Rural Women', paper presented to the conference 'Gender Approaches to Health in Emergency Situations', San Marino, 8–9 December 1995.

community-managed plantations. This has worked effectively in parts of India, but is likely to need strong institutional support.[15]

15.3.9 Food aid

Food aid is generally regarded as a matter for governments and international agencies, because only they have the capacity to purchase and distribute

large volumes. It is possible to set up more local schemes, as Case Study 15.6 shows, but the challenges are considerable.

15.3.10 Nutrition

Being able to monitor and combat malnutrition is an important component of all food security work, including early warning. Assessment of nutritional deficiencies requires specialist expertise and is beyond the scope of this book, but several major agencies have produced technical guidelines for the management of nutrition in crises.[16]

Advances in nutritional assessment methods have increased agencies' ability to monitor and manage crises as they enter the acute stage. Since the early 1990s, nutritionists have widened the focus of their work from malnourished individuals to larger populations, and from a narrow set of technical interventions to combat malnutrition to a broader range of strategies, policies and programmes that take account of related causal factors, such as water, sanitation, health and social care.

Multi-sectoral approaches are ideal in theory, but their complexity causes problems. In practice, nutrition initiatives often have to make the difficult choice between concentrating their resources on the direct alleviation of malnutrition – usually through feeding programmes – or addressing some of its underlying causes.

15.3.11 Protecting livelihoods

Where support to livelihoods is concerned, many of the steps that organisations will need to take in drought-prone communities can be regarded as general development interventions just as much as disaster mitigation.

A broad range of interventions will be needed to stimulate local economies so that poor people are no longer so dependent on agriculture for their food and income. Economic diversification is the key to success, through on- and off-farm enterprises. Where a family's income relies on a range of different economic activities, there is a greater degree of protection against the failure of any one of them (e.g. harvest failure due to drought).

Diversifying agricultural production is part of this. Many food security projects encourage farmers to grow a wider range of crops, establish kitchen gardens and orchards, keep poultry or set up fish ponds. This has the twin objectives of improving food supplies and generating produce that can be sold. Technical

assistance, if needed, must be supplemented by training in business skills, marketing and organising production to meet market demands.

Many drought mitigation projects, in Africa particularly, support household gardens in addition to farms. Gardens are typically used to grow vegetables that will give a more varied diet and can be sold. In many communities they are managed by women, who thereby gain more control over household food supplies and income.

Another common approach to enhancing livelihoods is by processing agricultural products – for example grain milling, oil processing, making jam and peanut butter, or fruit and vegetable drying. Processing preserves crops, and often adds value.

Off-farm employment may be regarded as more secure against drought than agriculture, but this impression can be misleading. Local industries that depend on water or agricultural products are also vulnerable: for instance, a grain mill stops working when there is no more grain to mill. In such cases, the impact of the drought may be delayed until some time after crops have failed, but this is only a delay. It is therefore common for people to migrate well away from their communities in search of work during a drought. In western India, for example, village men head for brickworks and building sites in the cities during prolonged droughts. The collapse of the agricultural economy also affects rural people's purchasing power, and so has a knock-on effect on shopkeepers and traders supplying goods.

Plans for local economic diversification must take hazards into account and, where possible, find productive activities that are unlikely to be directly affected. Artisanal crafts may be suitable, as the supply of raw materials may not be hit by a drought or other hazard and the markets may be some distance from the affected area. Creating alternative enterprises is a complex task, and likely to require support in technical and business skills, credit and market access. Specialist assistance should be sought to carry out such work.

The degree of complexity involved is illustrated by one aspect of economic diversification: the need for well-functioning local markets. These make it easier for vulnerable people to buy and sell at times of need and, by distributing efficiently and moderating shortages, help to keep down the prices of essential items such as food. Development and disaster planners will probably need to act in several ways to strengthen local markets and improve poor producers' access to them, by improving local transport infrastructure, helping to disseminate information about prices, lobbying against damaging

Case Study 15.7
From food security to community empowerment

The Kebkabiya district in Darfur, western Sudan, was badly affected by the drought and famine of 1984–85. In 1985, Oxfam began a post-disaster initiative to improve food security. In the first phase of the project, 12 community seed banks were established to serve a community of 30,000. The second phase, which began in 1989, introduced other measures to improve food production: animal health care, the use of animals for ploughing, pest control, soil and water conservation and community development.

The project embodied community participation from the beginning, but its nature changed over the years. In the first phase, the seed banks were managed by local committees, almost exclusively male, nominated by existing village authorities. There was, however, extensive consultation with communities in planning and establishing the seed bank scheme. As the seed bank committees gained in confidence, they took more decisions on their own, and when the second phase of work was prepared in 1989 there was no need for Oxfam to be involved in day-to-day management. The committees also began taking on extra tasks, such as organising training for farmers and supervising revolving funds for buying seeds.

For the second phase, new structures were needed to manage this wider range of activities. These were far more democratic, with each village in a group of 5–12 electing one man and one woman to represent it on a Village Centre Committee. In turn, each of the 16 Village Centre Committees elected one man and one woman to represent it on the Project Management Committee which oversaw the whole project. In 1990, the Project Management Committee registered as a separate NGO, the Kebkabiya Smallholders' Charitable Society, to take over the project from Oxfam. This is a membership organisation, with each household paying a small fee. Members elect representative committees at different levels.

The project was always staffed almost entirely by Sudanese, but a handover to the communities had been envisaged from the beginning. The approach was gradual, transferring authority over several years, and Oxfam continued to provide technical back-up when required.

P. Strachan and C. Peters, *Empowering Communities: A Casebook from West Sudan* (Oxford: Oxfam, 1997).

market restrictions, promoting more efficient methods of storing, preserving and transporting perishable goods such as food products, supporting small-scale decentralised processing facilities (e.g. grain milling), and providing credit and training in small enterprise management.[17]

While communities with high incomes generally suffer less from malnutrition, the link between wealth and nutrition is not clear-cut: there can be considerable differences within communities and households. Other factors play an important role. For example, the level of education among women has a great influence on dietary, hygiene and health practices. The benefits of increased income also depend on who earns and controls the money.

Maintaining natural resources such as forests, grazing land and sources of water is important to food security, especially where these are held in common. More intensive use of common property – for grazing, collecting wild food and roots, or fishing – is an important coping strategy when there is a drought. Preserving these resources against encroachment by private interests or their destruction by alternative forms of commercial or state-sponsored development, such as farming, logging and the construction of dams, is usually difficult. Local voices are unlikely to be heard unless their campaigns are supported by organisations with resources and lobbying skills.

Reforestation to mitigate drought or other hazards presents significant challenges. Communities need to be convinced of the need for it, and must have strong incentives for investing in trees that may not produce anything of economic value for many years. Expertise in forest management is essential, and should be brought in from outside where necessary. There are many anecdotal accounts of tree-planting initiatives as part of disaster mitigation programmes (protecting land erosion or providing wood for disaster-resistant housing) that failed because project managers lacked experience of this kind of work.

15.4 Monitoring and warning systems

There are now many kinds of system warning of food shortage. The first major one was the FAO's Global Information and Early Warning System (GIEWS), developed after the Sahel famines of the early 1970s to monitor food production and supplies at national level and assess emergency food needs in areas facing critical shortages. The African famines of the mid-1980s showed the need for improved warning systems, and several more were established in the Sahel and the Horn of Africa between 1985 and 1990. These usually combined hazard/meteorological monitoring (see Box 15.1) and assessments of food production levels after the harvest season.

Box 15.1
Drought monitoring

Drought monitoring systems look at two main indicators: rainfall and vegetation. The former is monitored by extensive networks of rain gauges, the latter mostly through remote sensing by satellites. In both cases, large amounts of high-quality data can be generated. These can be supplemented by other meteorological information (such as rainfall forecasts) and hydrological data (such as monitoring of groundwater supplies and the level of water tables).

Although rain gauges are relatively simple technologically, and collecting data often depends on local staff or volunteers, rainfall monitoring needs to take place on a large scale if it is to be of value in assessing overall needs and particular priorities. Management of such systems is generally taken on by government meteorological services, and feeds into the well-established and effective national and international meteorological information systems. Moreover, there is growing use of rain gauges that transmit data automatically to distant monitoring stations, using radio signals or other electronic means of communication (this is called telemetry). In the case of remote sensing of vegetation, which is the only really effective way of compiling information covering a wide area, the cost of procuring and analysing satellite data is so high that this task too is generally left to international and government services.

Monitoring of rainfall and vegetation does not indicate how much food people have, or need. Remote sensing does not distinguish between different kinds of vegetation, so does not show how well crops are growing. Since different food crops vary in their levels of tolerance to drought, rainfall monitoring is of limited value as an indicator of the availability of food. It is for this reason that food security or famine information and warning systems have become an increasingly important tool for disaster managers during the past 20 years.

Because they operate on national and regional scales, such systems are best managed by governments and international organisations. They are also geared to large-scale disasters requiring international aid.

However, local early-warning systems have an important role to play, and many have been established since the mid-1980s, often by NGOs. Many researchers and practitioners consider them to be particularly successful in monitoring impending food crises. They tend to draw on a wider range of indicators of food and livelihood insecurity than the larger systems. They also rely far more on qualitative data, and involve higher levels of community participation. They are better able to take account of local variations in food security, and are more sensitive to local coping strategies and vulnerability. They can recommend appropriate interventions to local decision-makers, who will have a better understanding of conditions on the ground and a greater sense of urgency in responding to problems. They are easier to manage than large-scale, centralised systems, but they tend to suffer from a lack of skilled personnel (see below) and are open to manipulation by powerful local interests.

Systems of all kinds have shifted their emphasis from the simple availability of food to considering which groups do not have access to food: this takes them logically into vulnerability and livelihoods analysis. As a result of these developments, the targeting of food aid has improved considerably.

The effectiveness of early-warning systems varies in practice. There are four main reasons for this:

1. The nature of the system itself and the information provided – the range of indicators used, accuracy of the data, the timeliness of warnings.
2. The institutional context within which the system is located, and institutional links to decision-makers.
3. The broader political environment. Decisions about when and how to intervene are political, and therefore influenced by many other factors.
4. Logistical obstacles to launching a timely and adequate response.

Most analysis of systems concentrates on the first and fourth of these factors, but research into responses to the African droughts of 1990–93 has shown that reasons 2 and 3 are most important in explaining if early-warning information is used, and variations in performance between different warning systems. Early-warning systems did sound the alarm about impending food crises, but the response systems failed to act early enough.[18] Conventional systems are also much less effective in conflict-induced famine.

Early-warning systems take many forms in their institutional set-up and location, the resources available to run them, and the information that they collect and process. However, all are designed to stimulate *action* by

informing decision-makers about food security conditions and people's needs. As information systems, their functioning is theoretically straightforward (see Figure 15.1), but in practice there are many obstacles.

An efficient, effective early-warning system for drought-related famine should have the following three characteristics:[19]

1. It should be capable not only of warning of large-scale famine, but also should be sensitive to changes in food-security status before famine threatens, and able to detect localised pockets of acute food stress.
2. It should generate a response that provides assistance early in the 'famine spiral', before families and communities are reduced to destitution.
3. It should stimulate interventions that protect livelihoods before lives are threatened. This implies providing a wider range of relief than food aid, as well as a more developmental approach.

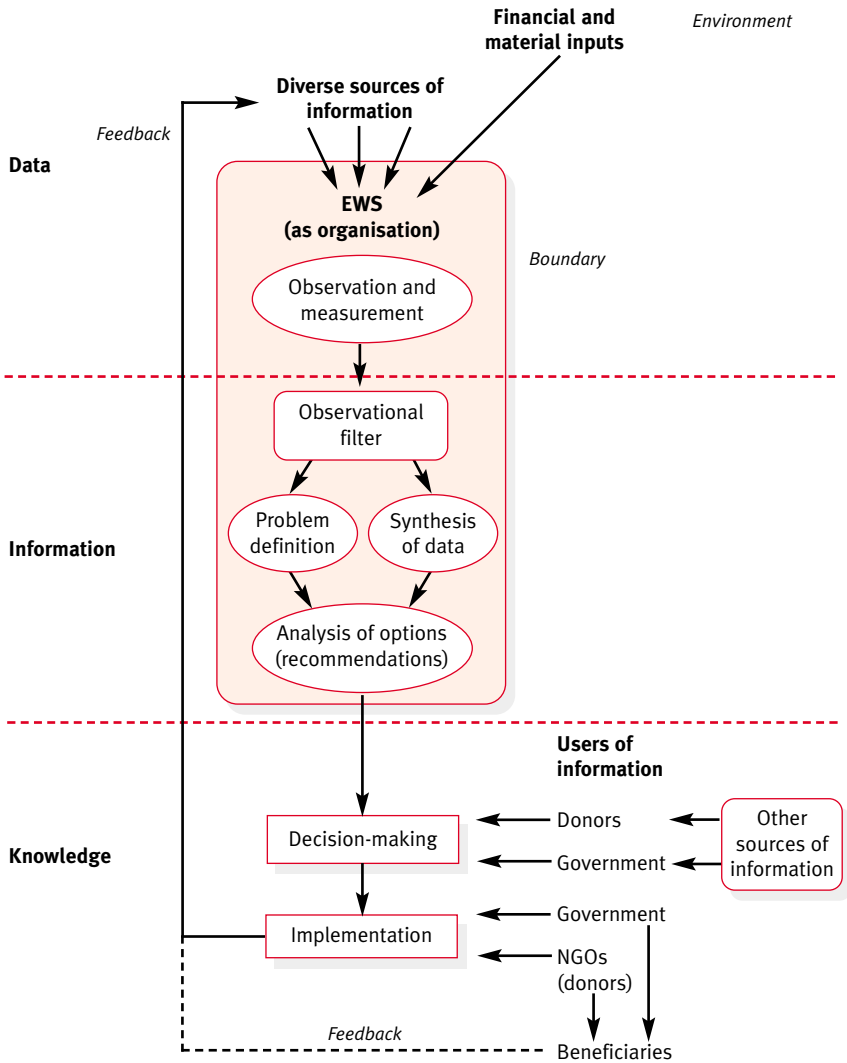
The rest of this section focuses on two aspects of warning systems for food insecurity and famine: the selection and collection of indicators, and the management of local-level systems. The discussion is necessarily brief, as this is a complex technical subject on which a great deal has been written elsewhere.[20]

15.4.1 Data and indicators

Under the influence of Sen's 'entitlement' theory, food security information and famine early-warning systems have increasingly incorporated a wider range of indicators of the availability of food and the ability to procure it. This includes data on the market price of food and other essential goods, family and community behaviour (the adoption of particular coping strategies) and the availability of employment opportunities in the area, as well as more conventional data on rainfall and levels of groundwater, crop production (surveys before and after the harvest), nutritional status and food supplies.

However, many early-warning systems still have too narrow a focus. They rely largely on indicators of food production and supply, instead of indicators of access to food. These are easier to collect and are often believed to be more accurate, though this may not be true in many cases. Socio-economic indicators, which tend to be harder to collect and draw more on qualitative data, are less influential in overall decision-making. They are more likely to be used in identifying those most in need of food aid. Coping strategies, which are difficult to monitor and interpret accurately, are rarely incorporated systemat-

Figure 15.1
An early-warning system as information system



M. Buchanan-Smith and S. Davies, *Famine Early Warning and Response – The Missing Link* (London: IT Publications, 1995), p. 14.

ically into early-warning systems. Officials are more likely to be impressed by conventional quantitative monitoring than community-based systems and local knowledge.

Multi-indicator systems are sensitive to the complexity of famine processes, and are therefore more likely to detect worsening food security early enough for agencies to intervene to protect livelihood assets and prevent starvation. However, information does not speak for itself. Data have to be interpreted. Options for intervention must be assessed. This presents many challenges where multiple sources of information are used.

The different types of data are not easily compared. For example, how does one weigh up the relative significance of data on grain prices in local markets compared to levels of rainfall or farm crop production, or sales of livelihood assets? To add to the problem, most systems depend to some extent on proxy indicators of food stress (e.g. the timing and extent of adoption of particular coping strategies).

Different methods are needed to collect different kinds of information, each requiring its own skills. Formal measuring systems can be used for some aspects of food security, such as crop production and food prices, that are quantifiable. Monitoring of nutritional status has its own methods. Assessing wider household food security status requires expertise in interviewing and participatory appraisal. These skills can be learnt and transferred, but this takes time, and specialist assistance will be needed as it is unlikely that any one local organisation or project team will have all of the relevant expertise in-house. Rapid staff turnover often prevents skills from becoming fixed within an organisation.

Some relevant information may have been collected by other people and for other purposes (e.g. a Ministry of Agriculture will collect agricultural production data). It will have to be obtained from those users. This may not be easy, especially in countries with very bureaucratic administrations. Information from other sources may have been collected or aggregated on a different basis from that of the local monitoring system. For example, government data sets may gather information at village or even district level, rather than household level. Government officials prefer to use administrative areas as their units of analysis, and may not take account of geographical or social differentiation within an administrative area. Disaggregation of data by age, sex or occupation is likely to vary between different data sets, as will the timing and frequency of data collection.

Over-emphasis on data collection is a common failing. Information is often gathered for its own sake, without sufficient thought being given to what field agencies need to know. Local-level systems in particular are likely to find themselves unable to process all the information they collect. This can be a particular problem for those that use a wide range of data sources and indicators. There are several instances of projects having to scale down their data-gathering operations, or bring them more into line with operational needs.

At the end of this process, information has to be packaged in a way that is intelligible to decision-makers and that helps to guide them towards appropriate action. This link to action must be kept firmly in mind when planning and running early-warning systems. The system may have to supply information to a wide variety of users, ranging from government policy-makers to field managers. Each group may want different kinds of data, which may have to be presented in different ways.

Case Study 15.8 illustrates one agency's approach to collecting and analysing food security information.

15.4.2 Maintaining local systems

Food security information systems are complex and difficult to manage. They can also be costly because of the considerable staff time required in collecting and interpreting data. This is true even with participatory data-gathering methods that involve community members, because the information still has to be drawn together from different sources, analysed and then packaged for decision-makers and field workers. As data often have to be gathered from communities dispersed over a wide geographical area, transport and subsistence costs can also be high.

Owing to these factors, the sustainability of warning systems is a major challenge. Systems need to be maintained continuously to give reliable data of patterns of food supply and demand over time. A secure funding stream is therefore needed. Lack of resources has damaged a number of government and NGO-run warning systems. The project-based approach that NGOs are generally obliged to adopt is an insecure foundation for such work because of its fixed time spans and the difficulty of obtaining repeat funding from donor agencies.

Both national and local warning systems must be integrated into the institutions that manage them. Many systems are purpose-built and tend to stand alone. Those who set up early-warning systems should plan their external linkages as carefully as their internal mechanisms. Local-level systems often

Case Study 15.8
Monitoring household food security

In the early 1990s, Save the Children Fund (UK) adopted a 'food economy' approach to analysing household food security. Food economy is defined as the sum of ways families obtain food. The food economy approach is most commonly used to estimate food aid needs, but it can also be used to inform other kinds of intervention to support food production or livelihoods.

Central to this approach is understanding rural households' everyday circumstances. Knowing how people normally obtain food is an essential part of predicting how they will react in a crisis, be it a major disaster or a seasonal food shortage. Building up a 'normal year' or baseline picture helps determine key indicators of food security that can then be monitored. Baseline pictures contain information on how households normally obtain food and cash income, their connections with the market and social or kinship networks, their assets (land, food stocks, livestock, cash, goods, tools) and their expenditure patterns. Data collection is mostly based on fieldwork using RRA or PRA techniques and, particularly, semi-structured interviews with community members, individually and in groups.

