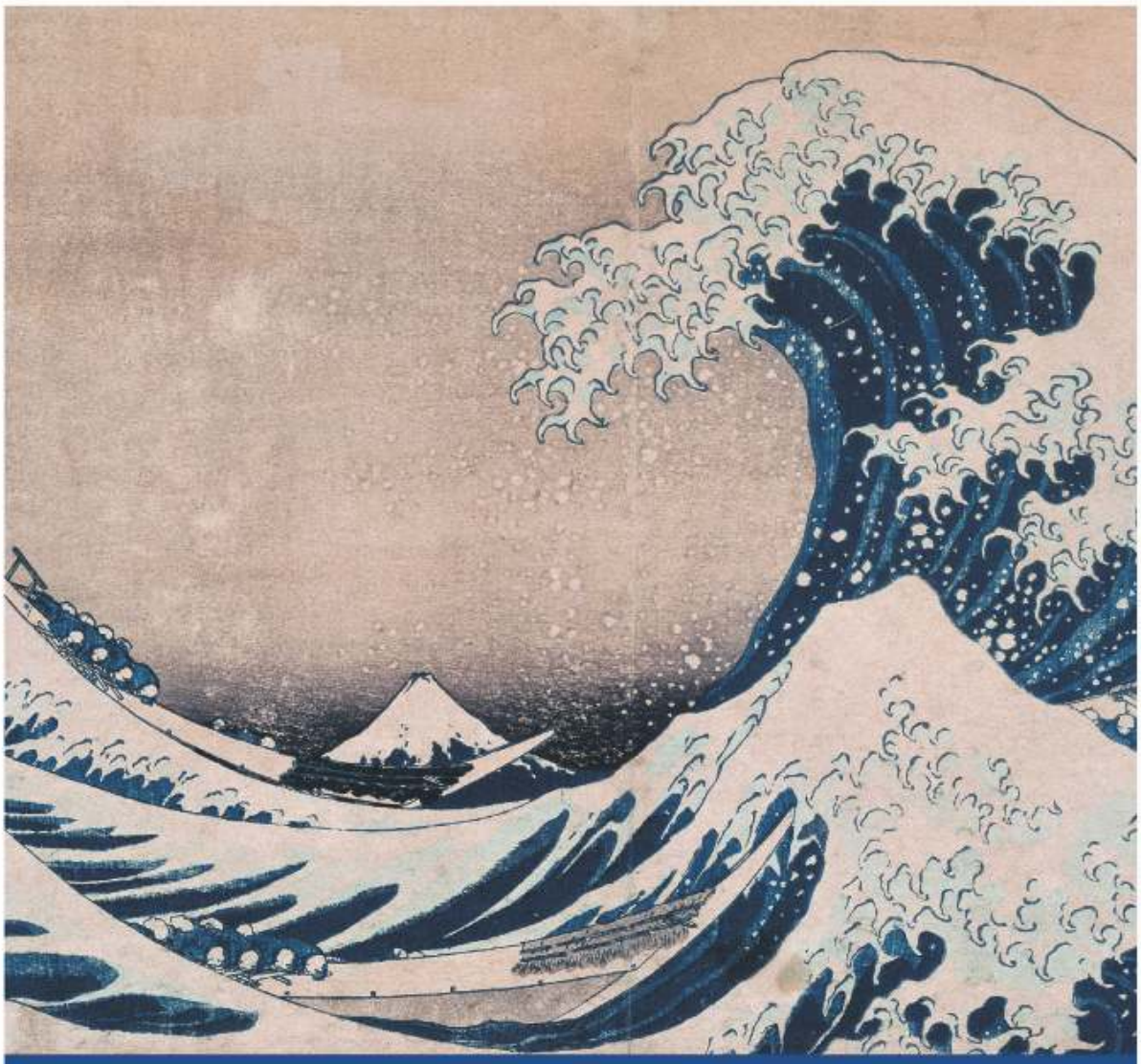

At Risk

Second edition

Natural hazards, people's vulnerability and disasters

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At Risk: natural hazards, people's vulnerability and disasters
Second edition
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The attached three chapters constitute Part I of the book, and have been made available in the public domain by the authors and Routledge as part of the UNDP follow up to the Hyogo Framework for Action 2005.

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Contents

6 FLOODS

Introduction

Flood disasters, challenges and changes in thinking

Floods as known risks

The paradox of flood control

Natural dams

Flash floods and landslides

Disastrous outcomes for vulnerable people

Mortality, morbidity and injury

Livelihood disruption

Floods and vulnerability

Summary: flood prevention and mitigation

Local-level mitigation

Social protection and flood precautions

Flood mitigation and preparedness

TEXT BOXES

6.1 Floods in China 1998

6.2 'Small' floods: a hidden problem

6.3 Bangladesh – reducing vulnerability to floods is not the same as stopping floods

6.4 Flooding and deforestation: the causation controversy

7 COASTAL STORMS

Introduction

The physical hazard

Patterns of vulnerability

Contemporary coastal settlements and the cyclone hazard

Coastal livelihoods

Case studies

Less-densely populated coasts

Rural hinterlands

Densely populated coasts

Islands and small island states

Policy responses

8 EARTHQUAKES AND VOLCANOES

Introduction

Determinants of vulnerability to earthquakes

Access to resources in normal life and transition to disaster

Classic case studies: Guatemala and Mexico

The Guatemala earthquake, 1976

The Mexico City earthquake 1985

Recent case studies

Kobe earthquake 1995

Social vulnerability and high-risk groups

Unsafe dwellings

Economic vulnerability

The failure of disaster preparedness measures

Community resilience

Gujarat earthquake 2001

Social vulnerability – high-risk groups

Unsafe buildings

Economic vulnerability

Part I

FRAMEWORK AND THEORY

1

THE CHALLENGE OF DISASTERS AND OUR APPROACH

In at the deep end

Disasters, especially those that seem principally to be caused by natural hazards, are not the greatest threat to humanity. Despite the lethal reputation of earthquakes, epidemics and famine, a much greater proportion of the world's population find their lives shortened by events that often go unnoticed: *violent conflict, illnesses, and hunger* – events that pass for normal existence in many parts of the world, especially (but not only) in less developed countries (LDCs).[1] Occasionally earthquakes have killed hundreds of thousands, and very occasionally floods, famines or epidemics have taken millions of lives at a time. But to focus on these (in the understandably humanitarian way that outsiders do in response to such tragedies) is to ignore the millions who are not killed in such events, but who nevertheless face grave risks. Many more lives are lost in violent conflict and to the preventable outcome of disease and hunger (see Tables 1.1 and 1.2).[2] Such is the daily and unexceptional tragedy of those whose deaths are through 'natural' causes, but who, under different economic and political circumstances, should have lived longer and enjoyed a better quality of life.[3]

Table 1.1 Hazard types and their contribution to deaths, 1900–1999

Hazard type in rank order	*Percentage of deaths*
Slow onset:	
Famines – drought	86.9
Rapid onset:	
Floods	9.2
Earthquakes and tsunami	2.2
Storms	1.5
Volcanic eruptions	0.1
Landslides	<0.1
Avalanches	Negligible
Wildfires	Negligible

Source: CRED at www.cred.be/emdat

Table 1.2 Deaths during disasters, listed by cause, 1900–1999

Cause of death [a]	*Numbers killed (millions)*	*Percentage of deaths*
Political violence	270.7	62.4
Slow-onset disaster [b]	70.0	16.1
Rapid-onset disaster	10.7	2.3
Epidemics	50.7	11.6
Road, rail, air and industrial accidents	32.0	7.6
TOTAL	434.1	100

Notes:

[a]the source for political violence data is Sivard (2001). For all other causes, data is summarised from that available at www.cred.be/emdat

[b]this figure has been increased by us to an estimate of 70 million, much higher than the official data, which would give a total of around 18 million. This is to compensate for large-scale under-reporting of deaths from drought and famine. There are several reasons why this can occur. For instance, it is often the case that governments conceal or refuse to acknowledge famine for political reasons. The Great Leap Forward famine in China (1958–1961) was officially denied for more than 20 years, and then low estimates put the number of deaths at 13 million and higher ones at up to 30 million or more (see Chapter 4). A further problem is that sometimes recorded deaths in famine are limited to those who die in officially managed feeding or refugee camps. Many more are likely to die unrecorded at home or in other settlements.

However, we feel this book is justified, despite this rather artificial separation between people at risk from natural hazards and the many dangers inherent in 'normal' life. Analysing disasters themselves also allows us to show why they should *not* be segregated from everyday living, and to show how the risks involved in disasters must be connected with the vulnerability created for many people through their normal existence. It seeks the connections between the risks people face and the reasons for their *vulnerability* to hazards. It is therefore trying to show how disasters can be perceived within the broader patterns of society, and indeed how analysing them in this way may provide a much more fruitful way of building policies, that can help to reduce disasters and mitigate hazards, while at the same time improving living standards and opportunities more generally.

The crucial point about understanding why disasters happen is that it is not only natural events that cause them. They are also the product of social, political and economic environments (as distinct from the natural environment), because of the way these structure the lives of different groups of people (see Box 1.1).[4] There is a danger in treating disasters as something peculiar, as events that deserve their own special focus. It is to risk separating 'natural' disasters from the social frameworks that influence how hazards affect people, thereby putting too much emphasis on the natural hazards themselves, and not nearly enough on the surrounding social environment.[5]

Many aspects of the social environment are easily recognised: people live in adverse economic situations that oblige them to inhabit regions and places that are affected by natural hazards, be they the flood plains of rivers, the slopes of volcanoes or earthquake zones. However, there are many other less obvious political and economic factors that underlie the impact of hazards. These involve the manner in which assets, income and access to other resources, such as knowledge and information, are distributed between different social groups, and various forms of discrimination that occur in the allocation of welfare and social protection (including relief and resources for recovery). It is these elements that link our analysis of disasters that are supposedly caused mainly by natural hazards to broader patterns in society. These two aspects – the natural and the social – cannot be separated from each other: to do so invites a failure to understand the additional burden of natural hazards, and it is unhelpful in both understanding disasters and doing something to prevent or mitigate them.

Disasters are a complex mix of natural hazards and human action. For example, in many regions wars are inextricably linked with famine and disease, including the spread of HIV-AIDS. Wars (and post-war disruption) have sometimes coincided with drought, and this has made it more difficult for people to cope (e.g. in Afghanistan, Sudan, Ethiopia and El Salvador). For many people, a disaster is not a single, discrete event. All over the world, but especially in LDCs, vulnerable people often suffer repeated, multiple, mutually reinforcing, and sometimes simultaneous shocks to their families, their settlements and their livelihoods. These repeated shocks erode whatever attempts have been made to accumulate resources and savings. Disasters are a brake on economic and human development at the household level (when livestock, crops, homes and tools are repeatedly destroyed) and at the national level when roads, bridges, hospitals, schools and other facilities are damaged. The pattern of such frequent stresses, brought on by a wide variety of 'natural' trigger mechanisms, has often been complicated by human action – both by efforts to palliate the effects of disaster and by the social causation of vulnerability.

During the 1980s and 1990s, war in Africa, the post-war displacement of people and the destruction of infrastructure made the rebuilding of lives already shattered by drought virtually impossible. In the early years of the twenty-first century conflict in central and west Africa (Zaire/Congo, Liberia, Sierra Leone) has displaced millions of people who are at risk from hunger, malaria, cholera and meningitis.[6] The deep indebtedness of many LDCs has made the cost of reconstruction and the transition from rehabilitation to development unattainable. Rapid urbanisation is putting increased numbers of people at risk, as shown by the terrible toll from the earthquake in Gujarat, India (2001) and mudslides in Caracas, Venezuela (1999).

Box 1.1: Naturalness versus the 'social causation' of disasters

When disasters happen, popular and media interpretations tend to focus on their *naturalness*, as in the phrase 'natural disaster'. The natural hazards that trigger a disaster tend to appear overwhelming. Headlines and popular book titles often say things like 'Nature on the Rampage' (de Blij 1994), and visually the physical processes dominate our attention and show human achievements destroyed, apparently by natural forces. There have been numerous television documentaries in Europe, North America and Japan which supposedly examine the causes of disasters, all of which stress the impact of nature. Much of the 'hard' science analysis of disasters is couched in terms that imply that natural processes are the primary target of research. The 1990s was the UN International Decade of *Natural* Disaster Reduction (our italics).

The diagram shown in Figure 1.1 illustrates why this is a very partial and inadequate way of understanding the disasters that are associated with (triggered by) natural hazards. At the top of Figure 1.1, Boxes 1 and 2, the natural environment presents humankind with a range of opportunities (resources for production, places to live and work and carry out livelihoods [Box 3]) as well as a range of potential hazards (Box 4). Human livelihoods are often earned in locations that combine opportunities with hazards. For example, flood plains provide 'cheap' flat land for businesses and housing; the slopes of volcanoes are generally very fertile for agriculture; poor people can only afford to live in slum settlements in unsafe ravines and on low-lying land within and around the cities where they have to work. In other words, the spatial variety of nature provides different types of environmental opportunity and hazard (Box 2) – some places are more at risk of earthquakes, floods, etc. than others.

But crucially, humans are not equally able to access the resources and opportunities; nor are they equally exposed to the hazards. Whether or not people have enough land to farm, or adequate access to water, or a decent home, are determined by social factors (including economic and political processes). And these same social processes also have a very significant role in determining who is most at risk from hazards: where people live and work, and in what kind of buildings, their level of hazard protection, preparedness, information, wealth and health have nothing to do with nature as such, but are attributes of society (Box 5). So people's exposure to risk differs according to their *class* (which affects their income, how they live and where), whether they are *male or female*, what their *ethnicity* is, what *age group* they belong to, whether they are *disabled* or not, their *immigration status*, and so forth (Box 6).