The next steps are to identify potential problems – changes in agricultural, economic or security conditions – that could affect access to food, and to develop scenarios showing what the impact of such changes would be. For example, the impact of reduced crop production, milk yields, and income from livestock sales or wage labour can be translated into an estimate of the likely impact on food availability. Similarly, the potential role of various coping strategies can be estimated. A computer software program, RiskMap, has been developed for this scenario analysis, which can be complex, although for smaller data sets it can be done using a spreadsheet or even manually.

Data sets are grouped geographically into 'food economy zones': areas in which the same food and cash income options are available and relied upon to varying degrees by families with different levels of wealth. This makes it possible to identify particular groups in need, but data collected on the basis of food economy zones are often incompatible with other data sets gathered on the basis of administrative districts.

Owing to the methods used, much of the information collected in the field

(continued)

Case Study 15.8 *(continued)*

is, inevitably, quantitatively imprecise. However, data analysis is designed to point out inconsistencies in data and ensure that the overall picture adds up. Field information of one kind is checked against other kinds and compared to secondary sources. Analysis takes place in the field, so that contradictions or odd findings can be dealt with on the spot.

A major problem with this approach is the need for skilled staff and ongoing training. Well-educated and committed field staff are not always easy to find, and turnover can be considerable.

Another problem is over-reliance on standard reporting formats and guidelines, leading to standardisation of the information-gathering process and hence to poor results. Field staff need to be sensitive to local circumstances and interviewees' needs, and ready to adapt their data-collection techniques accordingly. However, there is an ongoing tension between this need for flexibility, and the need for consistent data.

The food economy approach has been used widely by Save the Children Fund (UK) in Africa and Asia, and both it and the RiskMap programme have undergone considerable development during the past ten years. A manual has been produced and field training courses are held.

T. Boudreau, *The Food Economy Approach: A Framework for Understanding Rural Livelihoods* (London: Humanitarian Practice Network, Network Paper 26, 1998); J. Seaman, 'Making Exchange Entitlements Operational: The Food Economy Approach to Famine Prediction and the RiskMap Computer Program', *Disasters*, vol. 24, no. 2, 2000, pp. 133–52.

feed into national-level ones. But unless decentralised data are available for all the areas at risk, this can distort decision-making by giving undue prominence to particular districts.

Other problems include the lack of integration between different agencies' early-warning systems, which hinders collective analysis and action. Failure to standardise data across systems is a major issue. Agencies fail to learn lessons from each other's experiences, and even from their own similar programmes elsewhere.

Case Study 15.9
Sustaining food security information systems

In 1987, Save the Children (UK) established a local food security monitoring programme, Suivi Alimentaire du Delta Seno (SADS), in Mopti, Mali, in collaboration with Oxfam (UK) and the International Union for Conservation of Nature.

The system was designed to monitor local food entitlements. Data were collected using PRA methods. This included information on agricultural production, fish production, livestock conditions, levels of on-farm stocks, off-farm employment, household consumption and migration. Food prices were also monitored, together with the marketing strategies of producers and traders. Secondary data sets containing statistical information were incorporated: these covered rainfall and flood levels and national and regional food production estimates. Several one-off surveys were carried out to improve knowledge of particular subjects, such as the use of wild foods. The system developed indicators of the food security of different groups at different times of year.

The system's focus on coping strategies greatly improved understanding of the complexity of local food strategies, and challenged the misconception that food supply alone determines the state of food security. But coping strategies were difficult to monitor because households change their strategies frequently, and good baseline information was needed.

SADS produced quarterly food security assessments for local, national and regional decision-makers in government and international agencies. It also intervened to support livelihood strategies, principally through a credit scheme introduced in 1991 that made loans for productive activities such as the purchase of seeds or fishing equipment, to establish cereal banks and for economic diversification.

The sustainability of the information system and its institutional linkages were not considered in depth at the start of the project because the main aim was to explore the nature of vulnerability. It was difficult for an NGO to maintain such a system, owing to the cost of field staff and data collection, and the need to train people to gather and analyse information. The information SADS produced was timely in alerting decision-makers to pockets of food insecurity that had sometimes been

(continued)

Case Study 15.9 *(continued)*

overlooked by national systems, but its influence on decision-making was limited, largely for institutional reasons: it did not have direct links with government.

For these and other reasons, the information system was closed down in 1993. It was felt that it would be more appropriate to establish such a scheme within local or regional government structures; there was already a national early-warning system in Mali.

R. J. Lambert, 'Monitoring Food Security and Coping Strategies: Lessons from Information Collection and Analysis in Mopti, Mali', *Disasters*, vol. 18, no. 4, 1994, pp. 332–43.

15.5 Chapter summary

- There is a close link between environmental degradation and increased risk from natural hazards. Environmental protection and renewal is feasible, but may challenge vested interests.
- Industrial and domestic waste can present a serious threat to public health, whose impact may not be felt until some time in the future.
- Significant reductions in pollution and improvements in waste management require the involvement of the state, but partnerships between government and other actors are desirable.
- Global warming threatens to undermine society's resilience to environmental stress. The best ways of coping with the resulting increase in disaster risk are still unclear.
- Natural hazards such as drought are only one factor in food crises and famines. Political, social and economic factors can be influential.
- Food security is not merely a question of food availability. People do not have equal access to food because of differences in the resources they possess and other economic, social and political factors.
- There are many ways of overcoming food insecurity by improving people's ability to obtain food. Such initiatives can be undertaken locally.
- The most effective way to protect communities against drought-induced food insecurity and famine is to strengthen existing coping and livelihood strategies well in advance. Yet most external interventions are still in response to drought and crisis.

- The ideal approach is an integrated one that uses a range of methods to tackle different aspects of food and related livelihood insecurity. This is likely to include methods of protecting and increasing food production, better preservation of food crops, water conservation, preserving livestock and broader livelihood support.
- Local food insecurity/famine early-warning systems are valuable, especially where they are based on a wide range of indicators and community participation.
- Early-warning systems of all kinds need to stimulate appropriate action early enough to prevent destitution and starvation. In practice, they may fail to do so because of obstacles in the institutional and political environments in which they operate.
- The selection of food insecurity indicators and analysis of data need to be planned and managed carefully to ensure the collection of appropriate types and amounts of information.
- Food security information and early-warning systems are often costly, complex and difficult to manage. Sustaining such systems can be a major challenge.
- More harmonisation and integration of systems is needed.

Notes

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4 S. Devereux, *Famine in the Twentieth Century* (Brighton: University of Sussex Institute of Development Studies, Working Paper 105, 2000), www.ids.ac.uk/ids/bookshop/wp/wp105.pdf.

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6 *World Food Summit Plan of Action* (Rome: UN Food and Agriculture Organization, 1996), www.fao.org/wfs/index_en.htm.

7 For drought, see Smith, *Environmental Hazards*, pp. 286–313; Borton and Nicholds, *Drought and Famine*, pp. 11–22.
8 Borton and Nicholds, *Drought and Famine*, p. 15.
9 Young et al., *Food-security Assessments in Emergencies*, p. 4.
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11 Hubbard, *Improving Food Security,* pp. 58–60; I. Carter, *Improving Food Security: A PILLARS Guide* (London: TearFund, 2001); M. B. Anderson and P. J. Woodrow, *Rising from the Ashes: Development Strategies in Times of Disaster* (London: IT Publications, 1998), pp. 185–205; Developing Countries Farm Radio Network, www.farmradio.org.
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18 M. Buchanan-Smith and S. Davies, *Famine Early Warning and Response – The Missing Link* (London: IT Publications, 1995).
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Chapter 16
Preparing for disasters and emergencies

16.1 Introduction: what is disaster preparedness?

Many standard risk reduction terms are used loosely and inconsistently. 'Disaster preparedness' is one. Basically, it has three main elements:

1. Forecasting events and issuing warnings.
2. Taking precautionary measures in response to warnings.
3. Improving response by organising and strengthening capacity to deliver timely and effective rescue, relief and assistance.

Disaster preparedness therefore has two main aims: to help people to avoid impending disaster threats; and to put plans, resources and mechanisms in place to ensure that those who are affected receive adequate assistance. It is assumed that some people and property will be vulnerable to disasters, despite mitigation measures, and that agencies will have to deal with the disaster's impact.

This chapter highlights aspects of preparedness that do not fit easily into the other thematic sections of this Good Practice Review, with an emphasis on planning and systems. It is not a comprehensive review of emergency management practices. The chapter has two parts:

1. An overview of the main components of disaster preparedness.
2. Forecasting and warning systems.

16.2 Components of disaster preparedness

16.2.1 Overview

The main components of disaster preparedness are set out in the following framework (Table 16.1). Detailed guidance can be found in readily available expert publications, which have been used in preparing this chapter.[1]

The framework's nine general categories should not be seen as a fixed sequence. In most cases, activities in different categories will be carried out at the same time. Nevertheless, there is a logical sequence of sorts: planning must be preceded by understanding of vulnerability and leads on to the

Table 16.1 Disaster preparedness framework

1. Vulnerability assessment Starting point for planning and preparation, linked to longer-term mitigation and development interventions as well as disaster preparedness.	**2. Planning** Disaster preparedness plans agreed and in place, which are achievable and for which commitment and resources are relatively assured.	**3. Institutional framework** Well co-ordinated disaster preparedness and response system at all levels, with commitment from relevant stakeholders. Roles and responsibilities clearly defined.
4. Information systems Efficient and reliable systems for gathering and sharing information (e.g. forecasts and warnings, information on relevant capacities, role allocation and resources) between stakeholders.	**5. Resource base** Goods (e.g. stockpiles of food, emergency shelter and other materials), services (e.g. search and rescue, medical, engineering, nutrition specialists) and disaster relief funding (e.g. for items not easily stockpiled or not anticipated) available and accessible.	**6. Warning systems** Robust communications systems (technologies, infrastructure, people) capable of transmitting warnings effectively to people at risk.
7. Response mechanisms Established and familiar to disaster response agencies and disaster victims (may include: evacuation procedures and shelters, search and rescue teams, needs assessment teams, activation of emergency lifeline facilities, reception centres and shelters for displaced people).	**8. Education and training** Training courses, workshops and extension programmes for at-risk groups and disaster responders. Knowledge of risk and appropriate response shared through public information and education systems.	**9. Rehearsals** Evacuation and response procedures practised, evaluated and improved.

R. Kent, *Disaster Preparedness* (New York/Geneva: UNDP/DHA Disaster Training Programme, 1994), http://undmtp.org/english/disaster_preparedness/disaster_preparedness.pdf.

establishment of an institutional framework; the framework is a foundation for setting up information and warning systems, assembling resources, putting resource mechanisms in place and testing them, and providing public education and training. In reality, one never starts with no elements of the disaster preparedness system in place, so that the task is to make improvements in all areas.

16.2.2 Planning

A disaster preparedness 'plan' can take several forms, ranging from a broad mitigation and preparedness strategy to a detailed contingency plan for responding to a particular hazard. In most plans, the operational priorities will be to save human life, meet people's emergency needs (principally medical care, food, shelter and clothing) and restore facilities that are essential for health, safety and welfare (e.g. hospitals, water and sanitation, power and transport). Rehabilitation and reconstruction are likely to be included in more strategic plans, although in practice they tend to be poorly integrated with emergency response (see Chapter 17).[2]

Whatever the contents of the plan, it should have the following characteristics:

1. The objectives and activities must be set out clearly, logically and systematically.
2. It should be realistic, based on existing structures and systems and recognising their strengths and weaknesses. A high level of adaptability will be required during disasters. Plan for likely problems within response organisations as well as on the ground. Creating a preparedness/response system that can deal with the full range of disasters a society is likely to face will take a long time, depending on the resources available. Planning should reflect this.
3. Many preparedness plans include mitigation and recovery, but this may be only for form's sake. In practice, emergency systems' capacity to undertake these complex, long-term tasks is usually lacking (though it is essential to integrate preparedness plans with those for longer-term development and disaster management). Where there are weaknesses, strengthen existing structures rather than create new ones. The latter approach adds to the bureaucracy and will create confusion between organisations with similar mandates (see point 4 below and Case Study 16.1). The arrival of international relief teams after a major disaster often leads to creation of ad hoc parallel structures that confuse the situation even further, overwhelming local agencies and their systems.

4. Roles and responsibilities must be defined clearly. This is often done through provisions in the legislation setting up disaster management structures, or through administrative order. But as official mandates may be too generalised, there is usually a need for separate agreements between agencies. Existing arrangements can soon become outdated, so partners will need to monitor them regularly and adapt them if required. For organisations working at local level, it is particularly important to establish the extent of decentralisation in the plan and the corresponding extent to which they will be allowed to make operational decisions on their own.
5. The plan must be well informed – based upon reliable and comprehensive information covering all relevant aspects: hazards, risks, vulnerabilities and capacities. Analysis of past events and how they were managed will form a central part of this information base, but it is also important to anticipate the kinds of event that are likely to happen in the future, which may be different from those that have occurred in the past.
6. It must prepare for extreme events and chaotic situations. These will require a different scale and type of response from routine emergencies. In the conventional definition, a disaster is an event that overwhelms a society's capacity to cope. Although smaller events may well be disastrous at local level, major disasters are quite different in their scale and often in the nature of their impact.
7. It must reflect the needs of the community, especially the most vulnerable. This means that some kind of socio-economic vulnerability analysis is essential in advance. Preparedness plans are usually much more aware of the vulnerability of critical facilities and infrastructure (e.g. emergency command centres, hospitals, power and water supplies, roads and bridges) than of the vulnerability of the human beings who live within their remit. When a disaster strikes, needs assessments need to be as quick and accurate as possible, and should take the most vulnerable into account (see Chapter 6).
8. The aim should be to provide *effective and timely* response. This is a question not just of speed, but also of providing what is most needed, when it is needed. In the aftermath of a disaster, the affected communities' needs and priorities may change rapidly. Disaster managers must be able to identify and react to this.
9. Governments usually take the lead in disaster preparedness planning, but as in any other aspect of risk reduction the plan should integrate the skills and capacities of a wide variety of agencies – official and non-governmental, including community groups (see Chapter 5). This is likely to include many groups and organisations not normally involved in disaster management. In implementation, the plan should be flexible enough to

incorporate the variety of 'emergent groups' that are likely to spring into action after disasters (see Chapter 8.3.1, page 119). Local people are the main responders in the immediate post-disaster period, and disaster workers should support their efforts, not duplicate or undermine them.

10. Good coordination is vital – vertical (between local and higher authorities) and horizontal (between different agencies operating at the same level). Disaster preparedness planning does not have to be centralised. There will have to be some centre to coordinate emergency operations, but disasters cannot be controlled in a 'top-down' manner from a single point, and decision-making should be delegated where possible. Decentralisation of responsibilities is generally desirable because it allows disaster responses that are more rapid and better informed about local needs. Organisations operating locally may need to develop their own preparedness plans, especially in places where there is little chance of support from government or external agencies: this might be because government is ineffective or the area is very remote. But in most cases, some degree of coordination with official agencies is vital to make the most of what may be limited capacities, as well as to avoid duplication of effort. In many cases, plans (or parts of them) will have to be translated into local languages in order to engage local people and their organisations.
11. It should be 'owned' by all parties involved. For the plan to work, people must believe in it and be committed to it. At government level, enabling legislation and adequate resources (especially funding) are key indicators of commitment; so too is support from a senior figure such as a president or prime minister. Some of the indicators set out in Chapter 3 may be helpful in assessing the commitment of other agencies.
12. Regular review and updating is essential.

Above all, one should focus on the planning *process*, rather than the production of plans. A written disaster preparedness plan must not be seen as an end in itself. It is 'a product, but not the main goal, of the planning process'.[3] Its purpose is to stimulate action and make that action effective. Constant review and dialogue between partners will be required.

Case Study 16.2 describes some of the harm that results from inadequate preparedness planning.

16.2.3 Resources

When a disaster strikes, a variety of goods and services are needed to deal with the crisis.

Case Study 16.1
Organisational duplication in disaster response

The politicisation of disaster management institutions became a burning question in Peru, Bolivia and Ecuador during the El Niño crisis of 1997–98, when the response to the crisis was heavily influenced by party and presidential politics.

In Ecuador, the major parties and candidates were preparing for a presidential election. In Peru, the next presidential election was more distant but the country's autocratic president, Alberto Fujimori, was anxious to boost his popularity. In Bolivia, responses were influenced by a transition between administrations and political manoeuvring within a four-party coalition government.

In each country, the conventional emergency management organisations (civil defence) were marginalised by new, temporary government organisations that took over management of the El Niño event. The result was duplication of roles and attendant confusion, together with a serious loss of credibility and morale in the civil defence organisations.

Although in each case the official justification for the changes was the lack of capacity in the civil defence agencies and their response-focused attitudes, a prime motive was to put allies of the president in charge of dealing with the El Niño event, as it rapidly became a national political crisis in all three countries. In other words, a short-term, politically expedient, approach was preferred to the strategic development of disaster management capacity.

R. S. Olson et al., *The Marginalisation of Disaster Response Institutions: the 1997–1998 El Niño Experience in Peru, Bolivia, and Ecuador* (Boulder, CO: Natural Hazards Research Center, Special Publication 36, 2000), www.colorado.edu/hazards/sp/sp36/SP36.pdf.

The material resources required include search and rescue equipment, boats and vehicles (and fuel to run them), stockpiles of relief goods such as food, medicines, water purification and oral rehydration tablets, emergency shelter materials, blankets and cooking utensils. The range of potentially useful materials is very wide, and careful thought must be given to likely needs and how to supply them. There must be systems in place that ensure adequate funding will be on hand to pay for emergency response operations.

Case Study 16.2
Failure to plan

Cyclone Geralda struck Madagascar in February 1994. It was probably the strongest cyclone in the country's history, and caused widespread damage to crops, housing and infrastructure. The immediate emergency response was limited because the structures for dealing with such an event were not in place. The failure to develop adequate preparedness plans had the following consequences:

- Important roads and bridges had not been maintained, which hindered relief operations.
- Lack of functioning local committees led to delays in emergency response and relief. Responsibilities were not defined, which encouraged competition between members of parliament and town mayors over who should take the leading role.
- In one case, owing to the lack of response plans and the strict application of official rules, bulldozers stationed in one administrative district could not be used to clear a major landslide just 20 metres outside the district's boundary.
- In the absence of plans or criteria, it was impossible for the government to target distributions of emergency supplies.
- Much of the collection of baseline information about the affected population had to take place *after* the cyclone. This task and the post-disaster damage assessments were greatly handicapped by the destruction of roads and bridges. There were no protocols for damage assessment.
- Lack of emergency food and fuel stocks resulted in immediate shortages, hoarding and price escalation (rice prices went up by 300% overnight). The impact was felt particularly by the urban poor. Destruction of infrastructure added to the supply problem.
- Capacity to respond had to be built up after the disaster: this included logistics, communications and human resources, as well as material and financial capacity. Much essential equipment had to be imported, since it could not be purchased locally, and in some cases it took months for equipment to arrive.

R. Vonk, 'Emergency Preparedness in Cyclone Prone Areas in Madagascar', in J. Scobie (ed), *Mitigating the Millennium: Community Participation and Impact Measurement in Disaster Preparedness and Mitigation Programmes* (Rugby: ITDG, 1997), pp. 52–59.

The necessary human resources include trained emergency management staff and volunteers able to disseminate warnings, assist evacuation, carry out emergency response activities such as search and rescue and first aid, make needs assessments and manage the distribution of relief aid. The skills of medical personnel, the police, fire-fighters, engineers, architects, scientists, media professionals and many others will also be needed. Training courses should reach beyond emergency managers, staff and volunteers to include all professional groups that are likely to be involved in disaster response.[4]

Good preparedness includes having these resources in place, or having established mechanisms that can put them in place rapidly when needed.

Material resources

The history of disaster response is full of examples of inappropriate materials being sent for the relief of victims. This inappropriateness takes two main forms.

1. Items that are not needed, are unsuited to local cultures and practices, or are simply inferior. In this category are:

    - Foodstuffs that disaster-hit communities do not use or like, such as wheat for people who normally cook with rice; or items that they have already (such as the rice transported into a rural district in Peru after an earthquake in 1990; the district had a rice surplus, and so had no need of further supplies).[5]
    - Out-of-date or inessential medicines, which are frequently dumped on disaster-affected communities.
    - Faulty equipment such as the motor boats minus propellers for the outboard motors that arrived in Madagascar after Cyclone Geralda in 1994.[6]

2. Items that are needed but are brought in from far away when they are readily available locally (such as blankets, tents, cooking utensils and foodstuffs). Off-the-shelf prefabricated emergency shelters, designed by foreigners with little or no understanding of the diversity of local conventions and needs, have been heavily criticised since the 1970s, but still appear on occasion.[7]

Wherever possible, supplies and stockpiles of relief materials should be bought locally. They will be relatively cheap and appropriate. Local purchases also stimulate the local economy, but large-scale purchases of foodstuffs or other items in local markets for stockpiling are likely to push up prices, which may harm poor households.

All of these problems can be overcome, but this needs careful logistical planning and management, for which systems should be set up well in advance. New information technology has helped considerably here, and a great deal of work has been done to develop robust supply management systems (see Case Study 16.3). However, the capacity to use such systems needs to be built up through acquisition of technical resources and training.

Human resources

A standard component of most community-level preparedness programmes is the establishment of a cadre of volunteers. The effectiveness of such teams depends on the number of volunteers, how widely they are distributed across an area at risk, the level of skills and commitment they possess, and the extent of equipment and material resources at their disposal.

The number of volunteers will have to be built up over time, and developing their skills will also be a long-term process. Avoid short-term perspectives and over-ambitious targets. However, the task of setting up a single volunteer group, giving basic training and providing equipment, can be carried out within a short period.[8]

Volunteer-based programmes can be effective on both small and large scales. The Bangladesh Red Crescent's Cyclone Preparedness Programme (Case Study 16.5) deploys over 30,000 volunteers across hundreds of kilometres of exposed coastline, supported by an extensive infrastructure of radio warning systems and cyclone shelters. In the Philippines, the community organisation Buklod Tao (Case Study 7.2, page 107), working at village level, has a handful of trained disaster management volunteers, three boats and a few items of basic equipment such as ropes, first aid kits, megaphones and flashlights.

Whatever the scale of the programme, its organisational structure must be robust and lasting. There is an understandable temptation among disaster management agencies to create new structures for disaster preparedness/response, but unless the agency concerned is prepared to remain in the area and offer long-term support these may not be sustainable. In many, if not most, cases it is better to use established community structures as the foundation for disaster preparedness activities, because these will have a solid base of organisational skills, motivation and group solidarity. Many kinds of community structure can form a foundation for disaster preparedness work, including village development committees, peasants' federations, savings and credit groups, slum dwellers' associations and youth clubs.

Case Study 16.3
Managing humanitarian supplies

The flood of donations after major disasters causes major logistical and management problems. Much is neither requested nor appropriate. To overcome this, PAHO began developing a computerised supply management system called SUMA in the early 1990s. Initially focusing on health-related supplies, it has since been extended to cover all forms of relief goods.

SUMA identifies and sorts incoming aid, prioritises supplies according to the affected population's needs, indicates the flow of donations and identifies gaps. It can be used for large and small disasters. It is also used in normal times for inventory control of warehouses and health centres. The software, which can be run on most modern PCs, is updated periodically and, with operating manuals, can be downloaded from the Internet. SUMA is also used as an information and reporting system, making aid more transparent and accountable.

In a disaster, teams of trained staff and volunteers from government and other organisations run the system. PAHO has held courses for such teams and developed training materials (available free on the Internet), and SUMA is included in the curricula of other training institutions. An estimated 2,500 people have been trained around the world. All the national emergency organisations of Central America and the Caribbean have agreed to adopt SUMA methodologies in their official manuals and guidelines.

An independent evaluation of SUMA after two earthquakes in El Salvador in 2001 found that it had registered 16,000 tons of humanitarian assistance sourced from 41 countries via 880 flights or border crossings. Although the system was outpaced by the rapid arrival of assistance in the first 2–3 days, and there was a shortage of trained personnel, SUMA operators recorded an estimated 90% of humanitarian supplies flown into the country, and 60–70% of those brought in overland.

The WHO/PAHO Supply Management System (Washington DC: PAHO, 2001), www.paho.org/english/ped/suma.pdf; N. A. Nicolás and R. S. Olson, 'Final Report. "SUMA" and the 2001 El Salvador Earthquakes: An Independent External Evaluation', 2001, www.disaster-info.net/SUMA/pdf/suma_els2001.pdf. The SUMA website is at: www.disaster-info.net/SUMA.

The capacities of the local structure and its members, including their enthusiasm for the task, are the key criteria in identifying those most suitable for disaster preparedness. Many of the volunteers and organisers will probably come from those already involved in community work. Selection of team members should always involve consultation with the community and can be left to local groups in many instances. However, it is important not to overload groups and individuals with new responsibilities, and in most cases additional volunteers and organisers will have to be found.

Training of professionals and volunteers is essential. Refresher courses are also essential, although under-resourcing of preparedness means that these happen less frequently than they should. Disaster preparedness manuals emphasise the importance of rehearsals or simulations of disasters. No simulation can fully prepare disaster management teams for a real event, but rehearsals enable them to practise procedures and test their effectiveness. They often reveal weaknesses in the system that can be corrected. Such exercises must be taken seriously.

Case Study 16.4 is an unusual example showing that community-level training and preparedness can bring almost instant benefits, although normally a longer period of training, organisation and mobilisation will be needed to prepare a community for all eventualities.

16.2.4 Protection of assets

Short-term measures to protect household assets will be needed in sudden-onset disasters. The most obvious step is to move them out of harm's way. Communities vulnerable to frequently occurring hazards such as seasonal floods tend to have well-established systems for moving livestock, food, household utensils and other items (see for example Case Study 9.3, page 138). Where this is not possible, possessions can be secured within the home by putting them onto high shelves and platforms, hanging them from the ceiling, or even placing them on the roof.

If the house itself is vulnerable – for example, to the high winds and sea surge of a cyclone – some goods can be made safe by burying them in the ground in tins or pots. This is common practice in parts of Bangladesh, where it is also increasingly common to build mounds of earth that give shelter to animals above floodwater levels.

The need to protect livelihood assets has an influence on poor people's readiness to respond to warnings of disasters (see section 16.3, below).

Case Study 16.4
Mobilising a community for disaster response

One of the consequences of the eruption of the Mount Pinatubo volcano in the Philippines in 1991 was that communities in the vicinity faced an increased long-term threat from volcanic debris. The volcano emitted some 6.6 cubic kilometres of volcanic ash that settled on slopes and in river basins. In the following years, rainfall turned this into huge mudflows (lahars) which destroyed agricultural land, bridges, roads and homes over a wide area.

In 1994–95, a local NGO, CONCERN, began a project to train and mobilise people in Manibaug-Libutad, a community of 771 households in one of the areas at greatest risk from lahars. Twenty-five people volunteered for training in capacity and vulnerability analysis, hazard monitoring and mapping, disaster response management (including evacuation), damage and needs assessment, and other aspects of disaster management.

During the two-day training course, the community was able to identify safe places for evacuation, and resources such as people and organisations with cars, trucks and communications facilities. The participants immediately set up a community disaster response organisation, which in turn established committees for warning, evacuation, health, information and education, and relief and rehabilitation. Each committee recruited and trained volunteers.

Only three days after the initial training was over, rain began in the late afternoon and the warning committee posted men along a nearby lahar-retaining dyke to monitor rising mudflows and stream water. Barely two hours later, the committee gave the order to evacuate when the dyke began to collapse. Volunteers blew whistles and mobilised foot patrols, which went from house to house telling villagers to gather at the designated pick-up points for evacuation, from where they were taken by vehicles to safe areas.

Within another hour, one kilometre of the dyke had collapsed and a lahar was moving through the village, but by this time all the residents had been evacuated. An hour after that, the entire village was covered by the lahar to a depth of up to two metres.

Z. G. Delica, 'Community Mobilisation for Early Warning in the Philippines', in J Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 37–47.

Protection of household assets is largely a matter for individual households at present. Disaster preparedness and response agencies have not given much thought to it, being concerned with saving lives and relieving human suffering. Some shelters and safe places are designed to take animals and people will often take their most precious possessions to shelters. Community stores have been built to protect grain and seeds against flooding. The idea of providing secure buildings for storing other items is occasionally discussed but has not been tested on any scale.

The assets of the disaster preparedness system itself also need protecting. Control centres, communications systems, warehouses, search and rescue equipment and relief goods are all vulnerable. Agencies need to protect their own buildings, equipment – and files: preserving records of beneficiary groups, resources, methods and experiences is important (just as it is important for local government agencies to preserve land, legal and medical records).

16.3 Forecasting and warning

The literature on forecasting and early-warning systems is extensive; this section sets out only a few general principles of good practice, and discusses some of the most important issues in making warnings effective at local level. Much of the literature looks at forecasts rather than warnings, and tends to focus on scientific and technical features. There is some sociological writing on warning systems, but most is based on research in developed countries. Local systems also tend to be less well covered in the literature than national ones.

Looked at simply, the early warning process has three inter-related stages:[9]

1. Evaluation/forecasting (observation and prediction) based on scientific expertise and advanced technologies (e.g. mathematical modelling, remote sensing). A great deal of effort and resources have gone into this stage, resulting in significant advances in accuracy and timeliness in some areas of forecasting, notably tropical cyclone forecasts. This is the scientific and technical dimension of early warning.
2. Warning/dissemination, where forecasts are turned into messages and transmitted by appropriate agencies as recommendations for action. There has been considerable investment in this stage as well. In particular, rapid advances in communications technology have greatly improved the speed with which warnings are transmitted. At this stage, early warning acquires institutional and political characteristics.

3. Response, whereby warnings are turned into actions, such as evacuation. The actors in this process are more numerous and diverse. They include officials at national and local levels, NGOs, communities and individuals. In this third stage, the institutional and political aspects of early warning broaden out, and the early-warning process acquires an essentially social dimension, where the human factors of risk perception and decision-making play a crucial part. It has not received as much investment as the first two stages.

There are three key elements in the success of an early-warning system, at any level:

1. Forecasts must be accurate in predicting the location, time and severity of a hazard event.
2. Warnings must be disseminated in time for populations at risk to make themselves safe.
3. Warnings must be communicated to decision-makers and communities in appropriate ways, based on understanding of their perceptions and needs.

There have been significant advances in both of the first two areas. However, insufficient attention has been paid to the third.

16.3.1 General principles

The UN's International Decade for Natural Disaster Reduction in the 1990s highlighted early warning as a topic for analysis and development. International expert groups were convened to look at different aspects of the topic and make recommendations. These were summarised in a set of 'guiding principles' for effective early warning (a) at national and local levels and (b) at international and regional levels. Those relating to national and local levels are reproduced in Box 16.1.

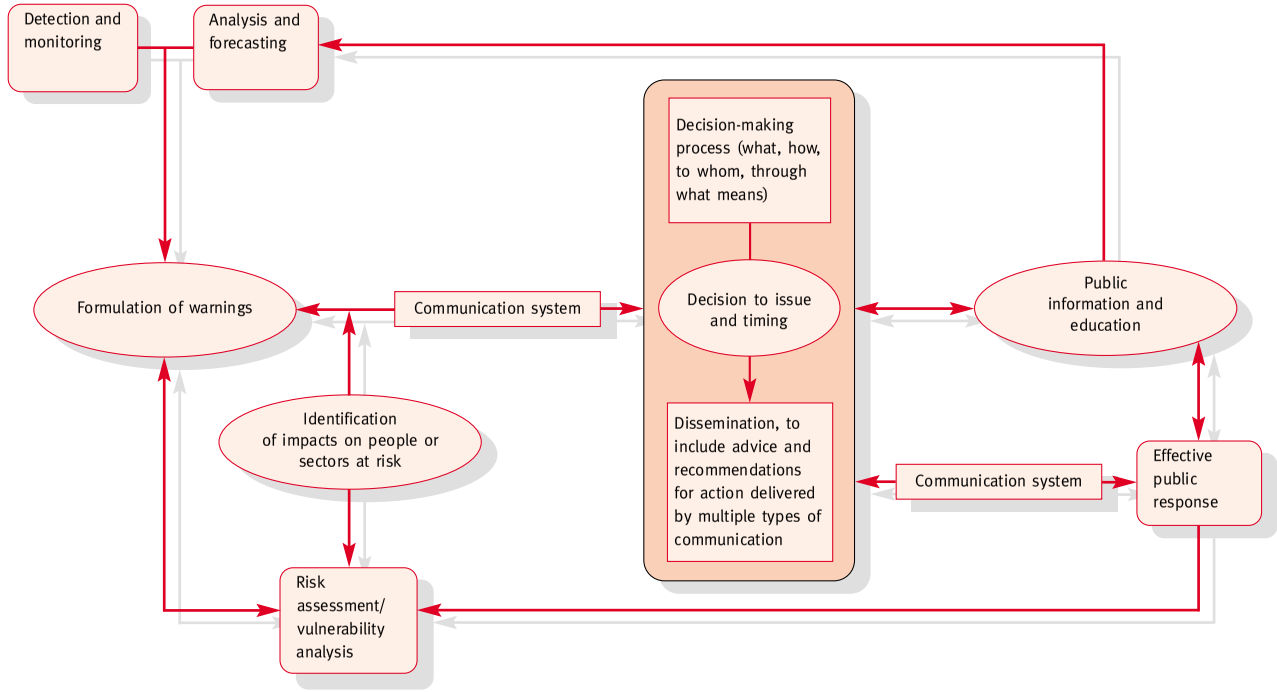
16.3.2 Issues in early warning

Warning systems vary greatly in size, structure, management and technological sophistication, according to the extent of their coverage, the nature of the hazard(s) they are warning of and the human and material resources available. But there are many issues common to all systems.

Management and resources

Large-scale early-warning systems require considerable resources: people, infrastructure, technology, data and funding. They are also complex to

Figure 16.1
Generic forecasting/warning system



Source: Carmen Schlosser, unpublished

Box 16.1
Ten guiding principles for the application of early warning at national and local levels

1. Early warning practices need to be a coherent set of *linked operational responsibilities established at national and local levels of public administration and authority.* To be effective, these early warning systems should themselves be components of a broader program of natural hazard mitigation and vulnerability reduction.
2. Within each country, the *sole responsibility for the issuance of early warnings for natural and similar disasters should rest with an agency*, or agencies, designated by the government.
3. The *decision to act upon receipt of warning information is political in character.* Authoritative decision-makers should be identified and have locally-recognised political responsibility for their decisions. Normally, action resulting from warnings should be based on previously-established disaster management procedures of organisations at national and local level.
4. In the chain of political responsibility, initial hazard information is often technically specialised or specific to a single type of hazard authority. To be applied effectively, *warnings need to be clearly understood and operationally relevant to local agencies* which are more frequently oriented toward non-specific hazard functions.
5. Early-warning systems must be *based upon risk analysis* which includes the assessment of the occurrence of hazards, the nature of their effects and prevailing types of vulnerability, at national and local levels of responsibility. The warning process must *lead to demonstrated practices that can communicate warning and advisory information to vulnerable groups* of people so that they may take appropriate actions to mitigate loss and damage.
6. *Locally predominant hazard types and patterns*, including small-scale or localised hydro-meteorological hazards related to patterns of human economic or environmental exploitation, must be incorporated if early warning is to be *relevant to risk reduction practices*.
7. There is a continuing *need to monitor and forecast changes in vulnerability patterns, particularly at local levels*, such as sudden increases in vulnerability arising from social developments. These may include conditions of rapid

(continued)

Box 16.1 *(continued)*

urbanisation, abrupt migration, economic changes, nearby civil conflict or similar elements which alter the social, economic or environmental conditions of an area.

8. The *primary responsibilities must rest at local levels of involvement* for producing detailed information on risks, acting on the basis of warnings, communicating warnings to those individuals at risk and, ultimately, for facilitating appropriate community actions to prevent loss and damage. A high resolution of local knowledge and developed experiences of local risks, decision-making procedures, definitive authorities concerned, means of public communication and established coping strategies are essential for functions to be relevant.
9. Groups of people that exhibit different types of vulnerability will have different perceptions of risk and various coping strategies. *Locally appropriate warning systems will provide a range of communication methods and should provoke multiple strategies* for protection and risk reduction.
10. To be sustainable, all aspects of the design and implementation of early-warning systems require the substantive involvement of *stakeholders* at the local and national levels. This includes production and verification of information about perceived risks, agreement on the decision-making processes involved, and standard operational protocols. Equally important abilities involve the selection of appropriate communication media and dissemination strategies which can assure an effective level of participation in acting upon receipt of warning information.

IDNDR Early Warning Programme: Reports on Early Warning (Geneva: UN International Decade for Natural Disaster Reduction, 1999), pp. ii–iv.

manage. They have to integrate multiple actors and different levels (international, regional, national, local), and must be linked not only to disaster preparedness but also to wider mitigation programmes. It is relatively easy to design a system on paper, but its implementation can take many years, depending on the scale, and should always be undergoing review and refinement.

Case Study 16.5
The Bangladesh Cyclone Preparedness Programme

Following the 1970 cyclone, which killed 500,000 people, the government and the Bangladesh Red Crescent Society began working together to improve coastal warnings and evacuation. The Cyclone Preparedness Programme currently covers 11 districts containing 3,500 villages. Its activities include issuing warnings, building and operating shelters (there are 1,350 along the coast, some built by other agencies), assisting with evacuation, search and rescue, first aid, relief and rehabilitation, and building up community preparedness capacity.

The backbone of the project is a cadre of 32,000 village volunteers, men and women, organised into local teams of 12. They are equipped with radios to monitor weather bulletins, megaphones and hand-operated sirens, first aid kits, rescue equipment and protective clothing. They are not paid, but receive travel costs and daily allowances for attending training sessions.

In the periods between cyclones, volunteers are trained by permanent Red Crescent staff. They receive a three-day basic training in cyclone preparedness, with refresher courses every five years. Specialist training in subjects such as radio use, first aid and leadership is provided separately.

The volunteers organise regular rehearsals and demonstrations in villages: the project aims to hold at least 260 mass community awareness demonstrations each year. Plays have been written for the programme to disseminate information about storing emergency rations, safe shelter and basic hygiene. More than 200,000 people have seen these. Folk songs, wall paintings, video shows and posters are among the other methods used to raise awareness.

The village volunteer groups are linked to each other and to Red Crescent offices at field and higher levels through a network of radio stations. This network is maintained throughout the year, and runs 24 hours a day during a warning or emergency period.

The system is costly and requires ongoing funding from the government and the international Red Cross/Red Crescent movement. Extending its coverage and improving its operational effectiveness are continuing challenges. However, it is widely acknowledged to be highly effective. Hundreds of thousands of

Case Study 16.5 *(continued)*

IVS Bangladesh

A page from a community training manual, showing actions to take in preparing for a cyclone

people can now routinely be evacuated from the path of cyclones. In May 1994, three quarters of a million people were safely evacuated; only 127 died.

A review in 2000 found that, as a result of the programme, 'Cyclone warning and the response to it have become part of people's daily lives.'