Box 1.1 continued

Thus it can be seen that disaster risk is a combination of the factors that determine the potential for people to be exposed to particular types of natural hazard. But it also depends fundamentally on how social systems and their associated power relations impact on different social groups (through their class, gender, ethnicity, etc.) (Box 7). In other words, to understand disasters we must not only know about the types of hazards that might affect people, but also the different levels of *vulnerability* of different groups of people. This vulnerability is determined by social systems and power, not by natural forces. It needs to be understood in the context of political and economic systems that operate on national and even international scales (Box 8): it is these which decide how groups of people vary in relation to health, income, building safety, location of work and home, and so on.

In disasters, a geophysical or biological event is implicated in some way as a trigger event or a link in a chain of causes. Yet, even where such natural hazards appear to be directly linked to loss of life and damage to property, there are social factors involved that cause peoples' vulnerability and can be traced back sometimes to quite 'remote' root and general causes. This vulnerability is generated by social, economic and political processes that influence how hazards affect people in varying ways and with differing intensities.

This book is focused mainly on redressing the balance in assessing the 'causes' of such disasters away from the dominant view that natural processes are the most significant. But we are also concerned about what happens even when it is admitted that social and economic factors are the most crucial. There is often a reluctance to deal with such factors because it is politically expedient (i.e. less difficult for those in power) to address the technical factors that deal with natural hazards. Changing social and economic factors usually means altering the way that power operates in a society. Radical policies are often required, many facing powerful political opposition. For example, such policies might include land reform, enforcement of building codes and land-use restrictions, greater investment in public health, provision of a clean water supply and improved transportation to isolated and poor regions of a country.

The relative contribution of geophysical and biological processes on the one hand, and social, economic and political processes on the other, varies from disaster to disaster. Furthermore, human activities can modify physical and biological events, sometimes many miles away (e.g. deforestation contributing to flooding downstream) or many years later (e.g. the introduction of a new seed or animal, or the substitution of one form of architecture for another, less safe, one). The time dimension is extremely important in another way. Social, economic and political processes are themselves often modified by a disaster in ways that make some people more vulnerable to an

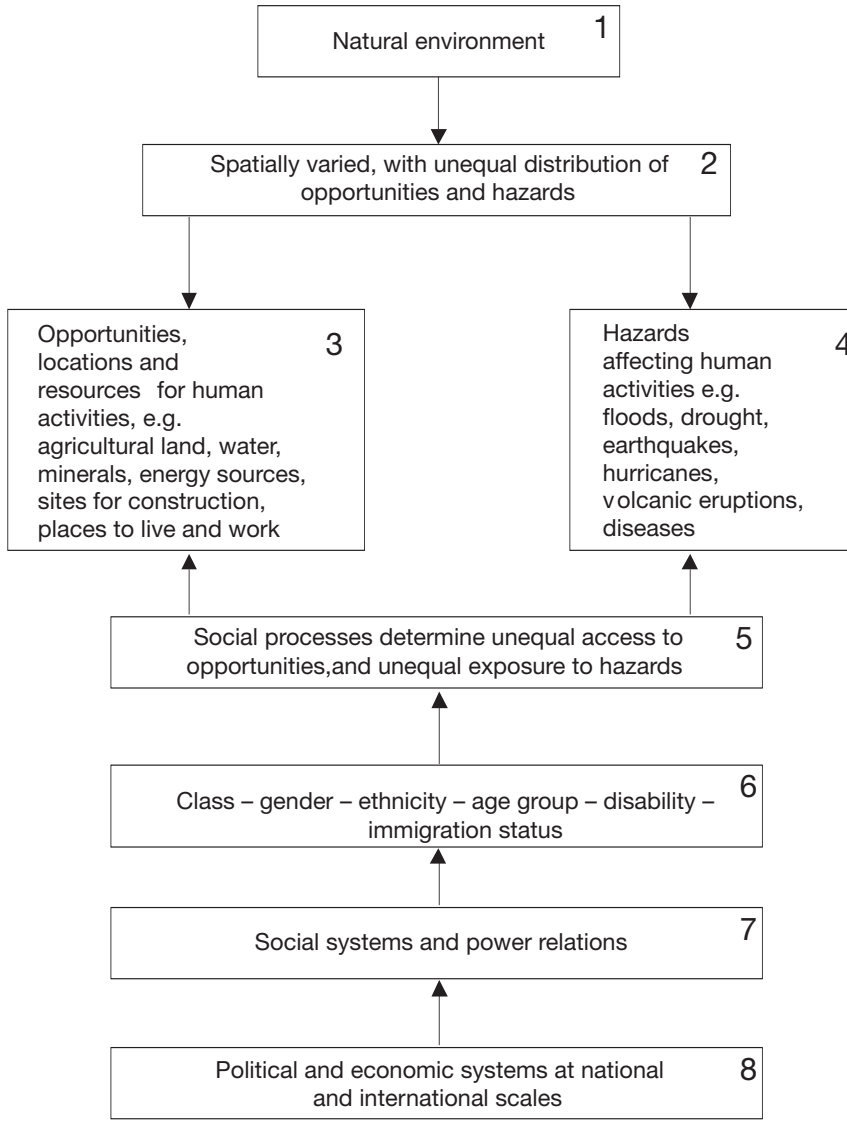

Figure 1.1 The social causation of disasters

extreme event in the future. Placing the genesis of disaster in a longer time frame therefore brings up issues of intergenerational equity, an ethical question raised in the debates around the meaning of 'sustainable' development (Adams 2001). The 'natural' and the 'human' are, therefore, so inextricably bound together in almost all disaster situations, especially when viewed in an enlarged time and space framework, that disasters cannot be understood to be 'natural' in any straightforward way.

This is not to deny that natural events can occur in which the natural component dominates and there is little place for differential social vulnerability to the disaster other than the fact that humans are in the wrong place at the wrong time. But such simple 'accidents' are rare. In 1986 a cloud of carbon dioxide gas bubbled up from Lake Nyos in Cameroon, spread out into the surrounding villages and killed 1,700 people in their sleep. In the balance of human and natural influences, this event was clearly at the 'natural' end of the spectrum of causation. The area was a long-settled, rich agricultural area. There were no apparent social differences in its impacts, and both rich and poor suffered equally.[7]

One example of a natural event with an explicitly inequitable social impact is the major earthquake of 1976 in Guatemala. The physical shaking of the ground was a natural event, as was the Cameroon gas cloud. However, slum dwellers in Guatemala City and many Mayan Indians living in impoverished towns and hamlets suffered the highest mortality. The homes of the middle class were better protected and more safely sited, and recovery was easier for them. The Guatemalan poor were caught up in a vicious circle in which lack of access to means of social and self-protection made them more vulnerable to the next disaster. The social component was so apparent that a journalist called the event a 'class-quake'.

It is no surprise that poor people in Guatemala live in flimsier houses on steeper slopes than the rich and that they are therefore more vulnerable to earthquakes. But what kind of social 'fact' is differential vulnerability in a case such as this? Above all, we think this case involves historical facts. Referring to a long history of political violence and injustice in the country, Plant (1978) believed Guatemala to be a 'permanent disaster'. The years of social, economic and political relations among the different groups in Guatemala and elsewhere have led some to argue that such histories 'prefigure' disaster (Hewitt 1983a). In Guatemala, after the 1976 earthquake, the situation deteriorated, with years of civil war and genocide against the rural Mayan majority that only ended in 1996. During this period, hundreds of thousands of Mayans were herded into new settlements by government soldiers, while others took refuge in remote, forested mountains and still others fled to refugee camps in Mexico. These population movements often saw marginal people forced into marginal, dangerous places.

This book attempts to deal with such histories and to uncover the deeply rooted character of vulnerability rather than taking the physical hazards as

the starting point, thereby allowing us to plan for, mitigate and perhaps prevent disaster by tackling all its causes. The book also builds a method for analysing the actual processes which occur when a natural trigger affects vulnerable people adversely.

Conventional views of disaster

Most work on disasters emphasises the 'trigger' role of geo-tectonics, climate or biological factors arising in nature (recent examples include Bryant 1991; Alexander 1993; Tobin and Montz 1997; K. Smith 2001). Others focus on the human response, psychosocial and physical trauma, economic, legal and political consequences (Dynes et al. 1987; Lindell and Perry 1992; Oliver-Smith 1996; Platt et al. 1999). Both these sets of literature assume that disasters are departures from 'normal' social functioning, and that recovery means a return to normal.

This book differs considerably from such treatments of disaster, and arises from an alternative approach that emerged in the last thirty years. This approach does not deny the significance of natural hazards as trigger events, but puts the main emphasis on the various ways in which social systems operate to generate disasters by making people vulnerable. In the 1970s and early 1980s, the vulnerability approach to disasters began with a rejection of the assumption that disasters are 'caused' in any simple way by external natural events, and a revision of the assumption that disasters are 'normal'. Emel and Peet (1989), Oliver-Smith (1986a) and Hewitt (1983a) review these reflections on causality and 'normality'. A competing vulnerability framework arose from the experience of research in situations where 'normal' daily life was itself difficult to distinguish from disaster. This work related to earlier notions of 'marginality' that emerged in studies in Bangladesh, Nepal, Guatemala, Honduras, Peru, Chad, Mali, Upper Volta (now Burkina Faso), Kenya and Tanzania.[8]

Until the emergence of the idea of vulnerability to explain disasters, there was a range of prevailing views, none of which dealt with the issue of how society creates the conditions in which people face hazards differently. One approach was unapologetically naturalist (sometimes termed physicalist), in which all blame is apportioned to 'the violent forces of nature' or 'nature on the rampage' (Frazier 1979; Maybury 1986; Ebert 1993; de Blij 1994). Other views of 'man [sic] and nature' (e.g. Burton et al. 1978; Whittow 1980) involved a more subtle environmental determinism, in which the limits of human rationality and consequent misperception of nature lead to tragic misjudgements in our interactions with it (Pelling 2001). 'Bounded rationality' was seen to lead the human animal again and again to rebuild on the ruins of settlements destroyed by flood, storm, landslide and earthquake.

According to such views, it is the pressure of population growth and lack of 'modernisation' of the economy and other institutions that drive human

conquest of an unforgiving nature. This approach usually took a 'stages of economic growth' model for granted (Rostow 1991). Thus, 'industrial' societies had typical patterns of loss from, and protection against, nature's extremes, while 'folk' (usually agrarian) societies had others, and 'mixed' societies showed characteristics in between (Burton et al. 1978, 1993).[9] It was assumed that 'progress' and 'modernisation' were taking place, and that 'folk' and 'mixed' societies would become 'industrial', and that we would all eventually enjoy the relatively secure life of 'post-industrial' society.

The 1970s saw increasing attempts to use 'political economy' to counter modernisation theory and its triumphalist outlook, and 'political ecology' to combat increasingly subtle forms of environmental determinism.[10] These approaches also had serious flaws, though their analyses were moving in directions closer to our own than the conventional views.

Now we try to reintroduce the 'human factor' into disaster studies with greater precision, while avoiding the dangers of an equally deterministic approach rooted in the political economy alone. We avoid notions of vulnerability that do no more than identify it with 'poverty' in general or some specific characteristic such as 'crowded conditions', 'unstable hillside agriculture' or 'traditional rain-fed farming technology'.[11] We also reject those definitions of vulnerability that focus exclusively on the ability of a system to cope with risk or loss.[12] These positions are an advance on environmental determinism but lack an explanation of how one gets from very *widespread conditions* such as 'poverty' to very *particular vulnerabilities* that link the political economy to the actual hazards that people face.

What is vulnerability?

The basic idea and some variations

We have already used the term *vulnerability* a number of times. It has a commonplace meaning: being prone to or susceptible to damage or injury. Our book is an attempt to refine this common-sense meaning in relation to natural hazards. To begin, we offer a simple working definition. By vulnerability we mean *the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard* (an extreme natural event or process). It involves a combination of factors that determine the degree to which someone's life, livelihood, property and other assets are put at risk by a discrete and identifiable event (or series or 'cascade' of such events) in nature and in society.

Some groups are more prone to damage, loss and suffering in the context of differing hazards. Key variables explaining variations of impact include class (which includes differences in wealth), occupation, caste, ethnicity, gender, disability and health status, age and immigration status (whether 'legal' or 'illegal'), and the nature and extent of social networks. The concept

of vulnerability clearly involves varying magnitudes: some people experience higher levels than others. But we use the term to mean those who are more at risk: when we talk of vulnerable people, it is clear that we mean those who are at the 'worse' end of the spectrum. When used in this sense, the implied opposite of being vulnerable is sometimes indicated by our use of the term 'secure'.[13] Other authors complement the discussions of vulnerability with the notion of 'capacity' – the ability of a group or household to resist a hazard's harmful effects and to recover easily (Anderson and Woodrow 1998; Eade 1998; IFRC 1999b; Wisner 2003a).

It should also be clear that our definition of vulnerability has a time dimension built into it: vulnerability can be measured in terms of the damage to future livelihoods, and not just as what happens to life and property at the time of the hazard event. Vulnerable groups are also those that also find it hardest to reconstruct their livelihoods following disaster, and this in turn makes them more vulnerable to the effects of subsequent hazard events. The word 'livelihood' is important in the definition. We mean by this the command an individual, family or other social group has over an income and/or bundles of resources that can be used or exchanged to satisfy its needs. This may involve information, cultural knowledge, social networks and legal rights as well as tools, land or other physical resources.[14] Later we develop this livelihood aspect of vulnerability in an 'Access model'. The Access model analyses the ability of people to deal with the impact of the hazards they face in terms of what level of access they have (or do not have) to the resources needed for their livelihoods before and after a hazard's impact (see Chapter 3).[15]

Our focus on vulnerable people leads us to give secondary consideration to natural events as determinants of disasters. Normally, vulnerability is closely correlated with socio-economic position (assuming that this incorporates race, gender, age, etc.). Although we make a number of distinctions that show it to be too simplistic to explain all disasters, in general the poor suffer more from hazards than do the rich. Although vulnerability cannot be read directly off from poverty, the two are often very highly correlated. The key point is that even a straightforward analysis on the basis of poverty and wealth as determinants of vulnerability illustrates the significance we want to attach to social forms of disaster explanation. For example, heavy rainfall may wash away the homes in wealthy hillside residential areas of California, such as Topanga Canyon (in greater Los Angeles) or the Oakland–Berkeley hills (near San Francisco), just as it does those of the poor in Rio de Janeiro (Brazil) or Caracas (Venezuela).[16]

There are three important differences, however, between the vulnerability of the rich and the poor in such cases. Firstly, few rich people are affected if we compare the number of victims of landslides in various cities around the world. Money can buy design and engineering that minimises (but of course does not eliminate) the frequency of such events for the rich, even if they are living on an exposed slope.

Secondly, living in the hazardous canyon environment is a choice made by some of the rich in California, but not by the poor Brazilian or Philippine job seekers who live in hillside slums or on the edge of waste dumps.[17] Without entering the psychological or philosophical definitions of 'voluntary' versus 'involuntary' risk taking (see Sjöberg 1987; Adams 1995; Caplan 2000), it should be clear that slum dwellers' occupancy of hillsides is less voluntary than that of the corporate executive who lives in Topanga Canyon 'for the view'. The urban poor use their location as the base for organising livelihood activities (e.g. casual labour, street trading, crafts, crime, prostitution). If the structure of urban land ownership and rent means that the closest they can get to economic opportunities is a hillside slum, people will locate there almost regardless of the landslide risk (Hardoy and Satterthwaite 1989; Fernandes and Varley 1998). This, we will argue, is a situation in which neither 'voluntary choice' models nor the notion of 'bounded rationality' (Burton et al. 1993: 61–65) are applicable.

Thirdly, the consequences of a landslide for the rich are far less severe than for the surviving poor. The homes and possessions of the rich are usually insured, and they can more easily find alternative shelter and continue with income-earning activities after the hazard impact. They often also have reserves and credit. The poor, by contrast, frequently have their entire stock of capital (home, clothing, tools for artisan handicraft production, etc.) assembled at the site of the disaster. They have few if any cash reserves and are generally not considered creditworthy (despite the rapid development of 'micro-credit' schemes in a number of countries – see Chapter 9). Moreover, as emphasised above, the location of a residence itself is a livelihood resource for the urban poor. In places where workers have to commute to work over distances similar to those habitually covered by the middle class, transport can absorb a large proportion of the budget for a low-income household. The poor self-employed or casually employed underclass finds such transport expenses onerous. It is therefore not surprising that large numbers of working-class Mexicans affected by the 1985 earthquake refused to be relocated to the outskirts of Mexico City (Robinson et al. 1986; Poniatowska 1998; da Cruz 1993; Olson et al. 1999; Olson 2000; see also Chapter 8).

Multiple meanings of 'vulnerable'

Just before and since the publication of the first edition of *At Risk*, there has been a very welcome increase in the writing about vulnerability (Wilches-Chaux 1992a; Jeggle and Stephenson 1994; Davis 1994; Buckle et al. 1998/99; Buckle et al. 2000; Currey 2002). In this revised edition we happily take on board much of what has been added. There are at least four streams of recent work we should acknowledge.

Firstly, some recent studies give more emphasis to people's 'capacity' to protect themselves rather than just the 'vulnerability' that limits them. Earlier

work (including, to some degree, our own) tended to focus most attention on the social, economic and political processes that make people 'vulnerable'. Understandably, it was necessary to use terminology that emphasised the *problem* that is generated by social processes – if people's capabilities were all working properly then there would be few disasters. This kind of analysis is essential, but it tends to emphasise people's weaknesses and limitations, and is in danger of showing people as passive and incapable of bringing about change. There is a need to register the other side of the coin: people do possess significant capabilities as well. Perhaps because of the influence of public health and social work professions, 'socially vulnerable groups' tended to be treated as 'special needs groups'. This approach can reduce people to being passive recipients, even 'victims' (Hewitt 1997: 167), and individuals without relationships. Usually, almost everyone has some capacity for self-protection and group action: the processes that generate 'vulnerability' are countered by people's capacities to resist, avoid, adapt to those processes, and to use their abilities for creating security, either before a disaster occurs or during its aftermath.

Secondly, there is now more interest in trying to quantify vulnerability as a tool of planning and policy making (Gupta et al. 1996; Davidson et al. 1997, 2000; Hill and Cutter 2001; UNDP 2003; Yarnal et al. 2002; Gheorghe 2003). With this has come debates about the correct balance between quantitative and qualitative data, and a deeper question concerning whether it is actually possible to quantify vulnerability. These efforts have been promoted by international agencies such as the Organization of American States (NOAA and OAS 2002), the United Nations Development Programme (UNDP 2003), DFID (Cannon et al. 2003), Emergency Management Australia (Buckle et al. 2001) and a large group of institutions led by FAO (FAO/IWAG 1998; UN-ACC 2000; WFP n.d.).

Thirdly, an increasing number of authors remind us of the cultural, psychosocial and subjective impacts of disasters. Definitions of vulnerability, including our own, usually include the notion of a potential for 'ill-being' (often expressed as an objectively assessed statistical probability) multiplied by the magnitude of the combined impacts of a particular trigger event. Thus, the conversion of risk is turned into a common metric, which enables different hazards to be compared (Rosa 1998), and this is the main analytical route taken by this book. Disaster impact is measured by a range of etic (external) and objectively verifiable indicators, such as mortality, morbidity, damage to property and physical assets, reduction in savings and so on.

While certainly necessary, these indicators are not sufficient, and we are aware that they tend to under-emphasise the cultural, the psychosomatic and subjective aspects of disaster impact (Perry and Mushkatel 1986; Oliver-Smith and Hoffman 1999; Johns 1999; Tuan 1979). Contemporary livelihood analysis must take conventional impact measures further to include notions of resilience and sensitivity, social capital and collective action. This conceptualisation of the

drawing down of different 'capitals' and the conversion of one to another offers a more holistic view of well-being and decision making, particularly under conditions of 'normal' life, and this is a contemporary development of disaster theory which we elaborate on at length in Chapter 3. However, even this approach tends to make many untested and simplistic assumptions about preferences, choices and values, particularly under conditions of acute stress and extraordinary circumstances. The disaster event itself alters both capabilities and preferences, in the short term (e.g. grieving, trauma, acute deprivation, sleep, shelter, child care and other intimate relations, with implications for making decisions and carrying them out) and in the longer term (alterations in the access qualifications required to satisfy preferences, the rules of collective action). It provides a shock to expectations that in turn are shaped by people's social constructions of the likelihood of a disaster event (Beck 1992). The individual, household, kinship network and larger collectivities may develop implicit or explicit strategies to manage risk, which themselves constitute an important element in well-being and provide the basis for action when vulnerability is made a reality by the disaster event itself.

Fourthly, overlapping with the previous point, there is a movement away from simple taxonomies or checklists of 'vulnerable groups' to a concern with 'vulnerable situations', which people move into and out of over time. 'Vulnerability', as we use the word, refers only to people, not to buildings (susceptible, unsafe), economies (fragile), nor unstable slopes (hazardous) or regions of the earth's surface (hazard-prone).[18] Typically, social characteristics such as gender, age, health status and disability, ethnicity or race or nationality, caste or religion, and socio-economic status are the focus of attention.[19] Special interest non-governmental organisations (NGOs) have produced detailed checklists to take account of the particular needs and vulnerabilities of such groups as elderly people or unaccompanied children, both in vulnerability/capacity assessments as well as post-disaster needs assessments (see Chapter 9). These post-disaster tools are very useful as *aides mémoires* for busy administrators and case workers in the chaotic situation of a refugee camp or large-scale disaster such as the earthquakes in Gujarat (2001) or north-western Turkey (1999). For example, religion and caste had to be taken into account as they had an impact on the distribution of relief in Gujarat, where there were fears by aid workers that Muslims and Dalits (untouchables) were not receiving an equitable share (Harding 2001).[20]

But the use of post-disaster checklists does not *in itself* help one to understand *why* and *how* those characteristics have come to be associated with a higher probability of injury, death, livelihood disruption and greater difficulty in recovery. The checklists now widely used by international agencies and NGOs are based on some combination of the agency's own empirical observations and the results of a growing number of post-disaster studies and audits, many of them by sociologists. However, the empirical discovery of an association or correlation does not explain the process that gave rise to

the association. For example, the finding that domestic violence against women increased after hurricane Andrew has to be understood in process terms. It is not female gender itself that marks vulnerability, but gender *in a specific situation*. These gender relations between women and men were played out in the context of the growth boom of south Florida in the1980s and early 1990s, weak regulation of the building industry, downsizing and restructuring that left many working-class men anxious about future employment. Such male anxieties and frustration were acted out as domestic violence following the hurricane (Peacock et al. 2001).

In contrast, the process of pre-disaster vulnerability/capacity assessment is undertaken in a more reflective state of mind, without the urgency of a typical disaster situation. Thus, within these contexts it is possible to investigate causal factors as well as the symptoms, assuming that political leaders permit such probing analysis.

Many vulnerability situations are temporary, and change as life stages do (marriage, child bearing, old age) or with changes in occupation, immigration status or residence. For example, one study found that there were large numbers of low-income, young, immigrant, non-English-speaking, single mothers living in an area bordering San Pedro harbour (part of greater Los Angeles). This specific geographical location has a higher probability than other parts of San Pedro (or surrounding areas) for cargo explosions, liquefaction and amplified shaking because of soil factors in an earthquake, and exposure to a toxic plume from refinery fires (Wisner et al. 1999). The concatenation of income, age, immigration status, language and single parenthood significantly shifts the meaning of 'gender' as a simple category or box-to-tick in a taxonomy of vulnerability. Only two miles away from San Pedro, other women live in mansions overlooking the Pacific Ocean from the heights of Rancho Palos Verde. They share the socially constructed identity of 'woman' with these young Guatemalan single mothers, but in most other respects, they inhabit a separate universe (Wisner 1999; Wisner et al. 1999).

Risk society?

There is a large and growing literature on risk that we acknowledge but do not directly engage with in this book. The main reason is that it focuses primarily on technological hazards facing the more developed, industrial countries and the condition of late modernity in which they find themselves. In contrast, we direct most of our attention to risk as experienced and interpreted in less developed countries. One influential author writing about risk during the 1980s and 1990s is Ulrich Beck. His books *Risk Society: Toward a New Modernity?* (1992) and *Ecological Politics in the Age of Risk* (1995), amongst a number of others, have been profoundly influential. In these publications he seeks the 'root causes' of environmental crisis just as we in this book look for the 'root causes' of vulnerability to disaster. Beck (like many other

researchers) finds those roots in the rampant consumerism of contemporary rich societies. But also (and this is of more interest to disaster studies) in two forms of social control of the consequences of over-consumption. One is 'ecological modernisation', by which the technicians of the 'risk society' attempt to 'fix' environmental problems without ever addressing root causes. The other is a form of amnesia or denial of environmental problems that he terms 'organized irresponsibility' (Beck quoted in Goldblatt 1999: 379).

Beck maintains that the more developed world is in a transitional state between industrial society and 'risk society': with so much wealth also come risks. With an increasingly complex and technologically driven society come new threats: 'hazards and insecurities induced and introduced by modernisation itself' (Beck 1992: 21). Many of these are treated by more affluent societies with a high degree of ambivalence, since a number of risks can no longer be directly experienced in a sensory manner (touched, seen or smelt as in the case of industrial society). Instead, there are risks of nuclear radiation, carcinogens in foodstuffs, toxicity from pesticides and risks associated with lifestyle. In addition, there is a background level of anxiety from a bewildering number of often ill-defined risks, some of them involving lifestyle and others involving incalculable horrors of unknown statistical probability, such as nuclear war or, we might add, since 11 September 2001, terrorist attack. Castel goes further to argue that modernity is involved in 'a grandiose technocratic rationalizing dream of absolute control of the accidental … an absolute reign of calculative reason' (Castel 1991: 289, quoted in Lupton 1999: 7).

Thus, industrial, affluent society is increasingly protected against the uncertainties faced in LDCs through the application of technology and higher levels of income. Yet it is none the less increasingly preoccupied with incalculable and diffuse risks, which have somehow eluded all the advances of science and medicine. Others have noted a correlation between the emergence of 'environmental' concerns (e.g. with the quality of water and air) and increased affluence of the middle class in the USA and Europe (Hays 1987). In addition, more discrete and dramatic 'surprises' continue to occur in more developed countries, such as the unanticipated scale of the devastation of Kobe by the Great Hanshin earthquake in Japan in 1995 (despite all of Japan's scientific and engineering prowess); the contamination of a large area following the explosion of the Chernobyl nuclear reactor in 1986; the outbreak of BSE (bovine spongiform encephalopathy or 'mad-cow disease') in Britain in 2001; or the loss of the Space Shuttle Columbia and the outbreak of SARS in 2003. This cultural environment of risk, it will be clear to the reader, overlaps with but is different from the concerns we address in this book.

Beck considers the ways in which people in highly developed societies involve themselves in 'reflexive modernity', an institutionalised activity and state of mind involving constant monitoring and reflection upon and

(according to Jacobs 1998) confrontation with these risks – whether they objectively exist or not. In particular, reflexive modernisation of risk can involve consideration of risks at the global level, an awareness that is a major incentive for international co-operation and practice, and leads to the globalisation of the meaning of risk. Thus transferred to the global scale, new concepts have been constructed and initiatives undertaken to 'manage' risk: for example, 'conserving biodiversity', 'reversing global warming' and 'disaster reduction' are forms of ecological modernisation conducted by the combined technocracy of rich, consuming nations (Sachs 1999). By extension, international efforts to 'manage' aspects of the impacts of hurricanes, droughts and volcanoes on behalf of poor, former colonial countries could also be considered a form of ecological modernisation. However, the fatal flaw in ecological modernisation is that it never deals with root causes. It is therefore never-ending and self-perpetuating. Later, we will return to several classic cases of this sort, such as the 'management' of the volcanic eruption in Montserrat (see Chapter 8).