Cyclone Preparedness Programme (London: British Red Cross Society, NGO Initiatives in Risk Reduction, Case Study 4, 2000), www.redcross.org.uk/riskreduction; M. H. Akhand, 'Disaster Management and Cyclone Warning System in Bangladesh', in J. Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 49–64.

It is certainly not the case that only rich societies can have effective forecasting and warning systems: one of the most notable successes in recent years is the Cyclone Preparedness Programme in Bangladesh (Case Study 16.5).

Well-integrated systems like the cyclone preparedness programme in Bangladesh cover a wide geographical area and reach down to community level. It is not clear how common this is. Centralised forecasting and warning systems tend to achieve broad geographical coverage, but can 'fade out' as they get closer to vulnerable communities.

In most systems, the bulk of effort and expense is put into transmitting detailed, clearly presented information to decision-makers and government emergency management services. Far less effort and funding go into disseminating this information right down to individual communities or households through accessible messages that will warn them and help them to make sensible decisions about how to respond. In Delhi, for example, a sophisticated forecasting and warning system for floods in the Yamuna River was found to break down at the point of informing poor people living in slums in the riverbed. A cryptic one-line statement ('the water level is expected to rise, make your own arrangements') was all these communities received to warn of floods in September 1995, delivered by local policemen touring the settlement.[10]

Local and community-based systems

There is a role for small-scale early-warning systems. These can be based on local capacities and technologies to a greater extent than larger systems. They can deal with the local incidence of hazards, which larger systems cannot usually manage. Communities can be more closely involved in running them – and are more likely to respond to their warnings.

The effectiveness of such systems is particularly evident in community-based monitoring of drought/famine (see Chapter 15.4, page 274), but they can also be effective with other hazards, notably flood warnings (see Case Study 16.6). Local warning systems can sometimes be free-standing, but for comprehensive, integrated outreach it is better if they form 'sub-systems' of larger-scale programmes.

Technological sophistication is not necessarily a barrier to small-scale warning systems or community involvement. In Jamaica, volunteer rainfall gauge readers in the upper watershed of the Cave River respond to heavy rainfall and general alerts by the National Meteorological Services by monitoring the amount and duration of the rainfall. They transmit information down to the village of Aenon Town, which the river also runs through, using citizen band radio. The radio operator at Aenon Town interprets the data and, using a prediction table, estimates how long it will be until the river floods there and how high the floodwaters will be. A complex computer-based flood forecasting model developed by scientists was used to draw up the prediction table, but the local radio operator only has to use the table itself and does not have to make any other calculations. When the estimated time to flooding gets down to three hours, an emergency operations centre is activated.[11]

Case Study 16.6
A community-operated early-warning system

The Coyolate River Basin covers 900 square kilometres of highlands and coastal plains in Guatemala. It is subject to recurrent floods. In 1997, the government established a community-operated disaster management programme with funding from the Swedish International Development Agency (SIDA).

Local emergency committees and volunteers were trained in hazard mapping and elements of emergency planning and response, including early warning. A technologically simple early-warning system was established, at about a quarter of the cost of conventional automated (telemetric) systems which use more sophisticated instruments. Community volunteers use plastic rain gauges to monitor rainfall, and simple electronic instrumentation to measure river levels, feeding information to a local forecasting centre via solar-powered radios. The centre, which is staffed by members of the local emergency committee, can forecast floods two to three hours in advance and begin emergency preparations if required.

Hurricane Mitch in October 1998 was the system's first test. While almost 300 people died in Mitch-induced floods on other rivers in Guatemala, no lives were lost along the Coyolate River system thanks to successful evacuation. In its first five years, the early-warning system benefited over 5,000 people in about 100 communities.

The project's success has led to similar systems being developed elsewhere in Guatemala and Central America. There are believed to be more than 20 community-operated early-warning systems in watersheds in the region, most of which have been set up since Mitch.

World Disasters Report 2002: Focus on Reducing Risk (Geneva: International Federation of Red Cross and Red Crescent Societies, 2002), pp. 52–53.

In any case, vulnerable communities will probably monitor impending events themselves. Communities living close to flood-prone rivers often have people watching water levels at times of severe or prolonged rainfall, and simple gauges – e.g. marks on a tree or a bridge – are used to measure this.

Influences on official response

Institutional response to forecasts and warnings of impending disasters is influenced by external factors – political, attitudinal, legal, economic, logistical, ideological and institutional – that are unrelated to the scientific data (for a discussion of this in famine/food security early-warning systems, see Chapter 15.4, page 274).

Where events are seasonal or frequent, such as cyclones or monsoon floods, institutions are relatively familiar with them and it is easier to develop and run effective warning systems. But in the case of infrequent events, officials may not understand the hazard, and establishing a warning system is less likely to have been a political priority.

Volcanic eruptions are a prime example. Many potentially dangerous volcanoes have not erupted in living memory, there is still a lot of scientific uncertainty when it comes to predicting the timing of individual eruptions, and as complex natural phenomena volcanoes are not easily explained to non-scientists – yet scientists still need to explain matters to decision-makers, the media and the public.[12] Successful evacuations, such as that of 60,000 people ahead of the eruption of Mount Pinatubo in 1991, owe their success to the effort and ingenuity that went into communicating with non-specialists (see Chapter 11.3.5).

Case Study 16.7 outlines a famous, tragic example of political and institutional weaknesses contributing to a disaster that could have been avoided.

Influences on community response

As previous chapters have shown, people at risk do make rational choices about protecting themselves from disaster.[13] Within communities, there are many different perspectives of risk which vary according to socio-economic differences in wealth, social standing, level of education, age, religion, ethnic group and gender. Personal and collective experience plays a significant part here. Risk perceptions are likely to vary considerably between different communities, and even within the same community. This diversity presents a particular challenge to those who have to transmit early-warning messages over wide areas.

One of the principal socio-economic factors affecting response to disaster warnings in many developing countries is, surely, the vital need to protect assets and maintain livelihoods. The poorer and more marginalised a house-

Case Study 16.7
Early-warning failure

Shortly after 9pm on the evening of 13 November 1985, the Nevado del Ruiz volcano in Colombia erupted. It threw out clouds of hot ash that scoured and melted part of the summit's snow and ice cap, sending torrents of meltwater, slush, ice and volcanic debris down the slopes, where they picked up water, vegetation and other debris to form lahars that raced along the valleys of streams and rivers normally fed by the volcano's melting snow and ice. Shortly before midnight, the lahars reached the town of Armero: more than 21,000 people were killed.

The eruption was not a surprise. The volcano had been noticeably active for about a year. Early in 1985, government scientists and civil defence authorities were alerted. The Civil Defence prepared a disaster plan, but this was done without an up-to-date hazard/risk map. This was the responsibility of the government geology and mines bureau, INGEOMINAS, but it showed little sense of urgency when it came to mapping or monitoring the volcano and in any case did not have sufficient expertise. Equipment and experts had to be brought in from other countries to help monitor seismic activity, but the monitoring system was not in place until the end of August, and even then there were two parallel monitoring sets in operation, one run by INGEOMINAS and the other by an officially sanctioned local Volcanic Risk Committee that had been set up by local government, universities and businesses. Central government officials were offered more expert volcanologists, equipment, training and information by UNESCO, but did not act on the offer for nearly two months.

Nevado del Ruiz increased its volcanic activity markedly in September, and this speeded up preparedness activity. The Volcanic Risk Committee issued a public warning of serious risk of an eruption and avalanches of rock and ice. A national-level emergency committee was formed, the Civil Defence developed its emergency management plan and the Colombian Red Cross assumed responsibilities for emergency communication and disaster response. The Civil Defence was active in identifying populations at most risk along the river systems fed by the volcano, initiating awareness programmes in schools, improving radio communications facilities and providing other emergency equipment, and meeting national and local officials. Provincial emergency committees contacted villages to

(continued)

Case Study 16.7 *(continued)*

highlight the need for preparedness and encourage the development of local evacuation plans.

Yet the disaster management arrangements remained incomplete. A preliminary hazard map was presented in early October, showing that extensive areas were threatened and some towns would need to evacuate rapidly; but only ten copies were made and distributed. The four provinces likely to be affected were developing separate plans, with little coordination. The seismic monitoring programme was still inadequate and data were not being shared fully. It was felt that national government was hesitant about action, and some government officials in the capital criticised the hazard map as being too alarming. In an attempt to calm the population, a national newspaper stated that the volcano was not dangerous, as did the Director of the Geophysical Institute of the Andes. The Chamber of Commerce in Manizales, a large town near the volcano, expressed concern that irresponsible reporting would cause economic losses. An archbishop criticised the media for spreading 'volcanic terrorism'. The Mayor of Armero stated that many people were confused by the information they received: they did not know whether to stay or leave.

Improvements to the scientific monitoring system and public presentation of a revised hazard map were delayed by a national political crisis early in November, when guerrillas took over the Palace of Justice in Bogota and the government sent in troops to recapture it. When Nevado del Ruiz began to erupt in mid-afternoon on 13 November, regional and local emergency structures were alerted but no immediate decision to evacuate was made, although it was known that the lahar flows might be rapid, leaving little time to escape: the people of Armero would have at most two hours' warning to evacuate to higher ground. In Armero, residents were reassured by a local radio station and the church public address system that there was no immediate danger.

After a new and more serious phase of the eruption began at 9pm, the Governor of Caldas Province called local radio stations to issue red alerts to communities living along the rivers. Officials in the capital of Tolima Province attempted to order the evacuation of Armero from 9.45, but there were power and communications difficulties owing to a torrential rainstorm filled with volcanic ash. Shortly afterwards, the lahar broke through a natural dam

(continued)

Case Study 16.7 *(continued)*

created by a landslide 12km upstream. The dam had been holding back 250,000 cubic metres of water, which were now released in a 40-metre-high wave. The Mayor of Armero had stated his concern about the dam on 17 September and government geologists had recommended draining it, but the work had not begun.

Survivors' accounts suggest that there was no official, systematic order to evacuate, although in some cases representatives of relevant agencies took action as individuals. Many people were reluctant to move having heard the earlier reassurances from the local priest and radio station. Even the Mayor and his family remained. In Armero, most people fled, on foot and in the darkness, only after hearing the first flood waves hit the town.

B. Voight, 'The 1985 Nevado del Ruiz Volcano Catastrophe: Anatomy and Retrospection', *Journal of Volcanology and Geothermal Research*, vol. 44, 1990, pp. 349–86.

hold is, the more important it becomes to hold on to assets and property (such as livestock and household goods) and income (for a day labourer, every day's wages are vital in feeding the family or paying off debts to money-lenders). A household may perceive the risk of evacuation, in terms of losing control of its assets and resources, as more devastating than the risk of the hazard, especially where warnings are frequent but do not necessarily lead to disaster.

There are many indications that poor people delay evacuation because of this, often with fatal consequences. It is believed, for example, that many of the 700 people who died in Mozambique in the 2000 floods were family members left behind to tend cattle and goats.[14] Anecdotal evidence suggests that Bangladeshis respond to flood and cyclone warnings more readily when they know that there is a place of safety for their livestock. The remark of a woman inhabitant of a *char* island on the Jamuna River in Bangladesh is revealing: 'During the '88 floods I remained alone here. Someone obviously had to look after the farm'.[15]

Gaining a better understanding of the contextual factors and constraints that generate people's diverse perceptions of risk and hence their diverse

responses to warnings should enable early-warning systems to be more effective. However, warning specialists are often not well-equipped to understand how communities perceive and react to hazards and risks. There are several reasons for this.

The first is that specialists and communities look at a potential disaster from different starting points. Early-warning systems start centrally, at international and national levels, and then move outwards and downwards through the administrative system towards districts, sub-districts and villages or neighbourhoods. In this perspective, individual villages or neighbourhoods are on the periphery. But for the individual at risk, their home and immediate locality are at the centre of the picture. This means that factors that are of primary importance to the villager or householder at risk are likely to be invisible to system managers, who work on a much larger scale. Conversely, the manager's national or regional perspective appears irrelevant to the individual at risk.

The second reason is that the two groups measure and describe risk in quite different ways. Technical specialists draw upon scientific and engineering methods of analysis to quantify risk, principally in mathematical terms of probability. This esoteric language is not understood outside the scientific community. It may not even be understood by officials and NGO staff responsible for disaster preparedness and response. It is not easy to translate such mathematical calculations into everyday language (such as 'high', 'medium' or 'low' risk) for operational use; indeed, this may only add to the confusion. Disaster victims and potential victims measure and describe risk in more varied, qualitative terms.

A third reason is the assumption among some disaster professionals that they alone understand and assess risk objectively (i.e. scientifically), whereas the disaster victims' understanding and assessment is merely subjective, even irrational, perception. There are a number of problems with this attitude. One is methodological: it is not possible to maintain a clear distinction between 'objective statistical' and 'subjective perceived' risk because 'objective' risk estimation itself involves value judgements, such as the definition of hazard events and the time/space sampling frame chosen for the events. Second, such a perspective undervalues the knowledge of those who actually experience hazards on the ground. It also overlooks the social and economic forces that make some people more vulnerable to natural hazards than others.

A better understanding of such matters will require different approaches to communicating with communities at risk based on dialogue with communities and community participation (see Chapter 11.2). Participatory methods

Case Study 16.8
Communicating community response

Simulation exercises can enable communities to explain themselves fully and clearly on their own terms, without mediation. In one such exercise, in the Philippines in 1996, villagers re-enacted what they had done before and during a major cyclone, Typhoon Ruping.

Villagers were divided into three groups with, as far as possible, a similar social and occupational mix. Each group was given one hour to discuss a different stage of the typhoon (before, during and after) and prepare its presentation, which took the form of a short drama involving all group members, followed by a more detailed explanation by the groups' rapporteurs.

The simulation provided valuable insights into how the villagers had learnt about the impending typhoon, their actions to protect property and assets, and their evacuation plans. It also revealed the impact of the typhoon on different groups in the community.

R. Bellers, 'Simulation Exercise Notes: Igbalangao's Experience of a Typhoon', mimeo (Oxford: Oxford Centre for Disaster Studies, 1996).

have considerable potential in helping outsiders to understand local contexts and actions in response to warnings (see Case Study 16.8).

Many communities draw on their own indicators of impending hazard when deciding how to respond to warnings. A survey on the offshore islands of Bangladesh has identified a wide range of local indicators of impending cyclones based on observation of weather patterns, action of the sea and rivers, and animal behaviour.[16] In the 1970s, China claimed success in predicting earthquakes by mobilising the masses to watch for signs in nature, such as chickens roosting in trees, fish leaping out of the water, horses refusing to enter stalls, dogs howling and other animals acting nervously. The Chinese believe that the bat is the animal most sensitive to approaching tremors; for the Japanese, it is the pheasant. Well water is also thought to rise before an earthquake.[17]

Indigenous knowledge of this kind has been shown to be reliable on occasion – as in the case of methods used by villagers along the Jamuna River in

Bangladesh to plot and predict flooding and erosion.[18] But in general there has been little attempt to validate indigenous forecasting scientifically. More work should be done in this area. It would help to dispel potentially dangerous errors in understanding, but it might also enable warning systems to incorporate reliable indigenous indicators, with a potentially higher chance of community response. Famine early-warning systems certainly benefit from community participation, as local people are sensitive to socio-economic as well as agricultural indicators of food insecurity.

Information command and control

Emergency planning manuals highlight the importance of officially validated forecasting and warning information issued from a central point. Experts are often concerned about the growing diversity of unofficial sources of information, especially radio, satellite and cable television stations and the Internet. Information from multiple sources, with varying degrees of reliability, is generally reckoned to be dangerous, leading to incorrect responses or even panic.

There is some justification for this. In Nepal in 1997, statements were made in the media and by politicians about the risk that the natural dam holding back the Tsho Rolpa glacial lake could burst during the imminent monsoon season, causing a sudden, massive and highly destructive flood that would hit some 4,000 people in the river valleys below. Alarm spread quickly among government officials, NGOs and communities. Officials advised thousands of people to evacuate, prices shot up and down in local markets, traders and large numbers of villagers moved to higher ground, and flights to the local airport were suspended. There was general confusion, but it was not in response to an official warning, because none was issued. There was not even an early-warning system in place on the lake at the beginning of the alarm. Scientific studies of the lake and the potential threat were carried out, but the response of officials, NGOs and communities alike was triggered by media stories and politicians' public statements. The media and politicians were not technical experts, but jumped to their own conclusions from the scientific data. There was no flood.[19]

But in the modern age command and control of information is unrealistic. The public are increasingly *consumers* of information from different sources, choosing what information to use and where to obtain it (see Chapter 11.3.4, page 177).

It will be extremely difficult to strike a balance between the need for warning systems that disseminate authoritative information and the public's desire to make its own choices. Disaster managers will have to acquire extensive skills

in media management, but the central issue is arguably one of public trust in disaster professionals. It has been suggested that one of the reasons for the Cuban authorities' success in evacuating 700,000 people from the path of Hurricane Michelle in November 2001 was the population's trust in officials and in their warnings. There were many other reasons – the warning and evacuation appear to have been models of good planning and implementation – but their effect would have been weakened without a sufficiently high level of public trust.[20]

Science and technology

Recent decades have seen rapid advances in the scientific understanding of natural hazards and in the development of technologies to monitor them. This has greatly enhanced scientists' ability to forecast the location, timing and severity of many events.

All forecasting and warning systems, other than a few free-standing local ones, rely at some point on such scientific knowledge, but scientists' capacity to predict varies with the hazard studied. For example, in the case of geological hazards (earthquakes, volcanic eruptions, landslides, tsunamis), it is possible to identify where events may take place, but very difficult to indicate when. Short-term predictions or forecasts (over days and hours) are generally much more successful in the cases of landslides, volcanoes and tsunamis than they are for earthquakes. Meteorologists have become very skilled at making short-term forecasts of hurricanes, predicting their timing and movement, and their seasonal forecasting is also becoming more reliable. Scientists' improved understanding of the El Niño phenomenon over the past 20 years has made their predictions of its timing relatively accurate.

The scientific and technical resource base is the result of many years of investment throughout the world. Knowledge is widely shared among the various scientific communities. Data from technical devices (such as remote-sensing satellites and buoys monitoring sea-surface temperatures) are routinely transmitted to forecasters and disaster planners through established global networks. The World Meteorological Organization, for example, has played a significant role in coordinating monitoring and forecasting of hydro-meteorological hazards.

Evacuation and shelter

In most cases, evacuation will be the primary response to warnings. Creation of escape routes and shelters is therefore essential.

Case Study 16.9
No escape route

In January 1981, 104 people were killed by floods in the small town of Laingsburg in South Africa. The lack of a flood warning system was a major factor in the disaster. The town is in a floodplain and there had been heavy rainfall.

The highest loss of life was due to residents staying in their houses, close to the river, until the depth and speed of the flood waters prevented them from leaving. Sixteen people were killed on the road bridge across the Buffels River. When the river overflowed its banks and spread into the town, vehicles approaching from the direction of Cape Town could go no further and traffic built up on the bridge. Unaware of the danger they were facing, drivers, passengers and onlookers remained on the bridge. The river continued to rise and crossed the road on the other side of the bridge, cutting off their escape route. The flood then covered the bridge itself.

W. J. R. Alexander, 'Early Warning Systems for the Detection and Response to Severe Floods', in J. Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 311–16.

People at risk need to know which routes are safe to use for escape and where to go in case of a hazard event. They must be confident that the escape routes will not be blocked by those fleeing the disaster, or be cut off by the hazard itself (e.g. by flood waters). Where routes are cut off people should be aware of alternative routes. Many lives are lost in disasters because people remain in their homes for too long, until they cannot escape, or because places they believed to be safe were not (see Case Study 16.9).

Particular attention should be given to helping vulnerable people to escape. Older people, the disabled, and pregnant women or women with young children cannot move very quickly and easily. They may need assistance, as in the example from India cited in Chapter 6.3.1 (page 89), in which young people helped their elders to safety before a cyclone struck.

People must also have confidence that emergency shelters are in safe locations and can withstand the hazards concerned. In some places, women have been particularly reluctant to go to shelters, because of the lack of privacy or

fear of abuse there. Many specially-constructed disaster shelters are used during normal times as community buildings, such as meeting halls, schools and stores. There is concern that local elites may use such facilities for their own purposes, and may deny access to others at times of crisis. Certainly, there is plenty of anecdotal evidence of this. It is also not unknown for local elites to influence the siting of shelters. It is unclear how widespread this is and how best to prevent it. More systematic study of how shelters are managed during and between disasters would be helpful.

Shelters do not always need to be specially constructed, since existing community buildings such as schools, churches, temples and mosques may be adequate. Planning should include compiling inventories of such facilities and strengthening or protecting them where necessary.

16.4 Chapter summary

- Disaster preparedness comprises several elements: forecasting and warning, taking precautionary measures and organising effective rescue and relief. Establishing a disaster preparedness system involves addressing a range of technical and institutional issues.
- Good disaster preparedness planning is crucial to success. Plans should be based on thorough and realistic analysis, should ensure coordination by all groups concerned and should be 'owned' by them.
- Above all, planning should be seen as a continuing process of improvement, not merely as the production of a plan.
- When disaster strikes, a variety of material and human resources will be needed. These should be built up (e.g. through stockpiling and training) well in advance.
- Relief materials should be genuinely appropriate to local needs, cultures and practices, and should be bought locally wherever possible.
- Volunteer-based programmes can be effective on both small and large scales. They should be based on existing community institutions, if possible. Thorough training and refresher courses are essential.
- Protection of livelihood assets is seen largely as a matter for individual households at present, but it deserves more attention.
- Disaster preparedness systems themselves need protecting.
- There have been great advances in hazard forecasting in recent years, but insufficient attention has been paid to communicating warnings to decision-makers and communities in appropriate ways.
- Small-scale, community-based warning systems can be very effective.
- The need to protect livelihood assets is a powerful influence on the way poor people respond to disaster warnings, but this is poorly understood

by most disaster managers. More dialogue with communities about their priorities and perceptions of risk is needed.

Notes

1 See R. Kent, *Disaster Preparedness* (New York/Geneva: UNDP/DHA Disaster Training Programme, 1994), http://undmtp.org/english/disaster_preparedness/disaster_preparedness.pdf; E. L. Quarantelli, *Major Criteria for Judging Disaster Planning and Managing and Their Applicability in Developing Societies* (Newark, DE: University of Delaware Disaster Research Center (Preliminary Paper 268), 1998), www.udel.edu/DRC/preliminary/268.pdf; D. Alexander, *Principles of Emergency Planning and Management* (Harpenden: Terra Publishing, 2002).

2 Examples of the structure and content of typical disaster plans are given in Kent, *Disaster Preparedness,* p. 15; Alexander, *Principles of Emergency Planning and Management,* pp. 96–97.

3 Kent, *Disaster Preparedness*, p. 14.

4 On emergency management training, see Alexander, *Principles of Emergency Planning and Management*, pp. 287–300; A. von Kotze and A. Holloway, *Reducing Risk: Participatory Learning Activities for Disaster Mitigation in Southern Africa*, International Federation of Red Cross and Red Crescent Societies/Oxfam/University of Natal, 1996, pp. 187–232.

5 T. Schilderman, 'Disasters and Development: A Case Study from Peru', *Journal of International Development*, vol. 5, no. 4, 1993, pp. 415–23.

6 R. Vonk, 'Emergency Preparedness in Cyclone Prone Areas in Madagascar', in J. Scobie (ed) *Mitigating the Millennium: Community participation and impact measurement in disaster preparedness and mitigation programmes* (Rugby: ITDG, 1997), p. 54.

7 I. Davis, *Shelter after Disaster* (Oxford: Oxford Polytechnic Press, 1978).

8 For example, A. Heijmans and L. P. Victoria, *Citizenry-Based & Development-Oriented Disaster Response: Experiences and Practices in Disaster Management of the Citizens' Disaster Response Network in the Philippines* (Quezon City: Center for Disaster Preparedness, 2001), pp. 45–80.

9 K. Smith, *Environmental Hazards. Assessing Risk and Reducing Disaster* (London: Routledge, 1996), pp. 110–12.

10 A. Sharma, 'Early Warning: Community Interpretations and Perceptions – A Case of Recurrent Floods and their Warnings in Delhi (India)', in J. Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 77–80.

11 B. E. Carby, 'Transferring Flood Warning Technology to Vulnerable Communities in Jamaica', in *ibid*., pp. 811–13.

12 For guidance on this, see *Communication During Volcanic Emergencies* (London: Benfield Hazard Research Centre, 2002), www.benfieldhrc.org/DMU/Carib/Carib.2003.pdf.

13 The following paragraphs are based on J. Twigg, 'The Human Factor in Early Warnings: Risk Perception and Appropriate Communications', in Zschau and Küppers, *Early Warning Systems for Natural Disaster Reduction*, pp. 19–26.

14 *World Disasters Report 2002: Focus on Reducing Risk* (Geneva: International Federation of Red Cross and Red Crescent Societies, 2002), p. 65.

15 H. Schmuck-Widmann, *Living with the Floods: Survival Strategies of Char-Dwellers in Bangladesh* (Berlin: ASA-Programm of the Carl-Duisberg-Gesellschaft, 1996), p. 30.

16 P. Howell, *Indigenous Early Warning Indicators of Cyclones: Potential Application in Coastal Bangladesh* (London: Benfield Hazard Research Centre (Disaster Studies Working Paper 6), 2003), www.benfieldhrc.org/DMU/WorkingPapers/workingpaper6.pdf.

17 A. Wijkman and L. Timberlake, *Natural Disasters: Acts of God or Acts of Man?* (London: Earthscan, 1984), pp. 93–94.

18 Schmuck-Widmann, *Living with the Floods*; H. Schmuck-Widmann, *Facing the Jamuna River: Indigenous and Engineering Knowledge in Bangladesh* (Dhaka: Bangladesh Resource Centre for Indigenous Knowledge, 2001).

19 D. Gyawali and A. Dixit, 'How Distant Is Nepali Science from Nepali Society? Lessons from the 1997 Tsho Rolpa GLOF Panic', *Water Nepal*, vol. 5, no. 2, 1997, pp. 5–43.

20 B. Wisner, 'Lessons from Cuba? Hurricane Michelle, November, 2001', Radix website, 2001, http://online.northumbria.ac.uk/geography_research/radix/resources/lessons-from-cuba.doc.

Chapter 17
Risk reduction after disaster

17.1 Introduction

This chapter looks at the operational challenges of introducing risk reduction measures during post-disaster work. First, it looks at the broad challenge of integrating relief, recovery and development. Next, it surveys some of the main ways in which mitigation and preparedness are introduced after disasters (though the basic principles of good practice outlined in earlier chapters also apply to post-disaster conditions).

17.2 Relief, rehabilitation and development

Underdevelopment and ineffective or inappropriate development programmes increase vulnerability to hazards, and hence lead to more disasters, great and small. In turn, emergencies make subsequent development more difficult for disaster-affected communities that have lost their livelihood assets – and therefore for the institutions that are trying to help them.

There is widespread agreement on the need for closer integration of relief, rehabilitation and development, which implies a longer-term perspective behind post-disaster action. In essence, it means that relief and rehabilitation should contribute to long-term development and the reduction of vulnerability, where they can – they should not simply reconstruct the existing risk. At one time, the phrase 'relief–development continuum' was used to refer to this integration. Nowadays, it is usual to speak of 'developmental relief', a concept first articulated by the Red Cross in the mid-1990s. This expresses a broad-based and sustainable approach to post-disaster work (see Box 17.1). ActionAid uses the notion of 'recovery plus', meaning an intervention 'whereby people are in some way better off than before the emergency'.[1]

There is plenty of scope for academics to debate the merits or drawbacks of such terms and concepts. Operationally, it is helpful to look for the similarities in their basic principles, which can be summed up as follows:

- intervene at the earliest possible stage in the disaster cycle to protect livelihoods and reduce vulnerability;
- incorporate development principles into disaster relief operations (e.g. build up local capacities, adopt participatory approaches);

Box 17.1

Nine features of 'developmental relief'

1. Participation.
2. Accountability.
3. Decentralised control.
4. Demonstrating concern for sustaining livelihoods.
5. Basing strategies on the reality of a disaster.
6. Identifying the needs and capacities of diverse disaster survivors.
7. Building on survivors' capacities.
8. Building on local institutions.
9. Setting sustainable standards for services.

World Disasters Report 1996 (Oxford: Oxford University Press/IFRC, 1996), pp. 50–51.

- use disaster relief not just to meet immediate needs but also to restore livelihood assets and rebuild livelihoods;
- use disaster relief to develop infrastructure that will be of value after the emergency is over; and
- take the opportunity to induce positive socio-economic change and not merely a return to the status quo.

This shift puts more emphasis on what is normally called rehabilitation. Originally seen as a distinct linking phase between relief and development, it is now seen more as a continuing process that may take place alongside both disaster relief and development, and ideally is integrated with them.

It is clearly unrealistic to expect 'normal' development to resume soon after the crisis period. People affected by disasters are left more vulnerable than they were before. Relief and development programmes need to adjust to take account of this. For example, the Centre for Sustainable Agriculture and Appropriate Technology, which works with peasant farmers in the Dominican Republic, had to redirect much of its efforts away from long-term rural development and towards short-term agricultural rehabilitation for two years after Hurricane Georges in 1998.[2]

Although interest in monitoring and evaluating relief programmes has grown enormously over the past few years, rehabilitation has not been studied as

much. Evidence of the long-term impact of rehabilitation is in particularly short supply. Where this is investigated, it is usually to demonstrate under-achievement, as in the *Times of India's* assessment of the Orissa state government's work after the two cyclones in 1999, which found that only 11 out of 100 planned cyclone shelters had been built, only 392 out of 3,779 secondary schools had been rebuilt, and government departments had not spent funds allocated for rehabilitation.[3]

Many post-disaster assistance projects come to an end too soon and too suddenly. Disaster response organisations talk a lot about 'exit strategies', but what an external agency describes as a phase-out may be seen by the affected community as a cop-out, in which the agency concerned walks away rather than seeing the job through to the end. Reflecting on the experiences of Afro-Honduran communities after Hurricane Mitch, a local NGO complained of a disaster training programme established by a major international NGO that 'existed here for a few months, but made no provision for follow up, provided no ongoing funds for replication to expand the number of people trained beyond the initial group, and left no materials or resources for implementation of what people had learned'.[4]

Organisations that are only working in the short to medium terms in a disaster-affected area should plan their withdrawal carefully, recognising that there will be plenty of work left unfinished, and community expectations may not have been fulfilled. Phased withdrawal is preferable to sudden departure. There must be a coherent handover to locally-based organisations and communities. The process should be planned early, it should be transparent and it should be agreed with partners. Relief and rehabilitation agencies bear some of the responsibility for ensuring that activities are sustained, and that local agents have the capacity and resources to manage this.[5]

Some relief and rehabilitation initiatives lead to longer-term risk reduction projects, especially where the same agencies are involved in both relief and development work in the area concerned. It is impossible to say how widespread this is: again, it is probably not common, but it may have become slightly more so since the spate of major natural disasters in the late 1990s.

Relief and post-relief initiatives tend to operate on different scales, with mass coverage being more easily achieved in relief operations. In the Red Sea Province of Sudan during the 1985–86 famine, a major food aid programme supported more than 400,000 people, but a parallel rehabilitation initiative including locust control and improvements to village wells could only reach a few thousand.[6] There is a dilemma for relief agencies in deciding how to

balance the need to give relief to as many people as possible with the need to provide for future emergencies.

The shortage of funds for rehabilitation is another obstacle. Relief funding covers only short-term, often fixed periods (typically six to nine months) and so cannot be used to support many longer-lasting activities that would improve resilience. This makes no sense logically. It results from the distinction between 'relief' and 'development' in donor budget lines. It leads to effort and resources going into activities that are not sustained, and to strict limitations on activities deemed too 'developmental' by relief donors. UK-based international NGOs interviewed in a recent study were frustrated by the inflexibility of donor regulations in this regard.[7] Funding from development budget lines is not a realistic alternative owing to the length of time taken for major funding schemes to reach decisions.

Staff in a development NGO once told the author of problems it had had with a humanitarian aid donor after a hurricane in the Caribbean. With the trees grown by its community forestry project flattened, it sought to make the best of the situation by using the wood to build shelter for people living in shanty towns, who were hurricane victims. The donor approached turned the proposal down because shelters made of wood were considered too permanent to be emergency response – but the donor was prepared to pay for bringing in plywood boards and plastic sheeting from outside the island for emergency shelter.

17.3 Approaches to risk reduction after disasters

17.3.1 Rebuilding livelihoods

Preservation of livelihoods is vitally important to poor and vulnerable people, and vulnerability is closely linked to livelihood security. After a disaster, earning a living will soon be a priority for the victims. Take, for example, the village of Rampur in Nepal and its farmlands, hit by a landslide in July 1993 that claimed the lives of 18 people and more than 70 animals. The disaster occurred during a peak period for harvesting, mending terraces and planting, and so from the third day after the disaster most villagers divided their time between rehabilitating canals and farmland and managing the chaos in their homes.[8]

In the past, relief agencies often failed to appreciate how important this is. For example, in the case of drought, interventions are often launched only after communities have begun to dispose of essential livelihood assets as the last resort in their coping strategy (see Chapter 15). Research by HelpAge International found a major discrepancy between the perspectives of older

people affected by emergencies and those of aid agencies. The aid agencies did not think that earning income would be a concern for older people, but in fact it was one of their top priorities.[9] Relief efforts also risk undermining local markets and incomes by flooding them with goods (e.g. food aid, shelter materials) or outside labour (e.g. in housing reconstruction programmes). Given that many relief/rehabilitation programmes are characterised by a lack of beneficiary participation in assessment and planning, there is a danger that livelihood support activities will be inappropriate. It is difficult for outside agencies to identify key livelihood issues in the chaotic and stressful conditions after a disaster, but even rapid participatory approaches can give insights into the complexity of livelihoods.

However, disaster response programmes nowadays usually recognise the need for some livelihood support. Relief/rehabilitation aid commonly includes food- or cash-for-work schemes (see below). It is also common to provide seeds and tools for agriculture, livestock, household utensils and shelter materials. The appropriateness of such goods (e.g. are seeds suitable for local conditions and farmers?) is much debated in the literature of humanitarian relief, but the principle of helping livelihoods and not just saving lives is generally accepted.

Interest in financial assistance measures is growing. Cash-based responses to emergencies may have potential in empowering local communities economically.[10] In the field, micro-finance institutions establish emergency loan funds to help their clients replace or repair assets (Chapter 13.2.2, page 222). The Disaster Mitigation Institute's livelihood relief fund finances the purchase of tools, seeds and raw materials for victims of natural hazards and riots in India. The fund has supported 9,500 people since 1998.[11]

Agencies are also looking more creatively at ways of supporting jobs. After the 2000 floods in Mozambique, initiatives by the International Labour Organisation (ILO) included rehabilitation of the central market in Chokwe and construction of three other markets, in order to help small-scale traders resume business and make goods more easily available locally.[12] In India, NGOs have helped artisans to continue to earn money by such measures as organising credit and supplies of raw materials, purchasing their products, and creating temporary exhibitions to help market products.[13]

There are encouraging signs of such livelihood support initiatives making a significant difference to poor people in the months after disasters.[14] However, little is known about their long-term impact. This is a significant gap, since it can take a very long time for livelihoods to recover fully, and in many cases they never do.

Case Study 17.1
Rebuilding livelihoods after disaster

After the October 1999 cyclone in the Indian state of Orissa, two Indian NGOs – Voluntary Health Association of India (VHAI) and Orissa Voluntary Health Association (OVHA) – established a community-based disaster management initiative in which livelihood support played a central part.

The initiative supported a wide range of income-generating groups: women's groups involved in dry fish processing, mat-weaving and broom-making; artisans, including bamboo-basket makers, masons, carpenters, blacksmiths, makers of fishing nets, toy makers and weavers; small traders; and women-headed households (through poultry and animal husbandry). It also supplied fertilisers and seeds, renovated wells, ponds, latrines and salt pans, and built water-harvesting structures. Village volunteers were trained in disaster preparedness and health care.

The type of support varied according to the activity. For example, fishermen were offered equipment under a long-term repayment scheme. Each newly formed cooperative group of five received a boat, net and radio worth Rs16,000 ($350) and agreed to pay back half of the value within 18 months. Members shared the money received from selling their catch: one group interviewed some months later reckoned each member was earning about Rs150 ($3) a day on average.

Two women's groups were trained in literacy and small enterprise management, enabling them each to secure a loan of Rs20,000 ($440) to fund fruit processing: in their first three months of operation, each enterprise earned a profit of over Rs7,000 ($155).

J. Keve and P. K. Mohanty, 'From Disaster to Development: How People Can Help Themselves', in T. Palakudiyil and M. Todd (eds), *Facing Up To the Storm. How Local Communities Can Cope with Disaster: Lessons from Orissa and Gujarat* (New Delhi/London: Christian Aid, 2003), pp. 53–61.

Establishing sustainable small enterprises or more secure livelihoods usually takes much longer than the limited timetables of relief programmes. Potentially valuable initiatives may not be followed through. Road repairs by humanitarian agencies in Mozambique after the 2000 floods helped the local

economy as well as the relief effort, but maintenance stopped when the relief phase ended.[15]

Post-disaster conditions are special, and it is not clear how well conventional income-generating activities can work in these circumstances. Moreover, as livelihood strategies vary greatly between and within communities, livelihood-supporting programmes need to be equally varied and based on very thorough knowledge of local conditions. Local NGOs and CBOs are best placed to undertake such work – and because they are locally based, to follow up. Participatory approaches are clearly valuable here for identifying needs, setting priorities and targeting beneficiaries. They may lead to unexpected results, such as a community workshop to design a response to drought in Ethiopia that came out firmly in support of providing food, seed, fertiliser and blankets on credit instead of as hand-outs.[16] More project evaluation and comparative research on such issues would be helpful.

17.3.2 Public works

Cash- and food-for-work programmes are a standard device in an emergency, intended to give temporary help to disaster victims and to provide more permanent community facilities for the longer term. By supplying food or creating paid jobs they can prevent livelihood collapse. One of the most famous examples is the 1972–73 drought in Maharashtra, India, where at one point nearly five million labourers were employed on public works by the state. The income they received under the programme enabled them to buy food in the market, and by doing so helped to prevent famine.[17]

Public works activities tend to focus on construction or repair of physical structures such as roads and schools. They are often used to improve resilience to future shocks by building mitigation infrastructure such as irrigation channels, dams and other water harvesting structures, embankments, flood shelters, and measures to stabilise hillsides (terraces, gabions and afforestation). Rehabilitation after the 1998 Bangladesh floods, for example, saw a number of cash-for-work projects building flood shelters of raised earth on common land such as school grounds and market places.[18]

Although food- and cash-for-work initiatives can help to protect livelihoods and reduce risk, success depends on good management. Threats to success include:

- Lack of clarity about objectives. Most schemes aim to provide income and public facilities, but in practice these two aims can be difficult to reconcile. The need to create work quickly may lead to projects of limited value,

Case Study 17.2
Cash-for-work and food insecurity

Koisha is a *woreda* (administrative unit) covering 700 square kilometres in southern Ethiopia, with a population of over 150,000. Since the 1970s, a number of factors including plant and animal disease, shortage of adult labour and small farm size, as well as low rainfall, have contributed to food shortages there. The region was badly affected by the 1984 famine, from which it has not recovered. Vulnerable households need food relief every year and almost all households need it in bad seasons.