Beck's work and the discussions it has stimulated are important and do, in some ways, overlap with our approach (Giddens 1990; Jacobs 1998; Lupton 1999). However it is rather remote from the dynamics of hazard, vulnerability and risk in LDCs that is our principle focus in this book. Nevertheless, there is another use of Beck's notion of reflexive modernisation that we find much closer to our purposes of the analysis of disasters in LDCs. While it can lead to perpetual anxiety and the self-defeating approach of ecological modernisation discussed above, reflexive modernisation can result in more focused political demands on authorities to address what we could call the 'root causes' of vulnerability. This pressure from below on authorities and corporations is that of citizens organised into what Beck calls an 'ecological democracy' (Beck 1995, 1998; Beck et al. 1994). Agreeing in large part with Beck's views, we place considerable emphasis on lay people, citizen groups and the vulnerable themselves as an important target audience of this book. Giddens (1992) has elaborated on the insights of Beck by exploring the relationship between 'risk' and 'trust'. Used in a different context, we also find that trust between, for example, citizen-based organisations and municipal governments, is critical in mobilising human resources for mitigating disaster loss and reducing vulnerability (Wisner 2002a) (see also Part III).[21]

Deconstructive approaches

The writings on risk, as in other subjects in social science, are distributed along a continuum of epistemological positions (Stallings 1997). At one end, there is a realist approach that takes risk as an objective hazard that exists and can be measured independently of social and cultural processes. Theories and methods associated with this epistemology are techno-

scientific, statistical and actuarial. Moving across the continuum, there are what could be termed 'weak constructionist' approaches, where risk is an objective hazard but is always mediated through social and cultural processes (Oliver-Smith and Hoffman 1999). Finally, there is the strong constructionist approach, where nothing is a risk in itself but is a contingent product of historically, socially and politically created 'ways of seeing' (Lupton 1999: 35). This book broadly takes a realist, and at times a weak constructionist, approach to risk. Many of the concerns and anxieties about which Beck and Giddens write so persuasively are a product of a late modern society in the more developed countries (MDCs), while the risks faced by many in developing countries are different. That is not to say that culturally constructed risks are any less apparent in LDCs. It is rather that they do not have the luxury of indulging in the anxieties found in MDCs, but instead face famine, flood, biological hazards, high winds and earthquakes – without the protection offered (to some) by affluent, industrial countries.

We part company with strong social constructionist approaches because we believe they do not lead, in any direct way, to an improvement in practice – either in disaster prevention or in post-disaster management. Therefore, for example, we acknowledge Bankoff's (2001) approach to famine as interesting but not useful from our perspective. He considers the historical roots of the discursive framework within which hazards are presented, and how that might reflect particular cultural values to do with the way in which certain regions of the world are usually imagined.[22] He characterises modernist approaches to disasters, risk and vulnerability as a historically constructed neo-colonial discourse which denigrates large regions of the world as 'tropical' (the unhealthy and dangerous 'other'), poverty-stricken and disaster-prone (ibid.). Although this view is accurate, we feel it is difficult to use it to contribute to the prevention or mitigation of disasters and improvement of relief and reconstruction. We acknowledge it but leave it to one side.

As noted above, the origins of the vulnerability approach we take in this book can be located in the 1970s when authors began to question the 'naturalness' of 'natural disaster' (O'Keefe et al. 1976). To that extent we have already been where Bankoff would ask us to go, and we now wish to provide more precise advice on linkages that transmit root causes into very specific unsafe conditions. Indeed, deconstructive critique is not new within geography and environmental studies, where for some time authors have pointed out that 'land degradation' and other environmental management categories come loaded with the assumptions and biases of the observer (Adams 2001; Leach and Mearns 1996; Gadgil and Guha 1995). The critique of structuralist, determinist methods is also well established within development studies (Crush 1995; Escobar 1995; Rahnema and Bawtree 1997) and has already had some influence on students of disaster.

There is, however, a heuristic aspect of such a post-structural critique of disaster discourse that we believe provides a valuable caution and corrective (Mustafa 2001). It could be argued that notions such as 'disaster management cycle', and terms such as 'relief', 'rehabilitation' and 'recovery' are technical constructs imposed on different cultural, economic, political and gender realities (Oliver-Smith and Hoffman 1999; Enarson and Morrow 2001). Such constructs fail to comprehend the lived reality of disaster and, to that extent, can fail to engage the co-operation of local people.

Vulnerability and normal/daily life

We argue in this book that feasible and informed practice in reducing disaster risk as well as a better theoretical understanding of disasters are possible only if one places the phenomenon of disaster 'in the mainstream' of policy and practice. Hewitt made this point twenty years ago when he wrote of how disasters had been mentally exiled to an 'archipelago' of exceptionalism (Hewitt 1983b). Agreeing wholeheartedly with Hewitt, we show how 'normal' historical processes contribute to the causation of disasters. We also show how 'normal' pressures in global, regional and national systems of economic, social and political power contribute to creating vulnerability to disaster. The material conditions of daily life, what one might call 'normal life', also underlie or, as Hewitt put it, 'prefigure' disasters (ibid.: 27). These material conditions are, above all, biological in the sense of our access to food, water and the air we breathe. We treat these material underpinnings of existence in some detail in Chapters 3 to 5. The Access model presented in Chapter 3 provides insight into how such material conditions of daily or normal life change with circumstances. It shows how major stress, such as an extreme natural event, can reverberate through a household's livelihood system, playing havoc with its ability to meet its needs, and, moreover, its ability to recover and protect itself against other, perhaps unrelated, stresses and crises at a later time.

Changes since the first edition

Nearly a decade has passed since the first edition of *At Risk* was completed. It has been ten years of very great change and, in some ways, unfortunate continuity. Much theoretical, practical and institutional work has been done on disaster 'vulnerability'. An entire United Nations International Decade for Natural Disaster Reduction (IDNDR) has passed (1990–1999). The language of major development agencies and banks has changed. Yet more and more costly and deadly disasters continue to occur.

The International Decade for Natural Disaster Reduction (IDNDR)

Not long after the publication of *At Risk*, in May 1994, the IDNDR held its mid-decade conference in Yokohama, Japan. This was an important watershed (see Chapter 9). Dissatisfaction emerged with the top-down, technocratic approach to disasters that had characterised the first half of the decade's activities. The resulting 'Yokohama Message' contained much that parallels the arguments we made in the first edition of *At Risk*. In particular, two prerequisites for disaster risk reduction are emphasised:

> 1 … [A] clear understanding of the cultural and organizational characteristics of each society as well as of its behavior and interactions with the physical and natural environment.
>
> 2 … [T]he mobilization of non-governmental organizations and participation of local communities.
>
> (Ingleton 1999: 320)

The 'Yokohama Message' warned of the danger of 'meagre results of an extraordinary opportunity given to the United Nations and its Member States' during the first half of the IDNDR.

During the second half of the IDNDR considerable efforts were made to involve NGOs and communities. A popular magazine, *Stop Disasters*, was published. Annual themes for 'World Disaster Day' included social issues, for example a focus on women in disasters. Perhaps the most important development was a turn toward cities during the last three years of the IDNDR. This began with an international electronic conference in 1996 that reached out to many practitioners and NGOs, as well as academics and government officials (IDNDR 1996). An ambitious pilot programme for urban earthquake risk assessment and mitigation was run from 1997 to 2000. This 'Risk Assessment Tools for Diagnosis of Urban Areas Against Seismic Disasters' programme (mercifully known by the short acronym RADIUS) involved a core of nine medium-sized cities in different parts of the world, with a total of 84 cities as observers participating in various ways.[23]

RADIUS displayed the mark of the 'Yokohama Message' very clearly, because work in the nine core cities involved a broad cross-section of sectors, citizens and scientific disciplines. It was focused on mitigation of loss, and it used accessible technologies. RADIUS began in each city with a study of earthquake hazard and vulnerability, and progressed through the development of city-wide action plans that, once again, involved many diverse sectors and institutions.

Urban growth and the growth of urban concerns

The IDNDR's urban turn reflected a judgement that rapid progress in reducing loss of life could be made by focusing on cities. Indeed, another major change since the first publication of *At Risk* is the speed with which the world's population is rapidly becoming urban.[24] The IDNDR's focus on cities was also co-ordinated to provide a contribution to 'Habitat II', a major world conference on urban settlements held in Istanbul, Turkey in 1997 (twenty years after Habitat I). How should we explain the decision to focus IDNDR activity on earthquake risk reduction in cities, as opposed to any one of other possible urban hazards (e.g. flood, storms, volcanic eruptions)? Part of the explanation is found in the origins of the IDNDR. Earthquake engineers were very prominent in its creation and remained influential. Also important was the fact that two costly earthquakes had recently surprised authorities and experts alike in the USA (Northridge, California in 1994, costing $35 billion) and Japan (Kobe in 1995, with losses of over $147 billion).

Changes in earth care

The language of 'sustainable development' had entered development studies and policy documents from the late 1980s, with the publication of *Our Common Future* (WCED 1987). The 'Earth Summit' was held in Rio de Janeiro in 1992, near the start of the IDNDR. Since then, at least on paper, disaster risk reduction has been included as an element of many of the national and local efforts to implement *Agenda 21*, the Rio Summit's plan of action. However, the processes undermining any positive moves to make concrete such diplomatic consensus were soon in evidence after the Summit. In 1998, hurricane Mitch struck several Central American countries and made it obvious that it was underlying processes of land degradation and de-vegetation that made people vulnerable (see Chapter 7). The death toll from this hurricane is estimated to have been 27,000 people, most of these in Honduras and Nicaragua. The majority of these deaths were from floods and landslides that could have been prevented if so much of these countries had not been stripped of their forest cover.

In 2002, the Johannesburg World Summit on Sustainable Development reaffirmed the place of disaster risk reduction within its notion of 'sustainable development'. In the run up to the Johannesburg Summit, ten years after the Rio Summit, the third Global Environmental Outlook report by the UN Environment Programme (UNEP 2002) included a substantial chapter on disasters (see Chapter 9 below). It noted some uneven progress in reducing disaster risk, mostly concentrated in the richer countries. But, on balance, it considered the significance of what it called a 'vulnerability gap', 'which is widening within society, between countries and across regions with the disadvantaged more at risk to environmental change and disasters' (ibid.: 297).

Since the original publication of *At Risk*, the science of global climate change has improved, while the political consensus behind the Kyoto Treaty[25] (on reducing greenhouse gas emissions) has made only slow progress, largely because of US opposition).[26] It appears that the severe impact of hurricane Andrew (which devastated much of Miami in 1992) and the huge floods in the Mississippi basin the following year have not convinced the Bush administration of the possible connection between greenhouse gas emissions and climate change. This is despite strong advocacy for 'sustainable development' by prominent US disaster researchers (Mileti 1999; Burby 1998). Perhaps another dose of rough weather from the next El Niño cycle will wake up the US government to the need for a 'war on wasteful consumption' to parallel its 'war on terrorism'.

In the run up to the Johannesburg summit numerous authors and institutions have revisited the connections between land use and disaster. They recalled the lessons of hurricanes Mitch (1998) and Andrew (1992), the Mississippi floods (1993) and floods throughout many parts of Europe during the 1990s, as well as almost annual huge floods in China. Deforestation and other kinds of land-use problems have been implicated in all of these disasters (Gardner 2002; Burby 1998). They also wrote of the wildfires in Indonesia, the USA, Australia, Mexico and Brazil. They reminded us of the great loss of lives in the flooding and mudslides in Venezuela in 1999, Algeria and Brazil in 2001, and a deadly landslide triggered by an earthquake in El Salvador, also in 2001 (Abramovitz 2001; ISDR 2002a; Wisner 2001f, 2001c). In all these cases, better land-use planning and enforcement could have prevented the extreme natural event becoming a disaster. We are also reminded that a population displaced by a large-scale dam is not likely to understand the hazards of the terrain, climate and ecosystem in the area in which they are resettled. It will be harder for them to protect themselves against natural hazards that are new to them (World Commission on Dams 2000b).

The emergence of the 'precautionary principle'

Natural scientists from many disciplines have begun to discuss the problems of uncertainty in their analysis of various natural phenomena (Handmer et al. 2001). In situations where human actions may be causing catastrophic harm to natural systems on a global scale, a prudent 'precautionary science' is needed. This may apply especially to situations where the probability of a catastrophic outcome may be low but the magnitude of the catastrophe very large (Johnston and Simmonds 1991; O'Brien 2000). A more conventional and optimistic view is that it is possible to 'manage the planet' if there is sufficient knowledge of all the interactions in such large-scale physical systems as the atmosphere, hydrosphere, lithosphere, asthenosphere[27] and biosphere (Clark 1989). Such a technocratic and managerial approach has

received increasing criticism over the past ten years. Our book will also challenge this latter line of thinking. Our effort is necessary in part because faith in simple technological fixes is still pervasive. As Zimmerman (1995: 175) notes: 'Too many of us blithely assume that we need not deal with the base causes of our environmental problems because soon-to-be-discovered technological solutions will make those problems obsolete'.