The development NGO SOS Sahel began working in Koisha in 1991 on an agricultural development programme, but soon realised that chronic seasonal food insecurity made it necessary to develop an integrated strategy of relief and development. This included a cash-for-work project to rehabilitate the main road through Koisha, an earth road built in the 1970s that had deteriorated badly. Road improvement was expected to improve marketing opportunities for local farmers.

A review of the initiative two years after it had begun identified a number of benefits:

- Nearly 700 households took part in the first year of the project (a good year agriculturally) and over 1,300 in the second year (a bad year). Even so, the project could not provide for many in need. Nor did it make provision for those unable to work (an estimated 15% of families could not participate because they did not have the necessary labour).
- The targeting method used, which involved community participation in selecting beneficiaries, was relatively effective, but support and training are required to make such processes sustainable.
- Most work was carried out during the slack period in the farming season, and in the mornings, allowing the labourers to attend to their farms and other activities.
- Cash-for-work improved food security: nearly half the money earned from the road repair in the first year was spent on food, and it appeared that the increase in money supply did not affect grain prices in local markets. Most labourers would nonetheless have preferred food for several reasons, including fear of losing out when cash was converted into food and the likelihood of creditors becoming more insistent when cash was available.

(continued)

Case Study 17.2 *(continued)*

- Over 40km of road through the *woreda* were rehabilitated, leading to increased commercial and relief traffic, a fall of 50% in transport costs and improved access to markets and services.

The review also found that, if such employment schemes are to make a real difference to local food security, they must be longer-term investments, managed as far as possible by communities and directed to public works identified as a priority by communities themselves.

Government and non-government institutions would have to be involved, and shared responsibilities negotiated. A range of projects would be required, together with a high degree of flexibility that would allow initiatives to close down during peak periods of demand for agricultural labour, and to scale up or down during good and bad years.

P. Jenden, *Cash-for-Work and Food Insecurity in Koisha, Southern Ethiopia* (London: Humanitarian Practice Network, Network Paper 11, 1995).

whereas it takes a long time to set up more substantial, complex initiatives because of the level of technical, managerial and other inputs required.

- Poor targeting that fails to support those most in need or creates divisions within communities by selecting some individuals and not others. There is still some debate about the best methods of selecting beneficiaries.[19]
- Inadequate planning and consultation, leading to effort being wasted on mitigation structures that are not a priority for the community, or will not work.
- Lack of commitment by beneficiaries, usually because they are not participants in the project, but are treated merely as employees. This can result in poor quality of construction. It also makes it less likely that the community will continue to maintain the newly-built facilities once the food or cash payments come to an end.

17.3.3 Changing attitudes: windows of opportunity

Disasters are generally believed to present a 'window of opportunity' for promoting and implementing risk reduction measures, because the consequences of failing to act are so strongly implanted in the minds of those who

are affected by disasters, the operational agencies that have to respond to them, and the public policy-makers who have to manage their effects. This reasonable assumption is well-demonstrated by the number and variety of mitigation initiatives introduced at all levels after major disasters in particular. For example:

- Disasters can be an opportunity to change socio-economic relationships that affect vulnerability (Case Studies 6.3 and 6.4).
- In Mozambique, ActionAid undertook an HIV/AIDS awareness campaign in camps for people displaced by the floods in 2000. The people then dispersed to their home areas, with key contact people in each place with whom the programme could work. Such coverage would not have been possible in normal conditions, where people cannot spare the time to sit together for several hours to discuss such issues.[20]
- In Central America, Hurricane Mitch prompted vigorous debate about vulnerability and how to reduce it, leading to the creation of new pressure groups such as the Foro Permanente de Ciudadanas in El Salvador that sought new laws and policies for disaster prevention.[21]
- Disasters can stimulate renewed thinking about the problem, which is leading to shifts in policy in some organisations.[22]
- In the UK, a series of technological disasters in the 1980s led to the creation in 1991 of Disaster Action, a mutual support group and pressure group for improved disaster management.[23]

Characteristics of the 'window of opportunity' are said to include:[24]

- residents and local officials are thinking about the problem of risk, when they do not normally do so;
- the disaster may already have forced some changes (for example by destroying unsafe buildings and infrastructure);
- the community has to make decisions about recovery; and
- technical and expert advice and resources become available from government and non-government sources.

It is hard to tell how long the window will remain open, or what conditions must be met to take advantage of the opportunity. Chances of success at community level may be improved by:[25]

- acting quickly before the fear or enthusiasm for change created by the disaster have lessened;
- basing interventions on familiar technologies and local resources as far as possible;

- concentrating on a small number of important actions, not introducing a whole portfolio of changes that dissipate efforts;
- focusing on what is achievable – communities already hit by a disaster have many urgent problems to attend to, and they will not respond if they believe the proposed mitigation measures are beyond their reach; and
- encouraging, supporting and involving communities as participants in change.

The principles of being realistic and setting priorities apply equally at organisational level, for here too momentum can easily be lost and lessons learned are soon forgotten. A further problem among organisations is that disasters may be caught up and lost in discussion of other development issues that are currently a policy priority for the organisation concerned. This happened in Nicaragua after Hurricane Mitch, when evidence of the disaster's impact was used to support arguments over alternative economic development models more than to debate measures that addressed risk reduction more directly.[26]

The psychological impact of disaster must also be taken into account. Post-traumatic stress can be a significant influence on the way survivors, the bereaved and responders behave after disasters, yet there is scope for discussion about the nature and consequences of such stress.[27] Over-emphasis on negative responses such as post-traumatic stress disorder and unresolved grief can lead to the assumption that people affected by disasters are passive victims, whereas in fact disaster-affected communities are the main actors in disaster response. The reluctance of some practitioners and researchers to take post-traumatic stress disorder seriously may be due in part to the fear that it will reinforce stereotypes of passivity. The experience of disasters can even stimulate survivors and the bereaved to work vigorously for better risk reduction efforts in the long term.[28]

This issue is neglected in relief and rehabilitation work in the South. This may be because psychological recovery is assumed to be 'a community function', not a task for outside agencies.[29] Or it may simply be overlooked.

It has been suggested that severe traumatic events sometimes undermine the individual and collective will to respond. It is conceivable that what aid agencies perceive as dependency syndrome (passivity brought about by the abundance of relief supplies) among disaster victims or lack of community spirit in undertaking post-disaster recovery is – at least in part – an expression of post-traumatic stress disorder. But this is complex and contested territory, and much more investigation is needed.

Case Study 17.3
Community strengthening through disaster recovery

In September 1989, Hurricane Hugo struck the small Caribbean island of Montserrat. Only 11 people were killed, but the physical damage was extensive: 98% of homes were damaged and 3,000 people (a quarter of the population) made homeless; 80% of hotel rooms (on which Montserrat's tourist industry depended) were destroyed; all government buildings and schools were damaged, and some destroyed.

Eight months later, an international development NGO (Canadian University Students Organization – CUSO), an intermediary NGO from the eastern Caribbean (Caribbean Conference of Churches – CCC) and a community action group began a rebuilding programme in the poor village of Streatham, where almost all the houses had been severely damaged or destroyed.

The initiative was community-based, using local people in a housing assistance team that held training workshops on rebuilding and structural strengthening techniques, built 22 homes and repaired the severely damaged community centre. The long-term developmental achievements were more significant. The housing team members took great pride in their work and the importance of the Streatham Community Action Group was enhanced as a result of its involvement in the programme. The participation of local people in volunteer group activities was greater than before the disaster. The action group's coordinator observed: 'We used to have just one or two people show up to help out. Sometimes nobody came. Now we often get ten coming, sometimes 20 who show up to pitch in'.

On this basis, CUSO decided to put additional funding into local development projects: introducing new agricultural production practices and improving water distribution. These had been planned before the hurricane, but over a longer time-scale; they were now brought forward. Two years after Hugo, the community group appeared to have established an economically-viable agricultural production and marketing cooperative.

P. R. Berke and T. Beatley, *After the Hurricane: Linking Recovery to Sustainable Development in the Caribbean* (Baltimore, MD and London: Johns Hopkins University Press, 1997), pp. 82–116.

17.3.4 Safer housing and locations

Every disaster that leaves many people homeless triggers renewed interest in rebuilding homes so that they are 'safe' or 'disaster-resistant'. Shelter relief and reconstruction programmes absorb large amounts of international aid, yet very little is known about their long-term impact in making vulnerable people more secure. It is likely that such programmes have little impact, for the following reasons:[30]

- An emphasis on technically 'safe' housing, without certainty that such housing is affordable or culturally acceptable. Large-scale programmes are particularly likely to be technology-driven and introduce new and expensive construction technologies.
- Although reconstruction programmes can provide jobs for local builders, in many cases the builders and their traditional skills are displaced by imported technologies and labour. Communities do not acquire the skills needed to extend, modify and repair the new houses.
- Where reconstruction does create local jobs, it is not clear how sustainable these new livelihood opportunities are once the programmes funded by aid agencies come to an end.
- The focus is on *houses* (physical structures) rather than *housing* (the arena of social and economic life). Homes are not seen as places of work, learning, communication and relationship-building. Houses are built without regard for how – or if – this will improve social and economic status or reduce vulnerability in its widest sense.
- Lack of community participation. Most reconstruction projects claim that they are participatory, but there is usually an element of agency propaganda in this, and the extent and nature of such participation are often hotly disputed.

In general, participatory approaches, based on local skills and appropriate technologies, offer the best chance of long-lasting success in post- and pre-disaster situations alike.

A common response to the destruction of housing in disasters is to resettle their occupants in safer locations as the best way to defend them against future hazard events. One of the most striking examples of this came after the Maharashtra earthquake of 1993, when the state government moved 28,000 inhabitants of 52 devastated villages to new sites.[31] Governments are probably best placed to undertake resettlement because of the major practical challenges, but NGOs are sometimes involved. Several NGOs' responses

to Hurricane Mitch in Central America in 1998 included relocation of vulnerable communities from the hillsides where their homes had been washed away by the torrential rains.[32]

From a purely hazards point of view, relocation makes sense. Some locations – floodplains, unstable hillsides, soils likely to liquefy as a result of seismic tremors – are inherently unsafe. It is impossible, or at least extremely costly, to make communities that live in such places more secure. After a major disaster, such as an earthquake, survivors may be so traumatised and afraid of future shocks that they are very keen to move. Provision of land can also improve livelihoods where it is used to grow crops or products used in building or craft work: there are instances of this in Central America after Mitch.[33]

However, relocation presents considerable practical challenges, notably the cost of purchasing land and providing infrastructure, and the difficulty of securing legal title. There are examples of planned relocation projects failing because the community could not obtain public land or buy private land.[34] NGOs need to work very closely with local authorities and beneficiaries to resolve these problems. More fundamentally, the policy of resettlement overlooks the economic and other reasons that make people settle in unsafe areas in the first place.[35]

There is sometimes a degree of compulsion in resettlement; even after disasters, people are usually reluctant to move. In Mozambique in 2000, government policy was to move communities away from areas at risk of flooding, even though their economy was based on the fertile farmland of the flood plains. Aid agencies were forbidden to give shelter materials to anyone who was not at a government-approved site, and these were often some distance from people's lands. This led to many farmers living in grass shelters on their old lands, and only returning to their new houses from time to time.[36]

17.4 Chapter summary

- Lack of integration between relief, rehabilitation and development hinders a sustained attack on vulnerability.
- Relief and rehabilitation should contribute to vulnerability reduction – they should not simply reconstruct the existing risk. This requires earlier intervention, more emphasis on rebuilding livelihoods and encouraging positive socio-economic change.
- Rehabilitation has not been studied a great deal, and there is little evidence of programmes' long-term impact.

- Many post-disaster assistance projects come to an end too soon and too suddenly (partly due to restrictions imposed by donors). More careful, phased withdrawal is needed.
- Livelihood recovery is a priority for disasters' victims but influxes of relief goods and outside labour can undermine local markets and income-earning opportunities.
- Cash- and food-for-work programmes are a standard device in emergencies, to give temporary help to disaster victims and provide more permanent community facilities (including mitigation structures) in the longer term. These can be very successful, but success depends on good management, clarity about objectives, careful targeting and community participation.
- Disasters can present 'windows of opportunity' for promoting risk reduction because the consequences of failing to act are so strongly implanted in the minds of all involved. But it is hard to tell how long the window will remain open, or what conditions must be met to take advantage of the opportunity.
- The psychological impact of disasters is much debated but must be taken into account in post-disaster recovery.
- Many 'safe housing' programmes after disasters may have little impact because they do not take sufficient account of communities' needs, preferences and capacities. Participatory approaches based on local skills and appropriate technologies offer the best chances of long-lasting success.
- Relocation is often advocated and practised after disasters, but presents considerable practical challenges and overlooks the economic and other reasons that make people live in unsafe conditions in the first place.

Notes

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Chapter 18
Monitoring and evaluation

18.1 Introduction

This chapter offers a brief general survey of monitoring and evaluation (M&E). Owing to the shortage of good-quality evidence, its conclusions are particularly tentative. Work on methods of assessing the benefits of risk reduction measures now being planned by the ProVention Consortium should improve our understanding of this complex subject. Some of the evidence referred to here is not attributed because of agencies' sensitivity about confidentiality.

The chapter contains a short account of approaches to monitoring and evaluation in general, drawing on recent writing on its application in development and humanitarian work.[1] The focus is on evaluation – as this presents specific difficulties where risk reduction is concerned – and field projects. Approaches to project monitoring in general are covered in standard manuals and should be part of all agencies' systems and training.

Monitoring and evaluation are important because they:

1. Make operational agencies more accountable to those they seek to help, as well as those who support them.
2. Demonstrate to donors, policy-makers and practitioners that risk reduction works, and thereby make a case for greater effort in this area.
3. Improve understanding of how risk reduction works in practice – including identifying problems and mistakes.

The range of M&E approaches and methods in development and relief has grown considerably over the years, as has the level of interest in the subject, but mostly since the early 1990s. This is most noticeable in the NGO sector, partly driven by criticism and donor pressure but also by the desire to prove success and improve performance.

A growing body of work is providing NGOs and other actors with better-informed guidance on M&E methods for development and emergencies. Several networks have appeared during the past decade to support such efforts. They include the Active Learning Network on Accountability and Performance in Humanitarian Assistance (ALNAP), whose members come

from bilateral and multilateral donors, UN agencies and NGOs (see www.alnap.org); and the electronic MandE information forum (www.mande.co.uk).

By comparison, organisations addressing risk reduction have given low priority to M&E, even though professionals working in the field recognise a weakness here. Most technical manuals ignore it, or mention it in passing without giving guidance. There may well be a similar neglect in training courses. M&E rarely features in the wider literature on disasters and risk. As in development and relief work, very few of the evaluations that are carried out are made public. The findings of a recent study of international NGOs (described in Case Study 18.1) may be typical of many other types of institution. However, some in the UN system are starting to think about how to develop national-level disaster risk reduction baselines, targets and indicators.[2]

18.2 Definitions

It is important to be clear about what is being monitored or evaluated. Assessment of a project or programme can focus on quite different aspects:

- Inputs. These are the human, financial and technical resources deployed. Their effectiveness, cost-effectiveness and appropriateness can be assessed.
- Activities and processes. This covers the performance of tasks and factors affecting this.
- Outputs. These are the immediate results the project achieves (sometimes called 'deliverables').
- Impact (or outcomes). Impact has been described as 'significant or lasting changes in people's lives, brought about by a given action or series of actions'.[3]

Similarly, the main distinctions between monitoring and evaluation can be identified:

- Monitoring usually addresses inputs, activities and outputs. Most monitoring systems are designed meet the ongoing information needs of project managers and provide information for donor reports. Evaluations focus on outputs and especially impact, and are intended for a wider audience within and outside the organisation.
- Monitoring is mainly descriptive. Evaluation is more analytical. Impact assessment is mainly analytical, and concerned with longer-term outcomes.

Case Study 18.1
Much monitoring, but little evaluation

A recent research project managed by the British Red Cross studied 22 international relief and development NGOs based in the UK, analysing 75 mitigation and preparedness projects of different kinds.

The researchers found that assessment or evaluation of impact had taken place in only 12 of the 75 projects, managed by eight of the 22 NGOs. That is to say, 12 had reports and evaluations that had *addressed* the question of impact: their quality varied, and with it the extent to which impact could be proved, although all demonstrated some beneficial impact. The projects were of very different kinds: drought/food security, networking/advocacy, housing, training, disaster preparedness and post-disaster rehabilitation.

Other features of the 14 evaluations (two projects were evaluated twice) were:

- Only one was a long-term, post-project evaluation; the rest were of ongoing work, sometimes at the end of a project phase.
- Seven were carried out within two years of the project's start, which is arguably too soon to demonstrate much impact; four were carried out within four years; one after five years and two after six years.
- Only two were internal evaluations; one used internal and external evaluators; the others were carried out by external evaluators.
- Four were donor evaluations; the rest were commissioned by the NGOs concerned.

In another 30 projects, M&E focused on activities only. Most projects for which evidence was available monitored activities. These implementation reports were often thorough. But eight projects had given little thought to indicators. In another 22 cases, there was simply not enough evidence to judge the quality of the M&E. The remaining three projects of the 75 were very new.

Although the documentation was limited, where mitigation or preparedness measures had been undertaken, they were generally believed by NGO staff to have been effective.

J. Twigg et al., *NGO Natural Disaster Mitigation and Preparedness Projects: A Study of International Development and Relief NGOs Based in the UK* (London: British Red Cross Society, 2000), pp. 76–78.

- Monitoring should be frequent, throughout the project. Evaluation is infrequent. It can take place at any point in the project cycle. It is usual to carry out evaluations towards the end of a project, or the end of a phase in the project if it is a long one. Mid-term evaluations are valuable in identifying if projects are heading in the right direction. These are becoming more common. Retrospective evaluations some time after the conclusion of the project are less usual.

Other terms used in this context are:

- Review. This comes somewhere between monitoring and evaluation. Reviews supplement regular monitoring, taking place less frequently and focusing more on activities and outputs than on impact. Reviews usually form part of internal management systems, but reviews involving external stakeholders are not uncommon.
- Audit. This term is normally associated with financial accountability and honesty. It is sometimes used more broadly.

These definitions and distinctions are meant to guide; they should not be seen as complete explanations or rigid categories.

18.3 Issues in monitoring and evaluation

18.3.1 Planning and operation

M&E systems must be planned carefully, bearing in mind that no two projects are identical. The purpose and methods of any monitoring exercise, review or evaluation should be clearly defined – and agreed (see the discussion of accountability below). Since it is almost never possible to assess everything, there must be some focus to the assessment, and its objectives must be realistic in relation to the resources that go into it. Thought should be given to such issues as:

- Indicators (see below) – this is very important.
- Units of assessment. M&E can take place at individual, household, group, community or institutional levels. Even in a large-scale project, it is important to get as close to the grass roots as possible; data can be collated subsequently.
- Sampling: sample size and sampling methods.
- Geographical coverage. This is conditioned by the coverage of the project in terms of geographical area, hazards and risks addressed, and the number and types of vulnerable people assisted.

- Existing information sources. Most evaluations will draw on external sources (e.g. government and other agencies' data sets and surveys) and internal sources (e.g. project documents) as well as field surveys. The low standard of information management in many agencies can make it difficult to identify and obtain these.
- Who should be involved in collecting, providing and discussing evidence (see the section on accountability below). The size, composition and skills of evaluation teams are important considerations.
- Scheduling. Evaluators must be given sufficient time to do their task properly. In many cases, they are forced to do it in a hurry because there is not enough money to keep them on the job for longer. Reviews and evaluations should be scheduled at an appropriate phase in the project's lifetime and at times of the year that best suit the beneficiaries. When in the field, researchers must find appropriate times of the week or day for talking to beneficiaries.
- Tools and methods to be used. These may comprise formal surveys, structured or semi-structured individual and group interviews, group discussions such as focus groups and workshops, direct observation, other PRA methods and case studies. Each method brings its own advantages and drawbacks. Project evaluations often use several methods. The methods adopted must be appropriate to what is being assessed and the resources available.
- Matching inputs and outputs. The evaluators must have enough time and resources to carry out the proposed activities and achieve the outputs required. In many cases, agencies' expectations are unrealistic and the time and resources insufficient.
- How the findings will be reported back to all the stakeholders concerned, and how they will be acted upon. Both of these actions are often neglected.

Terms of reference should reflect the main decisions that have been made on these issues. Clear terms of reference are vital. Many problems with evaluations stem from failure to achieve this clarity and to reach agreement with the relevant stakeholders on the contents of the terms of reference. Sufficient time should be set aside to achieve this.

Even the best plans can break down when confronted with reality in the field, so flexibility is essential. Good planning should allow for this.

As already noted, many evaluators are not given the time or resources to do their work thoroughly. Overcrowded schedules are common. This limits time in the field, forcing evaluators to place too much reliance on what may be

very selective field evidence, on agency documents that may be incomplete or unavailable, and on interviews in head offices. In consequence, many evaluations are little better than snapshots of an initiative, coloured by chance encounters and personal views. Experienced evaluators can compensate for this to some extent by drawing on their skills in identifying and gathering key data and their knowledge of similar initiatives elsewhere, but if they rely too much on their general knowledge they may miss features that are distinctive to the work in question.

However, snapshots can be useful. Small-scale or rapid assessments provide valuable insights in some cases, especially when focused on a distinct aspect of risk reduction, as in Case Study 18.2.

18.3.2 Accountability and participation

It is best to approach M&E as a mutual learning process for all involved, not merely as an information-gathering exercise. The principles of accountability to vulnerable people outlined in Chapter 12.2 (page 198) are very important here. Communities' views should be central to evaluation. However, many monitoring and evaluation systems are top-down, designed to provide information to headquarters staff and donors.

In a participatory project geared towards community action, it follows that the community must be involved in evaluation. This works very well in some disaster contexts, for instance in food insecurity and famine early warning, where a number of NGOs have established viable systems to alert communities and outside agencies to deteriorating food and livelihood security, and to generate appropriate responses (see Chapter 15.4, page 274). Sales of animals and other assets, changes in market prices, seasonal migration, school attendance, crop yields and failure to carry out funeral ceremonies are among the diverse indicators identified and applied by local people in such initiatives.

The participatory methods described in Chapter 8 can be useful in allowing beneficiaries to express their views. Standard PRA exercises can yield valuable information. Since it is never possible to involve everyone, careful thought must be given to ensuring that those who are consulted are representative of the range of vulnerable groups concerned, paying particular attention to the most vulnerable as well as people who may have dropped out of the project. Some evaluations pick up the views of similar people who were not involved in the project as a kind of 'control group'.

Case Study 18.2
Reporting on disaster response

On 11–12 November 2002, a cyclone warning was issued along the coast of the Bay of Bengal. A relatively weak cyclone struck, with high winds and heavy rain in several places. The Orissa State Branch of the Indian Red Cross used the event to assess the effectiveness of its disaster preparedness work.

The initial assessment was based on telephone calls from local voluntary coordinators and emergency team members in eight locations. These conversations focused on the following:

- When the cyclone warning was received, and from which source(s).
- Actions taken by local disaster preparedness teams.
- Actions taken by villagers.
- Details of the event (wind speed, condition of the sea, rainfall) and its impact.

The phone calls provided plenty of local detail. Using this, it was possible to build up a picture of the situation on the ground and actions taken almost as they happened, the effectiveness of warning and response mechanisms and factors affecting them, as well as variations between the locations.

The phone call method was not a substitute for field surveys, but it did help to identify priority issues for fuller assessment subsequently.

'Actions by 8 Red Cross Cyclone Shelter Communities in Orissa During Cyclone Warning (Nov. 11 to 12, 2002)', mimeo (Bhubaneshwar: Orissa State Branch, Indian Red Cross Society, 2002).

Beneficiary participation in M&E can take different forms. In some projects, it may be no more than providing information to review or evaluation teams, but this is too limiting. Ideally, beneficiaries should be involved in planning the assessment (including selecting indicators), providing information on what was and was not achieved, and analysing and verifying the results. Findings should always be fed back to communities. The needs of communities in this regard may differ from those of outside agencies – especially their senior management – and donors, who expect more conventional indicators of success, often emphasising the quantitative at the expense of the qualitative.

Beneficiaries are only one group of stakeholders. Project staff are another. NGOs and other local institutions, local and national government officials, and where appropriate international agencies and other kinds of organisation (e.g. the private sector) should all be consulted if they have been involved in the project, are affected by it, or have some influence on its outcome. Note that it can be difficult to reconcile the views of diverse stakeholder groups. This makes it all the more important to be clear from the start about what M&E are designed to look at. Meetings should be held to discuss and explain this. Where stakeholders have different priorities and perspectives, this should be made explicit at the start to avoid misunderstandings later.

Evaluations are often funded by donors or in some way linked to ensuring continued donor support. In such circumstances, the ideal of M&E as mutual learning is hard to sustain. Many of those involved will be tempted to overstate the positive features of their project and downplay the negative ones. They may be defensive about their work, fearing that evaluation teams are searching for faults. Community members may only tell evaluators what they think they want to hear.

18.3.3 Assessment teams

Participation and accountability are therefore significant factors to bear in mind when assessment teams are formed. The balance between internal and external assessors is an important consideration. In development projects, evaluation may be carried out by external specialists, local staff or local people, working separately or in mixed teams. There are no fixed rules: the appropriate size and mix are selected to suit the specific project, and there is increasing emphasis on gender balance and local participation.

In contrast, external specialists – mostly men – continue to dominate teams evaluating risk reduction and humanitarian aid initiatives, and it is still common to have projects evaluated by a single external consultant. Whilst it is useful to have the added objectivity of an outsider's view and the experience of a well-travelled evaluator, there is a danger that somebody new to the project will not understand all its complexities – this danger is accentuated by the limited time usually allocated to evaluators.

The purpose of the evaluation offers some guidance to the balance of the evaluation team. If the main purpose is lesson-learning, it makes sense to involve more internal staff; if it is accountability, the independence of external evaluators becomes more crucial. In practice, however, most evaluations aim at lesson learning and accountability.

There is a lot of discussion in the literature about the appropriate skills mix in evaluation teams. Again, there are no fixed rules about this. Some people feel that a wide range of relevant technical skills is essential; others maintain that experience in evaluation methods is more important. In some kinds of risk reduction project, technical expertise may be valuable, be it in science, engineering/architecture, nutrition, economics or the social sciences. Evaluators need to be able to use quantitative and qualitative data and relevant data collection methods. Knowledge of local geography, society, cultures and institutions is also valuable.

Case Study 18.3, though it concerns a review of a humanitarian operation in response to a complex political emergency, highlights several issues with wider relevance.

Case Study 18.3
Membership and functioning of an evaluation team

In 1996, the IFRC commissioned an external review of its programme in Tajikistan, where civil war had created major humanitarian problems. The review was wide-ranging. It covered health and nutrition programmes (including distribution of food and medical supplies), logistics, general relief programmes and developmental relief. The team was also asked to consider the broader and longer-term issues of disaster prevention and the development of the Tajikistan Red Crescent Society.

The programme's institutional stakeholders comprised the IFRC (Geneva Secretariat and Regional Delegation), the Tajikistan Red Crescent and national Red Cross Societies in the North that had funded the work.

The composition of the core review team in terms of skills and experience reflected the interests of the principal donor Red Cross societies, the British and American Red Cross, who were also influential in the choice of individuals. There were four core team members: the team leader (an independent consultant identified and funded by the British Red Cross), a health and emergency medicine expert (from another institution, identified and funded by the American Red Cross), a public health and nutrition specialist (seconded by the American Red Cross) and a logistics expert (from the IFRC Secretariat).

(continued)

Case Study 18.3 *(continued)*

All of the external evaluators were experienced, and though none had worked in Tajikistan, some had worked in other former Soviet states or in neighbouring Afghanistan. Two senior members of the Tajikistan Red Crescent were also seconded to the team. Only one of the team members was female, despite the review's terms of reference requiring efforts to be made to ensure a gender-balanced team.

The core team members were briefed by their sponsoring Red Cross societies and spent three days in Geneva being briefed, interviewing and studying documents, followed by briefings at the Federation's regional delegation in Kazakhstan and the headquarters of the Tajikistan Red Crescent. There was little opportunity to discuss the terms of reference and methodology before the interviews and document searches began, and fieldwork methods had to be discussed on the way to Tajikistan. Identifying and tracking down key documents during the preparation stage was difficult and time-consuming. On the other hand, sectoral responsibilities were clear, with the team leader covering areas not addressed by the technical specialists and the local staff acting as general advisers.

The 20-day fieldwork period mostly involved interviews with IFRC delegates, staff of the Tajikistan Red Crescent and key informants in the government and international agencies. A limited number of projects and Red Crescent local branches was visited. Beneficiary interviewing was limited and opportunistic. The schedule underestimated the time needed for interviews and meetings where translation was required.

There were three main issues relating to the way the team functioned:

1. The two members from Tajikistan were unable to attend the Geneva briefings (largely due to cost) and were not involved in writing the report. They participated as facilitators, informants and contributors to the review, but not as full members of the team.
2. Some of the team members brought their employer's agendas to the work: one was piloting a health assessment format for the American Red Cross; another wanted to carry out an internal review of IFRC logistics procedures in the region.

(continued)

Case Study 18.3 *(continued)*

3. Because of other work priorities, two of the four core team members could not participate for the full period of the fieldwork.

This left considerable responsibility for the final report with the team leader and the remaining team member, although the team agreed on the main conclusions. Each member of the team wrote their own sectoral sections and the team leader drew these together, in the process overcoming the problems caused by different writing styles, the specialists' tendency to give too much technical detail and their preoccupation with general sectoral issues without grounding them in the reality of the work being reviewed.

The timing of the review meant that the IFRC and Tajikistan Red Crescent had little time to study the report and act on its findings before operational and fundraising plans for the following year were finalised. However, many of the report's recommendations were subsequently implemented.

P. Wiles, 'Review of the International Federation of Red Cross and Red Crescent Societies' Tajikistan Programme', in A. Wood, R. Apthorpe and J. Borton (eds), *Evaluating International Humanitarian Action: Reflections from Practitioners* (London: Zed Books/ALNAP, 2001).

18.3.4 Baseline data

Evaluation is easier if there are already good baseline data to measure progress against. Projects should be based on baseline studies, with their objectives and indicators of achievement set accordingly. This happens far less than it should in practice, leaving many project evaluators struggling to find adequate measures of success. However, few baseline studies can anticipate all the questions likely to be asked in subsequent reviews and evaluations.

In risk reduction, a risk or vulnerability/capacity analysis should provide good baseline data and guide interventions. Application of the same method of analysis during or after the project should make it possible to draw meaningful conclusions about impact. It would be interesting to know if this has been done. The *apparent* failure to do so may be due to the following factors.

- Vulnerability and capacity analysis is a new technique for most field agencies, and hence has been used mostly in pre-project assessments. To date, there has not been much opportunity to apply it as an evaluation tool.
- Agencies are finding it difficult to analyse data collected in such exercises, particularly to weigh up data on the many aspects of vulnerability that have been gathered in a variety of ways using different indicators. Until project staff acquire greater confidence in the techniques for risk and vulnerability analysis, they will be reluctant to use it in evaluations, especially where the findings will go before senior staff or funding agencies.
- Considerable resources are required for comprehensive risk or vulnerability analysis. Few project budgets would allocate the same level of resources for evaluation – evaluations are generally under-resourced anyway.

18.3.5 Indicators

Vulnerability and resilience are multi-dimensional. It is difficult for vulnerability and risk analysis to collect data on every single relevant aspect, and in any case collection of unnecessary data should be avoided. Monitoring and evaluation systems need to identify and focus on the most useful indicators of risk reduction. Remember that the indicators that are easiest to measure are not necessarily the most useful as far as analysis is concerned (there is more on this below).

Indicators will vary from one project to another, according to the work being undertaken and its specific context. But in general they should try to be both SMART (specific, measurable, attainable, relevant and time-bound) and SPICED (subjective, participatory, interpreted, cross-checked, empowering and diverse): see Box 18.1.

This sounds simple on paper, but in practice it can be complicated. Questions to be asked regarding the practicality of indicators include:[4]

- Measurability. Is the indicator measurable? Is it sufficiently sensitive to an improvement or deterioration in conditions?
- Ease and cost of collection. How easy is it to obtain the information required? How costly will this be? Can the community participate? Are some relevant data already collected?
- Credibility and validity. Are the indicators easy to understand, or will people end up arguing over what they mean? Do they measure something that is important to communities as well as implementing organisations?

Box 18.1

Indicators: SMART and SPICED

SMART	SPICED
Specific: Indicators should reflect those things the project intends to change, avoiding measures that are largely subject to external influences. Measurable: Indicators must be defined precisely so that their measurement and interpretation are unambiguous. They should give objective data, independent of who is collecting the data. They should be comparable across groups and projects, allowing change to be compared and aggregated. Attainable: Indicators should be achievable by the project and therefore sensitive to the changes the project wishes to make. Relevant: It must be feasible to collect data on the chosen indicators within a reasonable time and at a reasonable cost. Indicators should be relevant to the project in question. Time-bound: Indicators should describe by when a certain change is expected.	Subjective: Informants have a special position or experience that gives them unique insights which may yield a very high return on the investigators' time. In this sense, what may be seen by others as anecdotal becomes critical data because of the source's value. Participatory: Indicators should be developed together with those best placed to assess them. This means involving a project's ultimate beneficiaries, but it can also mean involving local staff and other stakeholders. Interpreted and communicable: Locally defined indicators may not mean much to other stakeholders, so they often need to be explained. Cross-checked and compared: The validity of assessment needs to be cross-checked, by comparing different indicators and progress, and by using different informants, methods and researchers. Empowering: The process of setting and assessing indicators should be

(continued)

Box 18.1 *(continued)*

SMART	SPICED
	empowering in itself and allow groups and individuals to reflect critically on their changing situation. Diverse and aggregated: There should be a deliberate effort to seek out different indicators from a range of groups, especially men and women. This information needs to be recorded in such a way that these differences can be assessed over time.

C. Roche, *Impact Assessment for Development Agencies: Learning to Value Change* (Oxford: Oxfam/Novib, 1999).

- Balance. Do the selected indicators provide a comprehensive view of the key issues?
- Potential for influencing change. Will the evidence collected be useful for communities, implementers and decision-makers?

Even with this guidance in mind, it is rare to find all the evidence one wants. Indicators are *indicators*, they are not necessarily final proof. Indicators do not need to record absolute change. It is often enough to identify relative change.

Part of the process of collecting baseline information should be to identify those indicators that will be most valid for M&E. However, experience as the work progresses may highlight other issues and require changes to the project. Some indicators may have to be modified or new ones will emerge, so it is important to be flexible. Monitoring methods should be designed to pick up these issues so that decisions can be made.

Where baseline data are lacking, or previously identified indicators are found difficult to assess or simply irrelevant, new indicators must be developed. In practice, this happens quite often, but the process must be managed carefully to avoid confusing or misleading stakeholders. An open, participatory approach is needed here, and the aim should be to achieve the highest possible level of consensus.

Be aware of the problem known as the 'indicator dilemma'. Indicators that are chosen to verify impact can only identify *expected* change, and will only reflect those changes that have been made explicit or agreed by the stakeholders. But what happens where change is unexpected or was not agreed by stakeholders, or where a particular stakeholder group did not reveal an area of change that was important to them?

Conventional M&E methods usually focus on positive impacts. Few initiatives are without some negative impacts, although in most projects there is a reluctance to review these. All partners in a project should be open about the importance of identifying negative impacts and groups that have been overlooked or excluded. This requires a high degree of trust between those involved in running the project, which may be difficult to achieve owing to the unequal relationship between poor communities and external organisations bringing resources.

Some development agencies have experimented with approaches to assessing change that do not use predetermined indicators – instead, poor and vulnerable people review the changes that have taken place over a particular time and related factors.

Other indicator issues are covered below in the discussion of how to measure impact.

18.3.6 Identifying cause and effect

Many factors combine to make people vulnerable and create situations of risk. No project intervention can address all of these factors. All projects will be influenced by them. This influence must be understood in order to assess a project's achievements. To what extent are particular changes due to the project itself or its environment? It can be difficult to make a judgement here, particularly when evaluating long-term impact.

Moreover, good risk reduction work should comprise a range of diverse activities: organisational, educational, structural, economic. These activities are meant to be mutually reinforcing: for example, training in safe building tech-

niques should be complemented by regulation of land use, and the setting and enforcement of building standards, as well as by measures to address the economic and social pressures that force poor people to live in flimsy housing in hazardous locations. Where risk reduction adopts such a broad approach, with numerous interlocking elements, how can one assess the results arising from one particular type of intervention against another? It may be impossible to identify specific linkages between cause and effect. Consequently, how can one set priorities for intervention?

Some development project evaluations have used control groups for comparative purposes, but there are methodological problems with this approach and, in the case of risk reduction, it is arguably unethical to study at-risk groups that one has not attempted to protect. Some agencies specifically investigate external influences when assessing projects: this at least puts evaluation findings into context, even if it often cannot demonstrate particular cause and effect linkages.

Cross-checking (or triangulation) of different data sets and sources is helpful in isolating particular factors affecting success or failure. In most cases, the sources and types of information will vary. In particular, there will be a mixture of quantitative and qualitative information. Using different stakeholders or assessors to review the same issue can reveal similarities and differences. It is very important to consider the views of differently vulnerable groups. Direct observation is a useful way of checking if there are discrepancies between what people say and what they do (see Case Study 9.1, page 136).

The problem is reduced wherever evaluators can focus on specifics. Assessment of disaster preparedness and response measures tends to be simpler, for example. Warning and evacuation procedures can be tested through practice drills and by events. It is also relatively easy to isolate each element in the preparedness-response system for analysis. Responses to early warnings have been studied on many occasions, throwing light on community attitudes and the effectiveness of warning systems.[5] Such knowledge has supported the development of sophisticated methods for evaluating the condition of early-warning systems.[6]

18.3.7 Outputs or impact?

M&E manuals sometimes speak of ‘process’ and ‘impact’ indicators. Process indicators measure the implementation of project activities, and are usually quantitative. Impact indicators, which can be quantitative and qualitative,

measure changes that occur as the result of project activities. The difference between the two types of indicator is important.

Most evaluations of disaster mitigation and preparedness projects focus on outputs rather than impact. They tend to be short-term studies, usually carried out at the end of a project, when it is too soon to assess its long-term consequences. Post-project impact assessments are rare. The lack of critical long-term studies is also apparent in the published literature. Published case studies of well-regarded initiatives usually appear at a relatively early stage in a project's life or are based on early evidence. The exceptions tend to be drought/food security initiatives. These demonstrate that projects' impact can be judged only over a period of some years. They also reveal the extent of rethinking and modification that takes place even in successful projects. This is not to say that process indicators are not important – they often have to act as proxy indicators of impact. They are particularly important where hazards are infrequent (e.g. earthquakes, volcanic eruptions).