Critiques of economic globalisation

Another major change since this book first appeared is the increase in public and academic opposition to aspects of economic globalisation (including the street protests of Seattle and Genoa) (Hardt and Negri 2000; Sklair 2001; Wisner 2000a, 2001a; Pelling 2003a; Hines 2000; Monbiot 2003). In the first edition of this book, we dealt with the impact of such neo-liberal economic policies as 'structural adjustment' as a dynamic pressure leading to vulnerability. In the 1980s there was evidence that cutbacks in public expenditure on health and social protection were undermining the resilience of poor people to natural hazards. Since then the critique of neo-liberalism has been broadened to include the ideology of free trade and the institutions of economic globalisation such as the World Trade Organisation. In this new edition we recognise fully the role of economic globalisation as a 'dynamic pressure' affecting vulnerability to disasters (see Chapter 2). The scale of globalisation is enormous. As Friedman puts it:

> [G]lobalization is not simply a trend or a fad but is, rather, an international system. It is the system that has now replaced the Cold War system, and, like the Cold War system, globalization has its own rules and logic that today directly or indirectly influence the politics, environment, geopolitics and economics of virtually every country in the world.
>
> (2000: ix)

Starting in 2000 (in Porto Alegre, Brazil), the World Social Forum meets annually to act as a counterpoint to the business and governmental elite who meet at the World Economic Conference. The 2003 World Social Forum attracted 100,000 delegates (Wainwright 2003). Positive proposals are emerging for 'another globalisation' that is not based on dogmatic neo-liberal formulae for 'structural adjustment' of economies and 'free trade'. With widespread support by citizens' groups, churches and NGOs having caused governments to accept the notion of reducing the international debt of the least-developed nations, proposals such as a 'Tobin Tax' on international financial transactions may no longer be seen as utopian or fringe ideas.[28] In the face of rapidly accelerating privatisation of water supplies, others have begun to argue that as a basic need and human right, water

should not be considered a commodity among other commodities.[29] Our concern about control of water supplies by multinational corporations is especially about whether 'the market' is sufficient to guarantee resilience of water, drainage and sanitation systems in the face of natural hazards such as earthquakes, floods and storms; and if not, who bears the losses and costs?

Academic support for the critique of blind belief in economic growth as the predominant goal of development has been building up since the UNDP began to publish its *Human Development Report* (HDR) in 1990. Its Human Development Index (HDI) measures equity, health and education, and not just economic activity. In 1995 the HDR added gender-specific measures, and in 1997 two separate measures of human poverty: one for more developed countries and one for the less developed. Other international institutions have responded to the reintroduction of social and other human goals into the development discourse (UNRISD 2000). In 2001 the World Bank devoted two chapters to poverty and disaster vulnerability in its *World Development Report* (the annual publication which had tended to give priority to economic growth and which, to some extent, the *Human Development Report* was designed to counter) (World Bank 2001; however, compare Cammack 2002).

In its *World Disasters Report 2001*, the International Red Cross presented data from the UNDP and Centre for Research in the Epidemiology of Disasters (CRED) that compares the impacts of extreme natural events on countries with high, medium, and low scores on the HDI (IFRC 2001a: 162–165). They looked at data for 2,557 disasters triggered by natural events between 1991 and 2000. Half of these disasters took place in countries with medium HDI, but two-thirds of the deaths occurred in countries with low HDI. Only 2 per cent of the deaths were recorded in the countries with a high HDI. When tabulating deaths and monetary losses per disaster, the relationship with HDI is even clearer (Table 1.3).

UNDP took this analytical work even further in 2002 by commissioning the quantitative study of more than 200 possible indicators of disaster risk vulnerability and producing a vulnerability index for use in its *World*

Table 1.3 Level of human development and disaster impacts

	Deaths per disaster	Loss per disaster ($ millions)
Low HDI	1,052	79
Medium HDI	145	209
High HDI	23	636

Source: based on IFRC (2001a: 162, 164)

Note:

HDI is Human Development Index (see text for explanation).

Vulnerability Report. The worldwide results (for the years 1980–1999) are striking (UNDP 2003). The HDI again turns out to be the best predictor of deaths triggered by extreme natural events.

Changes in human development and well-being

In parts of the world (especially in many African countries), the improvements in access to education, health care and the greater longevity achieved in the 1960s and 1970s continued to decline in the 1990s (UNDP 2003b). We noted this trend in the first edition of *At Risk*, and argued that the programmes for managing international debt imposed on many of these countries by the World Bank and IMF had increased people's vulnerability to disaster. Despite reformulating, renaming and giving a 'human face' to these 'structural adjustment programmes' (SAPs) during the 1990s, the effects have continued.

Gardner (2002: 10) observed that health officials in the 1970s believed that the era of infectious disease was about to come to an end worldwide. However, today we find that '20 familiar infectious diseases – including tuberculosis, malaria, and cholera – [have] re-emerged or spread … and at least 30 previously unknown deadly diseases – from HIV to hepatitis C and Ebola – [have] surfaced' (ibid.: 10–11). HIV-AIDS deaths have grown from 500,000 worldwide in 1990 to nearly 3 million in 2000 (Barnett and Whiteside 2001). Most of the deaths from HIV-AIDS occur in the LDCs (the distribution is similar to that presented above for disaster deaths), and four-fifths of these are in sub-Saharan Africa (ibid.: 12). At the end of 1999, there were 34 million people living with HIV, of whom 25 million (74 per cent) lived in sub-Saharan Africa (1 million of them children). Over 12 million children had been orphaned by HIV-AIDS. The magnitude of this disaster dwarfs anything else we take up in this book, and the numbers are staggering. HIV-AIDS in Africa represents great complexity in its long-term consequences for production, social relations and vulnerability to future crises, including the effects of global climate change (see Chapters 2 and 5 on this series of interlinked problems, and Chapter 5 in particular for more on Africa and African HIV-AIDS). Although in 1998 the UNDP was able to conclude that, on average, health had improved in the previous 30 years (UNDP 1998: 21–23), in many African countries this was certainly not the case.

War and humanitarian relief

Since the first publication of *At Risk*, dozens of violent conflicts have broken out and many civilians have been killed, maimed (especially by land mines), injured, deliberately mutilated, starved, occasionally enslaved and displaced by the belligerent parties. So great has been the need for humanitarian relief

in these conflict and post-conflict situations that some 'normal' development assistance has been diverted, and opportunities for self-generated development delayed or destroyed, further worsening the position of marginal and vulnerable populations in the longer term. Furthermore, there has been confusion among development NGOs about how to act in regard to:[30]

- civilian/military relations during 'complex' emergencies;
- relations with war lords, local elites and the army;
- ways to move from relief to recovery, and to development;
- internationally acceptable standards of assistance;
- mobilisation of international support for relief.

Conflicts have continued to exacerbate natural extreme events such as drought in Afghanistan (2002; see Christian Aid 2002; World Food Programme 2002c) and the volcanic eruption in eastern Congo (2002). However, since the mid-1990s, the possible role of 'disaster diplomacy' in peace making has also been noted, and at least a dozen 'windows' for conflict resolution that opened during a natural hazard event have been documented.[31]

Violent conflict interacts with natural hazards in a wide variety of ways:

- It is often one of the main causes of social vulnerability.
- Displacement of large numbers of people in war and other violent conflicts can lead to new risks (exposure to disease, unfamiliar hazards in new rural or urban environments) (US Committee for Refugees 2002).
- Socially vulnerable groups in extreme natural events are often also vulnerable to abuse (injury, death, rape, forced labour) during violent conflict.
- Violent conflict can interfere with the provision of relief and recovery assistance.
- Participatory methods meant to empower and engage socially vulnerable groups may be difficult or impossible during violent conflicts.
- The application of existing knowledge for the mitigation of risk from extreme natural events is often difficult or impossible during violent conflict.
- Violent conflict often diverts national and international financial and human resources that could be used for the mitigation of risk away from extreme natural events (Brandt 1986; Stewart 2000).
- Conflict sometimes destroys infrastructure, which may then intensify natural hazards (e.g. irrigation systems, dams, levees) or compromises warnings and evacuations (e.g. land mines on roads).
- The failure of sustainable development can result in conflict over resources that can lead to violent confrontation.
- Violent confrontations often wreak havoc on vegetation, land and water, and this undermines sustainable development.

- Some economic development strategies and policies can lead to marginalisation and exclusion, and hence the creation of social vulnerability to extreme natural events, and may simultaneously provoke social unrest, e.g. food riots (Walton and Seddon 1994).

Media and policy selectivity

Another change since the first edition of our book is a growing concern about the highly selective treatment of disasters by the Western media, their tendency to overlook significant disasters, and a general decline in interest in the rest of the world. Even when such disasters are noticed, there is little follow up. Typically the most underreported humanitarian crises listed by Médecins Sans Frontières (MSF) for 2001 tend to be slow onset, long-term disasters, most often linked to war or post-war situations. We attempt to redress this balance in this edition of the book. Below is a list of 'missing' crises according to MSF (2001), some of which are dealt with in subsequent chapters:[32]

Malaria epidemic in Burundi: 3 million cases in a population of 6.5 million because of the severe spatial dislocation and displacement of people due to war since 1993.

Precarious situation of Chechnyan refugees in Ingushetia, where mafia-like business groups control the flow of food and other survival goods to the refugees (Agence France-Press 2002d).

North Korean famine refugees in People's Republic of China (PRC): brutality against hundreds of thousands of Koreans fleeing across the remote border with PRC.

Rural violence and urban marginalisation in Colombia: 2 million people have become internally displaced in Colombia since 1985; 300,000 alone in 2000. Rural health services have been destroyed. In urban areas these displaced persons live in very dangerous places. This is a recipe for increasing exposure to flood, landslide, earthquake and epidemic disease.

Breakdown of health care services in the Democratic Republic of Congo: MSF estimates that there are 2.5 million internally displaced persons (IDPs) in Congo. The volcanic eruption in the east added to this number (see Chapter 8). Camp environments are hazardous in many ways, as is isolated survival on the margins of the ongoing conflicts (see Chapter 5).

Continuing violence in Somalia: Despite inter-clan peace talks in Djibouti and other diplomatic initiatives, war lords continue to dominate Somalia. People there are exposed to drought, flood, cyclones and even earthquakes. Without a viable state, their vulnerability to these natural hazards will remain high.

20 years of war in Sri Lanka: 60,000 people have died in 20 years of war, and there are hundreds of thousands of IDPs. During 2001 there was both drought and flood in various parts of the country, and the conflict hampers mitigation of these hazards, response to their impacts, and recovery – as noted in Chapter 2.

Many displaced people in West Africa: Liberia, Sierra Leone, Guinea Bissau, Senegal, Nigeria and Angola have all been affected by severe internal, organised violence. In all these countries the result is to exacerbate vulnerability to 'normal' hazards such as flooding (e.g. Senegal in 2001), drought and outbreaks of human epidemic and animal epizootic disease (see Chapters 5 and 6).

Refugees and displaced people worldwide: MSF estimates that in 2001 there were 22 million refugees in the world (who had taken refuge across a national border) and another 20–25 million IDPs. Even before additional risk factors associated with gender, class, ethnicity, age, disability, etc. are taken into account, the very fact of being a refugee or internally displaced raises a person's vulnerability to some natural hazards.

Neglected diseases: MSF concludes its list of the top ten underreported humanitarian crises with an account of chronic diseases of the poor that had not made the headlines in the same way that HIV-AIDS has done. These include tuberculosis, malaria, human sleeping sickness (of which there are African and Latin American varieties) and Kala Azar (visceral leishmaniasis).[33] All four of these chronic, debilitating and potentially lethal conditions are linked to living conditions and there is considerable disease-agent resistance to available medication. Debilitation and disability mean that people have less time to invest in protecting themselves from other hazards by, for example, constructing or maintaining terraces, fire and wind breaks, farm or community wood lots, or carrying out irrigation works (see Chapter 5 and other chapters in Part II).

Convergence and critique

Convergence

During the 1990s there has certainly been a convergence of thinking – and to a limited degree, practice – concerning natural hazards, people's vulnerability and disasters. The IDNDR put vulnerability squarely on the development agenda. Work by many institutions on urban disasters in particular helped to focus and clarify our view of vulnerability: its causes, effects and remedies. A decade-long attempt to implement Agenda 21 – the programme of action following the Earth Summit – provided many illustrations of the strengths and weaknesses of sustainable development, a very slippery, ambiguous concept. Finally, the notion of human development and

its measurement using the HDI has offered new opportunities for planners and scholars to place disaster risk reduction in the mainstream. The evidence indicates that high levels of death and disruption of livelihoods by disasters are closely associated with low scores on the HDI at the national level. Whilst much of the analysis of *At Risk* is focused on the level of the household, neighbourhood or rural community, our understanding of vulnerability is consistent with these new results.

Critique

Commentary on *At Risk* has, on the whole, been positive. Some reviewers have suggested that we need to link more closely the two models presented in Chapters 2 and 3 and to use them more consistently in the chapters that make up Part II. Others have suggested ways to make the book more readable. Some have questioned whether we make enough allowance for human and social factors such as creativity and innovation (Haghebaert 2001, 2002). There have also been questions about whether we have 'thrown the baby out with the bath water' by not concentrating enough on the potential for actually affecting the natural and geophysical 'triggers' of hazards (Lavell 2001; Turner et. al. 2003). Haghebaert (2001) also wonders if our focus on 'root causes' distracts us from the less ambitious, but none the less life-saving, efforts of the state in providing safety. We have read this advice carefully and, where we concurred with it, applied it in the revision process.

A less approving critique involves what some see as the political implications of our approach. Some feel that our focus on root causes and social relations is of no practical use, and amounts to a call for social revolution. Smith (1996: 51) states that work such as ours, belonging to what he calls the 'structuralist school', 'can be criticized for rather stridently expressed views which, at worse, simply call for overall social revolution'.

Others take the opposite tack and believe we have abandoned the political struggle for justice in an unequal world. For example, Middleton and O'Keefe (1998) assert that we neglect political causes of disaster vulnerability on the national and international scale; that we limit ourselves in this way because of our desire to address multiple audiences, especially practitioners; and that we therefore rely exclusively on small-scale, incremental changes and improvement as solutions. Accusing us of sending a message 'of self-defeating counsel of prudence' (ibid.: 145), Middleton and O'Keefe write:

> … *At Risk* stops short of tackling the larger complex in which the world's poor are so vulnerable. (p. 11)

> … confining their examinations to unquestionably important detail, the authors add the fateful words that they do so in order not to

> oversimplify and not to produce 'a theory that is of little use to managers, planners, and policy-makers'. (p. 11)
>
> [The authors of *At Risk*] feel that sufficient attention to the smaller details will eventually force changes in the macro-economic and social conditions leading to the problems. (p. 162)

We do not propose to occupy a great deal of space giving a detailed defense of the first edition, but to focus on those criticisms which lead, however intentioned by the critics, to potential improvements to this edition. At the outset it must be said that Middleton and O'Keefe set out to write a very different sort of book from *At Risk*. Theirs is more focused on the political aspects, especially the politics of complex emergencies. They lay little claim to build theory; their main claim is to be 'radical'. Their book exposes rather than explains. One of the purposes of such a trenchant criticism of *At Risk* might have been to push aside an established book which occupied the central ground at the time, by differentiating the two different approaches. The issue of our preoccupation with detail at the expense of 'tackling the larger picture' is one way of excusing any author (including themselves) of taking the trouble to analyse in detail different approaches and theories of disasters. The Pressure and Release (PAR) model and the Household Access model, originally presented in the first edition of *At Risk* and re-introduced in an improved format in this edition, are not inconsequential details but tools that allow a carefully crafted explanation of disasters at different levels.

As the reader will soon see, Chapter 2 begins with 'root causes' that are truly global in scope and deeply rooted in history. In our schema we first break down 'root causes' into processes that are driven by ideology and that produce, reproduce and sustain political and economic systems. Secondly, we separate these into factors that distribute access within societies to power, structures and resources. In the schematic presentation of the model outlined in Chapter 2, we explain in the first edition that our intent is to show in detail how 'war, foreign debt and structural adjustment, export promotion, mining, hydropower development, and deforestation work through to localities' (p.24 of 1st edn).

True to our intention, in the first edition we took up, *inter alia*, the role of IMF structural adjustment programmes in undermining health in Nigeria and Zimbabwe (p.114), the role of international aid agencies in promoting a 'tech-fix' solution to flooding in Bangladesh (pp.138–143), the role that absentee land ownership plays in raising the stakes in coastal disaster risk (p.153) and the part played by inflation in Mexico in the lead up to its earthquake disaster of 1985 (pp.174–181). In the face of this evidence, how can our critics claim that we have 'a distaste for the large political issues'? All of these examples fit precisely that class of processes which Middleton and

O'Keefe claim falls outside the scope of *At Risk*: the macro-economic and the political.

These critics claim that the combination of our two models (outlined in Chapters 2 and 3) is capable of producing no more than the following tautology:

> People are vulnerable because they are poor and lack resources, and because they are poor and lack resources, they are vulnerable.
>
> (Ibid.: 12)

They mock this 'triumph of reason' but are kind enough to put it down not to our stupidity, but (returning to their favourite theme) to the fact that we are trapped in a 'fault in the logic of [our] models' (p. 12). This is an important source of misinterpretation. Poverty is not synonymous with vulnerability. The terms both imply relationships, but in the case of poverty it is relations with others in society which reproduces this state, while vulnerability implies causal relations with both society and also the physical environment at particular times. What Middleton and O'Keefe term circular reasoning is nothing of the kind. Our analysis often reveals the kind of vicious circle already mentioned earlier. Each time a disaster takes place, those most vulnerable are likely to be made even more vulnerable to the next extreme occurrence or stress.[34] Middleton and O'Keefe point out such vicious circles themselves in a number of their own case studies. Whether called the 'ratchet effect', 'underdevelopment trap' or 'marginalisation', this phenomenon is well established in the theoretical and empirical literature of development studies (Chambers 1983; Blaikie and Brookfield 1987). A vicious circle is not a tautology.

Audiences

This book will inevitably first come to the attention of academics and students in higher education whose work interests them in disasters, development and LDCs. We hope it will appeal to anthropologists, economists, sociologists, political scientists, geographers and others in social science. We also hope that the book will be read by engineers and natural scientists: physical geographers, geologists, oceanographers, seismologists, volcanologists, geomorphologists, hydrologists and climatologists.

Because we see this book as being useful for action as well as study, we want to identify other groups we hope will use this book. Normally, the discussion about a book's supposed readership is found in the preface, where it seems neutral and less significant. We would rather discuss our potential readers here, in relation to their own role in the social processes involved in making people vulnerable to hazards and in reducing vulnerability. By doing so we may assist in doing something to intervene in those processes to

reduce that vulnerability. Such groups may include professionals involved in disaster work as an essential element in their day-to-day activity (e.g. public health workers, architects, engineers, agronomists, urban planners, civil servants, business executives, bankers and investors, community activists and politicians).

The sociologist C. Wright Mills once wrote that there are three audiences for social analysis: those with power who are aware of the consequences of their acts on others; those with power who are unaware of the consequences; and the powerless who suffer those consequences (Mills 1959). In a similar way, we identify three other broad audiences for this book. There are, firstly, those with power who create vulnerability, sometimes without being aware of their actions. Secondly, we address those with power who are attempting to do something about hazards, but may be unable to make their work effective enough because of a failure to incorporate vulnerability analysis. Thirdly, we write for those who are operating at the grassroots level, who suffer the consequences of disasters, or who are working with people to reduce their vulnerability and increase their power.

The first is the group that creates and maintains the vulnerable condition of others. Such groups include major owners of resources at international, national and local levels (whose activities have significant effects on how and where other people live), foreign agribusiness firms, investment bankers, civil engineering contractors and land speculators. In some cases they may be unaware of the consequences their decisions have for the vulnerability of others.

The second audience is extremely broad, and consists of those who attempt to address and to reduce the impact of natural hazards. It includes a variety of levels in government, and people with a range of interests in government activity, whose normal work is not specifically aimed at disasters as such. However, in almost every country, governments and other bodies have assumed some sort of responsibility for dealing with disasters, and this often involves measures to mitigate hazards.

At the apex of political power, leaders will take decisions on disasters, possibly on the advice of their senior civil servants. At this policy formulation level, directives are developed on economic, financial or political grounds, and will involve decisions affecting planning, agriculture, water resources, health, etc. The implementation stage will not necessarily address vulnerable conditions in relation to hazards, and indeed some policies may increase vulnerability. We hope to demonstrate that it is not enough simply to deal with the hazard threat, so that policies will be designed to reduce vulnerability and therefore disasters. There is considerable opportunity to improve policy making and implementation at national, sub-national, and especially at municipal levels in many countries in these early years of the twenty-first century because of the emphasis given by the World Bank and other influential bodies to the question of ‘good governance’.

The implementation of policy extends beyond government ministries and agencies. Many voluntary agencies that have provided relief for disasters now see the need to address the pre-disaster conditions which give rise to patterns of repeated disaster and people's failure to cope. The Red Cross system is an example, and for ten years now it has published a *World Disasters Report* which (although not official policy) conveys a great deal of information and analysis on root causes and dynamic pressures.[35] Following an initiative by the Swedish Red Cross (Hagman 1984), many voluntary bodies have attempted to redefine their roles in terms of 'preventing' disasters rather than just alleviating their effects. We hope our book helps to enhance their future contribution.[36]

It is also possible to find representatives of the commercial sector among those involved with vulnerability who might be in a position to introduce mitigation measures. For example, a typical international civil engineering firm may include in its portfolio the design of large-scale engineering projects, such as high dams and flood defences that frequently exacerbate downstream flood hazards and thus increase vulnerability. But the same engineers may also create cyclone-resistant structures. Another example can be found in the logging industry, which can both increase risk (falling into the first category listed above) or it can work to reduce risk through measures such as selective cutting and replanting (Poore 1989; Fire Globe 2003). The same can be said of large-scale commercial agriculture and the mining industry, and parastatal firms such as electrical utilities (or their recently privatised descendants), for example in river basin management, including the construction and maintenance of dams. The construction industry can also, through its practices, either increase or decrease risk. A common perception that may motivate this second wide audience is that it is cheaper in the long run (in economic, social and political senses of the word) to prevent or mitigate disasters than to fund recovery (Anderson 1990). This is certainly the point of view of the World Bank, where its Disaster Management Facility has done the maths and shown without doubt that prevention is less costly than recovery (Gilbert and Kreimer 1999; Freeman et al. 2002). Now a consortium of banks and development agencies exists to promote prevention in the commercial as well as public sector – the ProVention consortium.[37]

The third group of readers are those who are vulnerable, or who at grassroots level are trying to deal with the processes that create vulnerability. We hope this book will assist organisers and activists who are part of grassroots struggles to improve livelihoods, for instance in the face of land deals and projects conceived by outsiders. Such locally organised pressure groups have proliferated rapidly during the 1980s and 1990s. They are now recognised as a major force for social change in general and disaster mitigation in particular (Anderson and Woodrow 1998; Twigg and Bhatt 1998; Fernando and Fernando 1997; Pirotte et al. 1999; Maskrey 1989).[38] This audience includes

members of regional NGOs and networks devoted to action research in partnership with vulnerable groups of people. The three groups to which we have donated the royalties from this edition of *At Risk* are part of this audience: La RED in Latin America, Peri Peri in southern Africa and Duryog Nivaran in South Asia.[39]

Scope and plan of the book

Chapters 2 and 3 set out the perspective of our book in detail. They describe how our view of disasters differs from the conventional wisdom, and also where they coincide. It is plainly wrong to ignore the role of hazards themselves in generating disasters, and the framework we are suggesting does not do so. Likewise, we are not suggesting that vulnerability is always the result of exploitation or inequality (just as it is not equivalent to poverty). It is integrally linked with the hazard events to which people are exposed. We also want to acknowledge that there are limits to this type of analysis. It is not always possible to know what the hazards affecting a group of people might be, and public awareness of long-return period hazards may be lacking. For instance, Mount Pinatubo in the Philippines erupted in 1991, but had been dormant for 600 years.

Chapter 2 introduces a simple model of the way in which 'underlying factors' and root causes embedded in everyday life give rise to 'dynamic pressures' affecting particular groups, leading to specifically 'unsafe conditions'. When these underlying factors and root causes coincide in space and time with a hazardous natural event or process, we think of the people whose characteristics have been shaped by such underlying factors and root causes as 'vulnerable' to the hazard and 'at risk to disaster'. This will be referred to as the 'Pressure and Release' (PAR) model, since it is first used to show the pressure from both hazard and unsafe conditions that leads to disaster, and then how changes in vulnerability can release people from being at risk.[40]

We consider that certain characteristics of groups and individuals have a great deal to do with determining their vulnerability to hazards. Some of these, such as socio-economic class, ethnicity and caste membership have featured in analyses since the 1970s. Others, especially gender and age, are more recent research categories, and have developed in part because of the influence of social movements such as feminism.[41] For example, in a classic example of the importance of gender, Vaughan (1987: 119–147) uses the oral evidence provided in women's songs and stories in Malawi to reconstruct a women's history of the 1949 famine that is strikingly different from the men's account:

> [Women], along with the very old and very young, were more likely than men to end up relying on government handouts … [W]omen

> stress how frequently they were abandoned by men, how harrowing it was to be left responsible for their suffering and dying children, how they became sterile, and how they were humiliated by the feeding system.
>
> (Ibid.: 123)

During the 1990s a large amount of work on gender and disaster yielded much more valuable evidence of this kind (Fernando and Fernando 1997; Enarson and Morrow 2001).[42] Others have emphasised the special needs, lack of status and access, and hence special vulnerability of the frail elderly, especially widows (Guillette 1991; Feierman 1985; Wilson and Ramphele 1989: 170–185).

Daily life comprises a set of activities in space and time during which physical hazards, social relations and individual choice become integrated as patterns of vulnerability.[43] These patterns are guided by the socio-economic and personal characteristics of the people involved. Here are found, sometimes (but not always), the effects of gender,[44] age,[45] physical disability,[46] religion,[47] caste[48] or ethnicity,[49] as well as class. All of these may play a role, in addition to poverty, class or socio-economic status. Although we include class in our analysis, we fully recognise the role of this wide range of social relations and do not dwell exclusively on class relations.

Chapter 3 adds to our alternative framework by focusing on patterns of access to livelihood resources. We expand the discussion there of 'underlying factors and root causes', identified in Chapter 2. In doing so we seek to shift the focus of our analytical method further in the social direction, without oversimplifying or producing a theory that is of little use to managers, planners and policy makers.

Part I concludes with a discussion of coping. We believe that too little attention has been given to the strategies and actions of vulnerable people themselves. In large part their 'normal' life is evidently (at least to outsiders) a continual struggle in which their conditions may resemble a disaster. People become braced to cope with extreme natural events through the stress of making ends meet, in avoiding the daily hazards of work and home, and of evading the predations of the more powerful. They form support networks, develop multiple sources of livelihood access and 'resist' official encroachments on livelihood systems in a variety of ways (Scott 1985, 1990, 1998). People learn rather cynically, yet realistically, not to rely on services provided by authorities (Robinson et al. 1986; O'Riordon 1986; Maskrey 1989; Oliver-Smith and Hoffman 1999). Our discussion of 'coping' will neither romanticise the self-protective behaviour of ordinary people, nor dismiss it.[50]

Having set out our alternative framework in Part I (Chapters 1–3), Part II presents case material organised by hazard type – those linked with drought, biological hazards, flood and landslide, cyclone, earthquake and volcano

(Chapters 4–8). In each chapter we follow a similar method in tracing the causes of vulnerability, making use of both PAR and Access models. It may appear to contradict our approach to deal with disasters through different natural hazard types. However, we have deliberately chosen to do this because users of this book may themselves be concerned with particular hazards, or may find it difficult to accept our approach without seeing it interpreted more concretely in the context of nature.