M&E is designed to measure change. Indicators are chosen accordingly. However, risk reduction presents problems because of what has been called its 'reverse logic': i.e. the success of an initiative is that something – the disaster – does *not* happen.

Structural/physical mitigation measures are relatively easy to assess. The quantity and quality of, for example, embankments, flood shelters, earthquake-resistant houses and soil and water conservation structures can be assessed visually, as can the extent to which alternative technologies or techniques are adopted. Judgement about the quality of such technical innovations serves as a proxy indicator for their impact – i.e. their resilience to actual hazard events.

Non-structural measures involving changes in attitude, skills, organisation or awareness are much more challenging. Proxy indicators of impact can be picked out but they are less certain than those for physical change. For example, interviews or discussion groups can reveal how interventions have changed a community's attitudes towards risk, but they do not allow us to judge how that community will actually behave when confronted with a disaster.

Given these challenges, the need for triangulation of different evidence is clear. Good impact evaluations should be wide-ranging in their search for relevant signs of increased resilience to risk, as well as objective about the strength of the evidence collected (e.g. Case Study 18.4).

Case Study 18.4
Evaluating the impact of rainwater harvesting

In 1997, the NGO ITDG commissioned an independent evaluation of a rainwater harvesting initiative in Kenya that had been launched over ten years previously (see Case Study 15.4, page 267). This built up a comprehensive picture from a range of indicators and sources.

The evaluation was based on project documentation (including local partners' monitoring records), interviews with project and partner staff, five group discussions with beneficiaries (104 people in total), individual interviews with 12 gardeners, a local trader and a chief, and some field observation. The discussion groups and individual interviews were based on PRA techniques.

The evaluation covered eight aspects:

1. Impact on average sorghum yields, and comparison of yields between traditional sorghum gardens and those improved by rainwater harvesting.
2. How the sorghum harvest was used, in good and bad years (e.g. to purchase food, seeds or livestock, to sell for cash, or to give to relatives and friends).
3. Impact on diet.
4. Impact on wealth.
5. Gender issues in control and decision- making, relating to decisions about whether to improve a sorghum garden, when to begin planting, division of labour and control over disposal of the harvest.
6. Impact on women's status (linked to point 5).
7. How the creation of new sorghum gardens affected traditional land tenure arrangements.
8. Positive and negative impact on the environment (water run-off, soil erosion, soil fertility).

The PRA methods were effective in obtaining respondents' views and stimulating discussion. Much of the evidence was qualitative. In some cases, quantitative data would have been valuable, but were not readily available. To obtain relative data on the use of increased sorghum yields and constraints on sorghum production, the evaluators used the techniques of ranking and proportional piling, in which individuals were given piles of stones (or donkey dung by the lakeshore, where stones were not available) and asked to place them in separate piles to indicate amounts.

(continued)

Case Study 18.4 *(continued)*

Data on crop yields proved more difficult. Local-level monitoring systems were of limited use and there were widespread variations in the type of soil, pest levels and rainfall between different sites. Moreover, the sorghum growers were reluctant to reveal their full yields to outsiders. Here it was necessary to piece together limited evidence from different sources: project records, discussions with project staff and the assessments of the gardeners themselves. This was compared with data from previous project reviews and workshops. The evaluators noted that no outsiders making short visits can expect to obtain specific data on such sensitive subjects, and that easily obtained replies might well be erroneous.

C. Watson and B. Ndung'u, 'Rainwater Harvesting in Turkana: An Evaluation of Impact and Sustainability', mimeo (Nairobi: ITDG, 1997).

Little work has been done on methodology for assessing the impact of risk reduction, yet organisations need guidance in this area, especially regarding appropriate indicators and means of verification. Agencies are comfortable with indicators of output (especially quantitative indicators), but are unsure about how to select and apply indicators of impact.

It is therefore common for evaluations to come up with the kinds of achievement indicator listed in Table 18.1. These are output indicators that itemise and quantify the measures taken by a disaster preparedness project. The figures appear impressive at first glance, but they cannot demonstrate the nature or extent of the project's effectiveness in improving performance. There is no measure of quality here. The training and orientation activities may have been very effective in improving knowledge and skills, but one cannot tell this merely from the numbers taking part. A considerable number of posters and leaflets have been circulated, but there is no indication of the impact these have made on people's perceptions and actions. Grain stores and funds have been established, but we cannot judge how well they work. The nearest this list comes to impact is in item 7, which refers to the number of people's voluntary teams that are 'functioning', without explaining what this means or how it was verified.

Table 18.1 Output indicators

	Indicator	*Target*	*Achievement*
1.	Number of households oriented in disaster preparedness and management.	120,000	140,000
2.	Number of volunteers trained in disaster preparedness and management.	118	118
3.	Number of [partner agency] staff trained in disaster preparedness and management.	600	598
4.	Number of other NGO staff trained in disaster preparedness and management.	80	72
5.	Number of government representatives trained in disaster preparedness and management.	118	118
6.	Number of flood level indicators established.	130	130
7.	Number of people's voluntary teams functioning.	118	118
8.	Number of posters circulated.	–	2,367
9.	Number of leaflets circulated.	–	10,650
10.	Number of radio sets distributed.	118	118
11.	Number of torches and whistles distributed.	118	118
12.	Number of email connections installed.	2	4
13.	Number of grain stores constructed.	20	20
14.	Number of grain store maintenance teams trained.	20	20
15.	Number of grain store management teams trained.	20	20
16.	Emergency credit fund established.	1	1
17.	Number of grain store management teams trained in credit operation.	20	20
18.	Flood insurance fund established.	1	1

Projects that have clear objectives and targets can develop a hierarchy of indicators that link process to impact and thereby make M&E more coherent. An example is given in Box 18.2. This is an extract from the Strategic Objective and Results Framework of the Asian Urban Disaster Mitigation Program (AUDMP), a major regional initiative run by the Asian Disaster Preparedness Center (see Box 14.2, page 249).

Box 18.2
Linking Process to Impact (1)

Program Goal: Reduced natural disaster vulnerability of urban populations, infrastructure, lifeline facilities and shelter in the Asian region.

Program Objective: Establishment of sustainable public and private sector mechanisms for disaster mitigation in the Asian region.

Objective Indicators:

1. Number of operational plans developed with resources identified by national collaborating institutions to carry out mitigation measures after demonstration activities end.
2. Number of replications or adaptations of mitigation skills and procedures promoted in AUDMP demonstration activities by other organizations, communities or countries in the Asian region.
3. Amount of investment from non-AUDMP funding sources attracted by Program and demonstration activities.
4. Number of households potentially benefiting from AUDMP-sponsored activities to reduce disaster vulnerability.

Results:

1. Improved capacity of municipal officials to manage risk, apply mitigation skills and technologies.

Indicators:

1.1 Number of new or improved assessment methods and guidelines/standards used for public or private sector development.

1.2 Number of emergency preparedness and response plans written or revised to reflect improved information on hazards and vulnerability.

2. Improved access to hazard mitigation information and skills (techniques, methodologies, experience) throughout the region.

(continued)

Box 18.2 *(continued)*

Indicators:

2.1 Percent[age] of public and private sector professionals with AUDMP-initiated disaster mitigation training who are using the knowledge gained in fields impacting disaster management or urban development.

2.2 Number of institutions where AUDMP-initiated training and professional development course modules are institutionalized.

2.3 Level of participation in the AUDMP regional information and contact network established during the Program.

3. Improved policy environment for disaster mitigation

Indicator:

3.1 Improved policy environment for disaster mitigation.

'Strategic Objective and Results Framework', undated, Asian Urban Disaster Mitigation Program website: www.adpc.ait.ac.th/audmp/ME-framework.html.

The principal indicators here are mostly numerical. However, the framework goes down to a more detailed level (an extract is given in Box 18.3). This characterises the subsidiary evidence required to arrive at the numerical conclusions, and outlines sources of information and the evidence-gathering activities to be undertaken. The emphasis remains quantitative, although the subsidiary indicators are more diverse.

18.3.8 Cost–benefit analysis

In risk reduction work, cost–benefit analysis is usually applied to large-scale projects, especially those involving structural mitigation, and this is reflected in the standard methodological guidance available.[7] The results of cost–benefit analyses make a convincing case for risk reduction (see Box 18.4).

Such examples should be treated with caution, however. They are few and far between, at least in the published literature, where they are usually presented as statements of fact without explanation of how the calculations were made. The readiness with which publications on disasters repeat such assertions should perhaps be worrying, as it suggests that little substantiated data is available.

Box 18.3
Linking Process to Impact (2)

Objective Indicator 2: Number of replications or adaptations of mitigation skills and procedures promoted in AUDMP demonstration activities by other organizations, communities or countries in the Asian region.	Result 1: Improved capacity of municipal officials to manage risk, apply mitigation skills and technologies. Indicator 1.1: Number of new or improved assessment methods and guidelines/standards used for public or private sector development.
Standard/Target: 25 replications or adaptations. Replication should be initiated during the Program period even if not completed until after the Program ends. Replications may be of methodologies, sets of skills/procedures, guidelines/standards, or policies. Replications must be attributable to the example of the demonstration projects.	Standard/Target: At least 10 new or improved methods or guidelines/standards adopted and used during the Program period. Count ordinances, development regulations, building standards, vulnerability/risk analyses – and means a community or municipality has for controlling or regulating development, incorporating hazard information. Monitor applications and enforcement of standards/regulations by city officials and private professionals. Target is based on one new or improved assessment method or set of guidelines/standards used per national demonstration project.
Data Sources: Activity reports; surveys and evaluations; requests for guidelines/models received by ADPC Management Team and national partners.	Data Sources: Regularly scheduled activity reports; municipal records; published regulations.

(continued)

Box 18.3 *(continued)*

Critical Activities: Process documentation of demonstration activities and methodologies. Promotion and public awareness efforts with relevant government officials, decision-makers, community groups and professionals (e.g. promotional materials, training, city-sharing workshops, community meetings, electronic networking).	Critical Activities: Preparation of hazard, vulnerability maps; identification of elements at risk; recommendations for mitigation strategy; identification of implementation options and priorities.

Box 18.4

Economic costs and benefits of risk reduction measures

- The World Bank and US Geological Survey calculated that economic losses worldwide from natural disasters in the 1990s could be reduced by $280bn if $40bn were invested in preparedness, mitigation and prevention strategies.[8]
- In China, $3.15bn invested over 40 years in measures to control floods is estimated to have prevented potential losses of $12bn.[9]
- A World Bank team working in La Paz, Bolivia, calculated that disaster prevention and preparedness would cost $2.50 per capita, whereas annual losses from property damage alone resulting from natural disasters were estimated at $8 per capita.[10]
- According to Oxfam, the value of cattle saved on a flood shelter covering approximately four acres in Bangladesh during the 1998 floods was Tk4m, against a construction cost of only Tk700,000.[11]
- The owner of a sweetshop in the Indian city of Indore, interviewed in 1994, said he had paid Rs25 to put stepping stones around his shop so that customers would not have to stand in flood water. Not to have done so would, he believed, have cost him Rs100–200 in lost business.[12]

Box 18.5
Economic costs of disasters

The economic costs of disasters are usually divided into three kinds: direct, indirect and secondary.

- Direct costs relate to the capital cost of assets (e.g. buildings and other physical infrastructure, raw materials, crops) destroyed or damaged.
- Indirect costs are the damage to the flow of goods and services (e.g. lower output from factories destroyed or damaged, loss of sales income due to damaged infrastructure, costs of having to buy materials or services from elsewhere, medical expenses, lost productivity).
- Secondary effects are the short- and long-term impacts on overall economic performance (e.g. deterioration in external trade and government budget balances, reallocation of planned government spending, increased indebtedness, changes in income distribution patterns, changes in the scale and incidence of poverty).

At local level, and in initiatives involving non-structural mitigation measures, cost–benefit analysis has not been greatly used. This is partly because the principal local actors, NGOs and CBOs, are unwilling to give too much weight to purely quantitative features of complex socio-economic processes, partly because of their lack of familiarity with the methods, and partly because of the difficulty of carrying out this kind of analysis.

There are three significant problems with cost–benefit analysis of risk reduction in addition to the wider difficulty of assessing impact outlined above.

First, it is extremely difficult to assess the impact or cost of disasters, spatially or temporally. Data on disasters' human and economic impact have improved over the years, but remain unreliable. Estimates of the human costs (deaths and injuries) are often guesses, especially in developing countries, where most disasters take place. Estimates of disasters' economic impact generally focus on direct costs. It is much harder to assess indirect and secondary costs (see Box 18.5 for an explanation of these terms). In developing countries, the problem is even harder. For example, assessment of direct losses becomes much more difficult if a large proportion of losses are

uninsured; and it is very difficult to calculate a secondary cost such as loss of income when a significant proportion of economic activity takes place in the informal sector.

The second issue relates to the first. Methodologies for economic impact assessment in disasters have several weaknesses.[13] They include:

- lack of standardisation (e.g. variations in the scope of assessments, reporting formats and methods of valuing damage);
- lack of training for assessors;
- limitations in coverage (e.g. assessors focusing on their institutions' areas of interest; overlooking damage that is not eligible for government assistance; political pressures to over- or under-report damage); and
- pressure to carry out assessments soon after a disaster, and quickly (while this is important in addressing relief needs, there is often no follow-up and hence no assessment of disasters' longer-term consequences).

Finally, the main criticism of economic cost–benefit analysis is that it values costs and benefits in purely monetary terms. Yet it is difficult to put a price on the environmental, social, political and psychological costs of disasters and the benefits of mitigation and preparedness. A focus on economic costs and benefits addresses only one aspect of people's vulnerability to disasters.

18.3.9 Using M&E findings

M&E is worthless unless it leads to improvements in agencies' work to reduce risk. M&E reports are potentially valuable documents. They allow for practical lessons to be learned within and across programmes and regions. They provide a basis for discussion about better practice and policy change. They also contribute to institutional memory, which is important in organisations such as NGOs that suffer from rapid staff turnover.

Agencies of all kinds are poor at absorbing the particular and general lessons that come from evaluations. Often, the review or evaluation report is filed, to be acted upon at another time but then forgotten amidst the pressure of work. Many organisations have poor information storage and retrieval systems, making it very difficult to find documents.

Few staff have the time to reflect upon the lessons learned from individual projects, and fewer still are able to consider what can be learnt from several

Table 18.2 Characteristics of cost–benefit and vulnerability analysis

Cost–benefit analysis	Vulnerability analysis
Specific hazard(s) whose frequency and severity can be calculated with a relatively high degree of certainty.	Vulnerability context – including hazards and socio-economic factors.
Structural projects.	Mix of structural and non-structural measures.
Large-scale projects.	Community-level, small-scale projects.
Where data sets are sufficient, or resources exist to collect sufficient data.	Limited formal data needed; data can be collected locally.
Developed countries, developed or urban regions within developing countries.	Developing countries, poor and remote communities.
Macro-level analysis.	Micro-level analysis.
Quantitative data.	Qualitative data.
Specialists required for research and analysis.	Skills for research and analysis easily acquired and applied by non-specialists.
Externally driven, or top-down.	Participatory.

projects. In NGOs in particular, overwork and pressures of work constitute a 'systemic weakness' preventing thinking and innovation.[14]

Participatory M&E creates a sense of 'ownership' of the final product among the stakeholders involved. This greatly increases the likelihood that lessons will be noted and acted upon.

Much more transparency is needed in M&E. In particular, the failure to share and publish evaluations hinders the acquisition of knowledge about successes and failures. This culture of concealment also runs counter to the principle of accountability that many agencies claim to follow. There is a particular reluctance to document mistakes and share lessons learned from them.

18.4 Chapter summary

- M&E is important in making agencies accountable, demonstrating that risk reduction works and improving understanding of how it works.
- Organisations involved in risk reduction have given low priority to M&E and it is poorly covered in technical manuals and other literature. This makes it difficult to offer a view of 'good practice' in this area.
- M&E systems must be planned carefully, bearing in mind that no two projects are identical. The purpose and methods of any evaluation exercise should be clearly defined and agreed, there should be some focus to the assessment, and its objectives must be realistic.
- Many evaluators are not given the time or resources to do their work thoroughly. However, snapshots of initiatives, and small-scale or rapid assessments, can be useful.
- M&E should be approached as a mutual learning process for all involved. Beneficiary communities should be involved in evaluation, remembering that they are not the only project stakeholders.
- The balance between external and internal assessors, between local people and outsiders, between different technical specialists and generalists and between women and men are important considerations when assessment teams are formed.
- Identifying linkages between cause and effect is a particular challenge, especially since good risk reduction work should comprise a range of diverse but mutually reinforcing activities. Triangulation of different data sets and sources is important.
- Most evaluations of mitigation and preparedness projects focus on outputs rather than impact. There are few long-term impact assessments.
- Choice of indicators presents a number of problems, including identification of suitable proxy indicators of impact and the need to draw on very diverse data sets (quantitative and qualitative).
- Cost–benefit analysis is generally held to make a convincing case for risk reduction, but it is very difficult to carry out – particularly in pricing the environmental, social, political and psychological costs and benefits. A focus on purely economic aspects addresses only one dimension of vulnerability.
- M&E findings must be used to improve agencies' performance, but organisations of all kinds are poor at absorbing these lessons. Much more transparency is needed in M&E: the failure to share and publish evaluations hinders the acquisition of knowledge about success and failure.

Notes

1 C. Roche, *Impact Assessment for Development Agencies: Learning to Value Change* (Oxford: Oxfam/Novib, 1999); A. Hallam, *Evaluating Humanitarian Assistance Programmes in Complex Emergencies* (London: Humanitarian Practice Network, Good Practice Review 7, 1998); A Wood, R. Apthorpe and J. Borton (eds), *Evaluating International Humanitarian Action: Reflections from Practitioners* (London: Zed Books/ALNAP, 2001).

2 *Living with Risk: A Global View of Disaster Reduction Initiatives* (Geneva: UN International Strategy for Disaster Reduction, 2002), pp. 330–34.

3 Roche, *Impact Assessment for Development Agencies*, p. 21.

4 L. Noson, 'Hazard Mapping and Risk Assessment', in ADPC (ed.), *Proceedings, Regional Workshop on Best Practices in Disaster Mitigation, 24–26 September 2002, Bali, Indonesia* (Bangkok: Asian Disaster Preparedness Center, 2002), pp. 83–84.

5 J. Twigg, 'The Human Factor in Early Warnings: Risk Perception and Appropriate Communications', in J. Zschau and A. N. Küppers (eds), *Early Warning Systems for Natural Disaster Reduction* (Heidelberg: Springer Verlag, 2003), pp. 19–26.

6 See for example D. Parker, 'Criteria for Evaluating the Condition of a Tropical Cyclone Warning System', *Disasters*, vol. 23, no. 3, 1999, pp. 193–216.

7 See for example *Primer on Natural Hazard Management in Integrated Regional Development Planning* (Washington DC: OAS, 1991), pp. 2/16–2/29, www.oas.org/usde/publications/Unit/oea66e/begin.htm; *Mitigating Natural Disasters: Phenomena, Effects and Options – A Manual for Policy Makers and Planners* (New York: Office of the United Nations Disaster Relief Coordinator, 1991), pp. 137–40.

8 M. Dilley and B. N. Heyman, 'ENSO and Disaster: Droughts, Floods and El Niño/Southern Oscillation Warm Events', *Disasters*, vol. 19, no. 3, 1995, pp. 181–93.

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