Part III (Chapter 9) draws out lessons for recovery and for preventive action. We provide a holistic view of recovery and review the mixed history of narrow relief and reconstruction efforts, paying special attention to whether and how 'dynamic pressures' and 'root causes' of disaster vulnerability can be addressed during what has been called the 'window of opportunity' for policy change created by disasters. We end the book with a series of objectives that link human development and vulnerability reduction, emphasising issues of governance and livelihood resilience and local capacity that have begun to be accepted as desiderata in mainstream development circles.

Limits and assumptions

Limitations of scale

There are logical grounds for limiting our book to certain sorts of disaster. Disasters cannot, of course, be neatly categorised either by type or scale. At one extreme, it seems that there have been five mass extinctions over the last 400 million years in which up to half of the life forms on the planet disappeared (Wilson 1989: 111). The best known of these is the disappearance of the dinosaurs. The scale of such disasters (and even the use of the term is perhaps inappropriate) is clearly so many orders of magnitude greater than those with which we are concerned that we exclude them. Such events are beyond the present scale of human systems.

More recently, there have been two or three occasions when a large proportion of the human inhabitants of this planet died with apparently little distinction in regard to the relative risk of different social groups. Many millions died during the pandemics of bubonic and pneumonic plague known as the Plague of Justinian (AD541–93) and the Black Death (1348–1353). More recently the influenza virus that swept the world during and after the First World War killed 22 million in less than two years (1918–1919). This was approximately four times the total of military casualties during that war. The demographic and socio-economic consequences of the first two events had epochal significance. The current HIV-AIDS pandemic could equal them in its widespread socio-economic consequences unless a vaccine is found or sexual practices change. Despite the great significance of biological disasters, we shall address such events only tangentially

(see Chapter 5), in part to illustrate the limits of the vulnerability approach. Catastrophic epidemics may be limiting cases that shed light on 'normal' disease disasters, such as outbreaks of cholera and malaria in Latin America and Africa, meningitis and Ebola in Africa, or plague in India.

Nuclear war is another type of disaster that we do not consider because it is produced directly by humans, although some research on the 'nuclear winter' has been inspired by threats from natural events such as massive volcanic explosions or asteroid impacts. There is also considerable climatological, astrophysical and palaeontological work on mass extinctions which links some of these to severe interference with received solar radiation. Atmospheric phenomena of a similar scale of magnitude, such as global warming, will be treated as part of the more remote 'dynamic pressures' of the PAR model, shaping patterns of vulnerability. We also consider war itself (in its non-nuclear form) to be a significant 'root cause' of disaster and will address it several times throughout the text.

We devote only a little attention to what might be called 'social hazards', especially to terrorism. The events of 11 September 2001 in New York City have caused disaster researchers to reflect upon the lessons that twenty-first century terrorism might have for their own work on other kinds of hazards (and vice versa). If the official US position is correct – that the attack on the World Trade Center constituted the beginning of a war (the 'war on terrorism') – then, in fact, such a disaster is not new.[51] Millions of civilian lives have been lost in wars during the twentieth century (Hewitt 1994, 1997). An alternative position is that the attack was not an act of war but a crime (albeit with a large number of victims). If this alternative view is correct, then there are also precedents, such as the gas attack on the Tokyo subway in 1995 and the bombing of the Murrah Federal Building in Oklahoma City. In either case, our book cannot expand to include such disasters, and we might simply offer the observation that those seeking to understand such 'acts of war' or 'crimes' should, as we do, look for root causes and not for quick (including massive military) fixes.

Technological hazards

Vulnerability assessment is also relevant to analysing disasters resulting from technological hazards. However, we restrict the scope of this book and exclude technological hazards, for the simple reason that they are not natural in origin. One of our purposes in this book is to deal with natural hazards, because of the inadequacy of explanations of disasters that blame nature. Our aim is to demonstrate the social processes that, through people's vulnerability, generate human causation of disasters from natural hazards. So there is little point in looking at specifically human-created hazards.

Failure of technology, such as that which occurred at the Chernobyl nuclear facility in Ukraine in 1986 and the chemical factory at Bhopal, India

in 1984, massive oil and toxic spills and the dumping of nuclear waste in polar regions (UNEP 2002: 297), fall outside the scope of our book because they are chiefly failures of techno-social systems.[52] Later, there will be some tangential discussion of the Bhopal disaster, which involved explosions and the release of toxins from a fertiliser and chemical factory. The same locational factors responsible for generating hillside slums already mentioned in other countries led to dense squatter settlement around the plant. Such a case is at the limits of our type of analysis, and overlaps with a related literature concerning technology and society (Perrow 1984; Weir 1987; Piller 1991) and environmental justice (see below).

What happens to poor and other vulnerable people who find themselves in the path of rapid industrialisation, de-industrialisation, industrial deregulation or the importation of toxic waste is clearly of concern to us. But it is not a central issue in this book. Some overlap with a critical appraisal of technological risk and what Beck calls 'ecological modernisation' will nevertheless occur in the chapters that follow. Flooding caused by the failure of a dam is a good example (Chapter 6). The web of cause and effect in the connections between society, nature and technology is often impossible to disentangle (Abramovitz 2001).

Another point of similarity between our approach to natural hazards and studies of technological and more pervasive environmental risks is a concern with bottom-up, grassroots activism. The environmental justice movement has grown rapidly since its origins in the study of racial disparities in the location of US hazardous waste facilities during the late 1980s (Bullard 1990; Hofrichter 1993; Shiva 1994; Heiman 1996; Johnston 1997; Faber 1998).[53] One question, to which we will return in Part III, is whether a similar worldwide movement is possible through which citizens assert their human right to protection from avoidable harm in extreme natural events.[54]

We will be concerned with the impact of technology on vulnerability, particularly technology in its apparently simplest and benign forms.[55] For example, a new road may link a previously isolated rural community with sources of food that may reduce vulnerability in times of drought. That same road may also lead away able-bodied youth in search of urban income, reducing the labour available to maintain traditional earth and stone works constructed to prevent erosion, or to build or repair houses adequately to withstand earthquake. The result may be a reduction of crop yield during drought years because of additional soil loss or deaths from an earthquake which otherwise would be preventable.

The same road may introduce mobile clinics that immunise children against life-threatening diseases, or it may provide the channel through which 'urban' diseases such as tuberculosis and sexually transmitted diseases arrive via the men who have gone to work in city, mine or plantation. It may also provoke landslides that kill people or reduce the available arable land. All these contradictory effects of technological change are

possible. The same may be said of the introduction of new water or energy sources, new seed varieties, construction of a dam or a new reinforced concrete building.

There are several ways in which such questions of technological change arise in relation to disaster vulnerability. One of the most frequent responses to disaster by outsiders is the provision of various technologies to the affected site during relief and rehabilitation activities. These include temporary housing, food supplies, alternative water supplies and sanitation facilities, seeds and tools to re-establish economic activities. In all such cases, the new or temporary technology may play a role in increasing or decreasing the vulnerability of a particular social group to a future hazard event. The controversy over the use of genetically modified maize when offering famine relief in southern Africa in 2002 is a dramatic example.[56]

Development planners sometimes introduce technology at the so-called 'leading edge' of whatever version of rapid, systemic change they define as 'development'. This may be irrigation technology in the form of a large dam that displaces thousands of families in what economists call 'the short run'. It might take the form of low-income housing or the development of an industrial complex. Such development initiatives can have a series of unintended, unforeseen consequences.

The people displaced following the flooding behind a large dam may not benefit from resettlement in the areas that are fed by the irrigation water. If they are included among settlers, they may end up at the bottom of the water distribution system, where water is scarce.[57] Women on such new schemes may lose conventional rights to land on which they used to grow food for their families (Rogers 1980) or their knowledge and skills may be rendered 'obsolete' (Shiva 1989). Nutritional levels among children may fall, paradoxically, as cash income from the marketed product of irrigation increases (Bryceson 1989).

The introduction of technology can modify and shift patterns of vulnerability to hazards. For example, the Green Revolution varieties of grain have shifted the risk of drought and flood from an emergent class of 'modern' farmers to the increasing number of landless and land-poor peasants. These latter have become more vulnerable because they are denied access to 'commons' that formerly provided livelihood resources and because they are highly dependent on wages earned in farm labour to purchase food and other necessities (Jodha 1991; Chambers et al. 1990; Shiva 1991). They are also vulnerable because they now depend for food and other basic necessities on wages from farm employment that can be interrupted by flood, hail, drought or outbreaks of pests and disease (Drèze and Sen 1989; see Chapter 4).

The change in technology brought about by the Green Revolution has affected the resource-poor in rural areas because the pre-existing social and economic structure has not been able to distribute benefits properly, and this has led to a realignment of assets and income. The losers may consequently

be subject to new hazards. For example, in order to find somewhere to farm, they may migrate into low-lying coastal land that is exposed to storms (see Chapter 7). They may have little choice but to live in poorly constructed housing as urban squatters. In Bhuj, Gujarat (India) many thousands of such people died in the earthquake of February 2001.[58] The literature on development is full of studies of such unintended consequences.[59] This book will focus on such technological developments and their consequences where they can be seen to impinge on people's vulnerability to extremes of nature, or where they affect the ability of groups to sustain their livelihoods in the aftermath of environmental extremes.

Notes

1 We use the term LDC for 'less developed country' (including such extremes as 'least developed' and 'highly indebted, least developed') in keeping with UN practice. LDCs are contrasted to 'more developed' countries (MDCs). In the first edition we used the term 'Third World' to refer to LDCs, but that term has a history. It connotes the historical process (usually one form of colonialism or another) by which a country was impoverished or 'underdeveloped' (as a transitive verb). We still find merit in this view, and our 'Pressure and Release' model often has processes set in motion during the colonial past as 'root causes' of vulnerability. However, the term 'Third World' also carries overtones of the logic of the Cold War, during which period there existed two opposing 'worlds' and a third, non-aligned world. But with the collapse of the Soviet Union, many of its constituent republics (which are now independent), and even some central and eastern European countries that were part of the Soviet bloc, are now clearly seen to be 'less developed' and have many people who share vulnerabilities in common with inhabitants of countries previously designated Third World. Since the first publication of this book, the changes that began in 1989 have so reshaped the geopolitical map that use of the term Third World may be confusing.

2 We used diverse sources in estimating these numbers, which, especially for the earlier part of the century and for specific kinds of conflicts, must be considered only the roughest approximations. *For estimates of deaths due to war and political violence* we are most grateful to Professor Kenneth Hewitt, Wilfred Laurier University, Canada, for time spent in personal communication with Ian Davis during July 2002. Hewitt's book, *Regions of Risk* (1997), and an earlier 1994 article, were also helpful sources as well as Sivard (2001) and White (1999). *Drought/famine death statistics* are based on the authors' approximate calculations that expand on the official reports that are regarded as gross underestimates, since entire famines, such as the 'Great Leap Forward Famine' in China (1958–1961), which may have killed 30 million people (Yang 1996; Becker 1996; Heilig 1999), are omitted from official databases. Discussions were held between Ian Davis and researchers at the CRED, Université Catholique de Louvain, Brussels and the US Office of Foreign Disaster Assistance (OFDA) in July 2002, who confirmed that they are only able to document statistics that governments provide to them. Famine is treated at length in Chapter 4. *For other disaster mortality statistics* we relied on the database maintained by CRED and OFDA called EM-DAT (available at www.cred.be/emdat, which we accessed for this purpose on 11 July 2002). For a critical note on the reliability of disaster statistics, including those for drought and famine, see Chapter 2, Box 2.3. *Traffic*

accident statistics came from the *World Disasters Report 1998* (IFRC 1998: 20–31). *Estimates of deaths due to HIV-AIDS* came from Barnett and Whiteside (2001). For more on HIV-AIDS, see Chapter 5.

3 For example, the World Health Organisation (WHO) estimates that 12 million children under five die *each year* (mostly in LDCs) from easily preventable illnesses such as diarrhoea, measles and malaria (Mihill 1996; Boseley 1999). This is ten times as many as the average deaths from natural hazards in an entire *decade* (see Chapter 5).

4 In our usage, 'social' refers to human-created systems, and so includes economic and political processes. For brevity, from here on when we refer to 'social framework' or 'social environment', we normally mean to include political and economic factors as well.

5 Hewitt (1983b) referred to the segregation of disasters from the normal functioning of society and policy making as creating a 'disaster archipelago'. He maintained and elaborated on this position in subsequent work (Hewitt 1997).

6 In April 2003, the International Rescue Committee reported that as many as 4.7 million people in the Republic of Congo had perished as the result of the combination of injuries sustained in the conflict, starvation and disease. Although there is a margin of error of 1.6 million lives in this estimate, the conflict in the Congo has, according to the report 'claimed far more lives than any other conflict since the second world war' (Astill and Chevallot 2003: 7).

7 Baxter and Kapila (1989); in recent years there have been attempts to prevent this happening again, with projects that have placed pipes in the lake which attempt to trap the carbon dioxide gas and vent it safely to the atmosphere (Jones 2001, 2003). For further background on the lake Nyos disaster, see Chapter 8, note 7.

8 A major watershed for relief agencies was the year 1970, when enormous disasters in Peru, East Pakistan (now Bangladesh) and Biafra (Nigeria) coincided. A new theory of disasters that focused on the vulnerability of 'marginal' groups was suggested by subsequent reflections on these events, plus the Sahel famine (1967–1973) and drought elsewhere in Africa, erosion in Nepal, an earthquake in Guatemala (1976) and a hurricane affecting Honduras (1976) (Meillassoux 1973, 1974; Baird et al. 1975; Blaikie et al. 1977; Davis 1978; Jacobs 1987).

9 In the second edition of the 1978 book *The Environment as Hazard*, the authors have made no fundamental change to their 'stages of development' model (Burton et al. 1993).

10 On the response of 'political economy' and 'political ecology' to both 'modernisation theory' and 'environmental determinism' see Meillassoux (1974); Baird et al. (1975); Wisner et al. (1977); Jeffrey (1980, 1982); Susman et al. (1983); Watts (1983b); Bush (1985); Spitz (1976). Work during this period was heavily influenced by Latin American dependency theory. For a summary of more recent rebuttals, see Adams (2001: chs 7 and 9).

11 For examples of the use of a too-general notion of vulnerability, see Anderson and Woodrow (1998); Parry and Carter (1987); Cuny (1983); Davis (1978). In such cases it is essential to specify the mechanisms by which one gets from generally widespread conditions (e.g. 'poverty' or 'crowded conditions') to particular vulnerabilities (e.g. loss due to mudslide, cyclone, earthquake, famine).

12 Such functionalist views of social system coping include work by sociologists and others influenced by Parsons and Durkheim – Mileti et al. (1975); Timmerman (1981); Pellanda (1981); Drabek (1986); Lewis (1987) – and also the work of self-defined 'sustainability scientists' who have emerged particularly as work on 'adaptation' to global climate change has been funded (Kasperson and Kasperson 2000). While there is some valuable work from these points of view,

on the whole we believe that one has to be more specific. *People* cope, not disembodied systems (see Chapter 3).

13 Since publication of the first edition of our book, development policy has become more concerned with wider notions of 'human security' that encompass reduced vulnerability to disaster as well as social protection from economic crisis and respect for people's human rights in war and violent conflict (see UNDP 1994a).

14 Readers who are familiar with the Sustainable Livelihoods approach of the Department for International Development (the UK foreign aid ministry) will see a parallel here with the five types of capital commonly used in that framework – natural (mainly land, forests, water sources); physical (infrastructure and production resources); financial; human (e.g. education level); and social (e.g. networks and family connections). See Chambers (1995b); Carney (1998); Moser (1998); Rakodi (1999); Sanderson (2000).

15 The World Commission on Environment and Development (the Brundtland Commission) linked the concept of livelihood to the ability of people to protect the environment, and stated that the goal of development should be 'sustainable livelihood security' (WCED 1987). In our view, vulnerability to hazards is likely to increase when livelihoods are pursued at the expense of environmental stability (Abramovitz 2001). So it is not a solution to vulnerability if people seek to increase their access to livelihood resources for short-term gains, even if it is necessary to cope with the immediate impact of hazards. We develop a more accurate view of livelihoods in relation to disasters in Chapters 3 and 4.

16 In 1991 and 1992 there were torrential rains and mudslides in southern California affecting two counties (Ventura and Los Angeles) where 10 million people live. Also in 1991 there was a fire storm that killed twenty-five people and left thousands homeless in the middle income, suburban hills above Oakland and Berkeley in northern California. This fire left the denuded, steep hills subject to landslides. During this same period there were a number of mudslides in Rio de Janeiro and Belo Horizonte in the industrial south of Brazil. More recently, in 1999, flash floods and landslides killed 30,000 poor urban residents on the extreme periphery of greater Caracas who lived in the coastal hills (IFRC 2001b: 82; Dartmouth College 1999; see also Chapter 6).

17 During a rainy night in 2000, a 100 m high pile of solid waste collapsed on hundreds of poor people in Payatas, to the north-east of Manila, the capital of the Philippines. They were permanent residents, some of perhaps 2,000 that make their living by sifting the rubbish and selling scrap metal and other recyclable items. Seven hundred people were confirmed killed or reported missing (Luna 2001; Westfall 2001).

18 As we write this second edition we acknowledge the fact that the term 'vulnerable' and 'vulnerability' are widely used in many disciplines and professions involved with disaster risk reduction. Somewhat quixotically, we believed in the early 1990s that we could reverse this linguistic trend. By now it is so well entrenched that we have put down our lance and sit under a tree with Sancho Panza enjoying the wine and landscape. However, for the sake of clarity, in our book at least we will maintain the convention of reserving the adjective 'vulnerable' for people.

19 Morrow (1999: 10) writes of the urban context of Miami, Florida, in the USA and provides a checklist which identifies the following categories: (1) residents of group living facilities, (2) elderly, particularly frail elderly, (3) physically or mentally disabled, (4) renters, (5) poor households, (6) women-headed households, (7) ethnic minorities (by language), (8) recent residents/immigrants/

migrants, (9) large households, (10) large concentrations of children/youth, (11) the homeless, (12) tourists and transients (homeless people).

20 It is additionally tragic that a year after the earthquake in Gujarat hatred between the two groups led to attacks by Hindus and Muslims on each others' communities (especially in the capital Ahmedabad), with the loss of perhaps 2,000 (mostly Muslim) lives (Harding 2002).

21 There is further discussion of the concept of the 'risk society' in Chapter 5.

22 We have no doubt that stereotypes and images, especially those arising in colonial relations, have profoundly influenced the way that LDCs are viewed today and the kinds of policies that are produced (Blaut 1993; Said 1988; Arnold 1999). We question only whether this kind of analysis is sufficient to provide a purchase on the nexus of economic and political relationships that constitute the root causes of disaster vulnerability.

23 See http://www.geohaz.org/radius.html.

24 In 2000, 47 per cent of the world's population was defined as urban, up from 38 per cent in 1990. In 1950 the world's urban population was only 30 per cent of the total (United Nations 1999: 2; Worldwatch Institute 1998: 33–34); see also Chapter 2, where urbanisation is discussed as a 'dynamic pressure'.

25 At the Johannesburg Summit in September 2002, Russia and Canada announced that they would sign the Kyoto Accord, thus bringing the number of signatories up to the required number for it to come into force. The USA, however, still refused to sign.

26 On the science behind the study of global climate change, see Chapters 2, 4, 5 and 7. Even the controversial author of *The Skeptical Environmentalist*, Bjorn Lomborg (2001), admits that warming of the atmosphere has taken place, but argues that the rate of change is toward the lower rather than higher range suggested by studies by the Intergovernmental Panel on Climate Change. For critiques of Lomborg and his answers, see http://www.lomborg.org.

27 This is the layer of the earth's mantle upon which the lithospheric plates sit. Convection currents in the asthenosphere allow heated material to rise, while cool material sinks, leading to movement of the plates. Understanding of biogeochemical cycling and plate tectonics (including earthquakes and volcanoes) would require study of the asthenosphere as well as the more accessible lithosphere.

28 Tobin has proposed a tax on international financial transfers in order to reduce the flows which are simply used to exploit price differentials (e.g. of currencies) for private benefit. For information see ATTAC, a worldwide network of citizens' organisations lobbying for this tax: http://attac.org/indexen/ and search on 'Tobin'.

29 See Petrella (2001); Barlow and Clarke (2002). The World Bank estimates that private water industry revenue approached $800 billion in 2000; 15 per cent of the water supplies in the USA have been privatised, 88 per cent of UK supplies and 73 per cent of water systems in France (Rothfeder 2001: 102; Petrella 2001: 72). African, Asian and Latin American municipal water systems are also being privatised rapidly, often at the insistence of the International Monetary Fund (IMF) as a condition of its loans, either as direct sales of municipal assets or, more commonly, long-term concessions, leases or management contracts. Large multinational corporations are the major bidders, including Vivendi, Suez Lyonnaise, Bectel-United Utilities, ENRON-Azurix, Bouygues-SAUR and RWE-Thames Water. Under new management, water prices have increased, putting more pressure on the livelihood systems of the poor (see Chapter 3). This has sometimes caused violent protests, as in Cochabamba, Bolivia in 2000 (Rothfeder 2001: 107–114). Although the terms of contracts are becoming more

precise and incorporating details as regards minimum standards and protection for the poor, municipalities are often working with limited information, technical and legal capacity against some of the largest corporations in the world (Lee 1999: 140–183).

30 See Middleton and O'Keefe (1998); Anderson (1999); Pirotte et al. (1999); Cuny and Hill (1999); Sphere Project (2000); Vaux (2001).

31 See Disaster Diplomacy, the website at Cambridge University maintained by Ilan Kelman since 2001: http://www.arct.cam.ac.uk/disasterdiplomacy/

32 The list for 2001 is sadly similar to those compiled by MSF for previous years (as, alas, is the list for 2003). In 2000 their list included displaced persons due to war in Angola, Chechnya, Indonesia, Burma (minority Rohingya Muslims who had fled across the border to Bangladesh), Democratic Republic of Congo, Afghanistan (not much of a story until 11 September 2001), Sierra Leone and Colombia (see MSF-USA 2001).

In 1999 the list included conflict, displacement, and acute vulnerability to environmentally linked disease on the part of hundreds of thousands of people running from conflict in Democratic Republic of Congo, Afghanistan, Angola, Colombia, Sri Lanka, Burundi and Somalia. In addition, MSF list a little-known severe outbreak of cholera in Mozambique (December 1998 to mid-May 1999) that infected 62,263 people and killed 2,063 (see MSF-USA 1999)

33 Kala Azar is caused by infestation by a protozoan transmitted by the bite of the sand fly. It causes fever, weight loss, swelling of the spleen and liver and anaemia. Untreated, it is almost always fatal. See World Health Organisation fact sheet: www.who.int/inf-fs/en/fact116.html.

34 We take up this critique again in more detail in Chapter 3.

35 The International Federation of Red Cross and Red Crescent Societies (IFRC) has its world headquarters in Geneva and member societies in many countries that are involved in hospitals, primary health care, training for public health, safety and emergency response. It is a federation of 178 national societies.

36 Early self-critical evaluations by voluntary agencies included one by a broad coalition that supported 'Operation Lifeline Sudan' (Minear 1991) and the group 'USA for Africa' (Scott and Mpanya 1991). More recent appraisals have been collected by Action Against Hunger (1999, 2001), Anderson (1999), Pirotte et al. (1999) and Vaux (2001).

37 For details go to http://www.proventionconsortium.org/.

38 On NGOs (private voluntary organisations, popular development organisations, development support organisations, etc.) see Conroy and Litvinoff (1988); Holloway (1989); During (1989); Wellard and Copestake (1993); Bebbington and Thiele (1993); Farrington and Lewis (1993); Riddell et al. (1995); Christoplos (2001).

39 The Network for Social Science Research for Disaster Reduction Latin America, headquartered in Panama City, Panama (La RED): www.desenredando.org/;Peri Peri, whose base is in Cape Town, South Africa: www.egs.uct.ac.za/dimp/; Duryog Nivaran, centred in Colombo, Sri Lanka: www.adpc.ait.ac.th/duryog/duryog.html.

40 This view has much in common with other attempts to reconcile an analysis of structural constraints on people's lives with an appreciation of the individual's agency and freedom (Mitchell 1990; Palm 1990; Kirby 1990a; Hewitt 1997; Alexander 2000; Wisner 2003a; Pelling 2003b).

41 The women's movement makes an enormous contribution to our understanding of vulnerability, environmental degradation and the possibilities for restoration, peace making and 'healing'. This often requires redefining what is meant by such terms as 'development' and 'progress'. See Sen and Grown (1987); Momsen and

Townsend (1987); Dankelman and Davidson (1988); Shiva (1989); Tinker (1990); Cliff (1991); Keller-Herzog (1996); WEDO (2002); Kerr (2002); on women and the politics of 'development' and vulnerability, as well as eco-feminist philosophers, see Merchant (1989) and Biehl (1991).

42 See also the Gender and Disaster Network website: http://online.northumbria. ac.uk/geography_research/gdn/.

43 Accounts of disaster that try to balance macro- and micro-perspectives include Hewitt (1983a); Oliver-Smith (1986b); R. Kent (1987); Maskrey (1989); Kirby (1990a, 1990b); Palm (1990); Hewitt (1997); Tobin and Montz (1997); Alexander (2000).

44 Studies emphasising the role of gender in structuring vulnerability include Jiggins (1986); Schroeder (1987); M. Ali (1987); Rivers (1982); Vaughan (1987); Drèze and Sen (1989: 55–59); Sen (1988, 1990); Agarwal (1990); Phillips (1990); Kerner and Cook (1991); O'Brien and Gruenbaum (1991); Walker (1994); Wiest et al. (1994); Cutter (1995); Fothergill (1996, 1999); Fernando and Fernando (1997); Fordham (1998, 1999, 2003); Morrow and Phillips (1999); Stehlik et al. (2000); Enarson and Morrow (2001); UN Economic and Social Department and ISDR (2001) and Cannon (2002).

45 The very young are highly vulnerable to nutritional and other health stresses during and after disasters and are vulnerable to emotional disturbance in the post-disaster period (Chen 1973; UNICEF 1989, 1999: 25–46; Goodfield 1991; Cutter 1995; La RED 1998; Harris 1998; Jabry 2003). Jabry (2003) states that 'an estimated 77 million children under 15, on average, had their lives disrupted by a natural disaster or an armed conflict, each year, between 1991 and 2000'. The old are often more vulnerable to extremes of heat and cold, are less mobile, and are therefore less capable of evacuation, and may have medical conditions that are complicated by injury or stress (Bell et al. 1978; Melnick and Logue 1985; O'Riordon 1986: 281; Tanida 1996; Klinenberg 2002; HelpAge International 2000), and are particularly vulnerable to recurrent disasters (Guillette 1991). The elderly can also suffer serious psychological harm following disasters (Bolin and Klenow 1983; Ticehurst et al. 1996). Widows in many parts of the world are especially vulnerable, as in southern Africa (Wilson and Ramphele 1989: 177–178; Murray 1981), and east Africa (Feierman 1985) or in the USA (Childers 1999).

46 Disabilities such as blindness, mental retardation, somatic hereditary defects and post-traumatic injury (such as spinal cord injuries) affect hundreds of millions of people worldwide (Noble 1981). People with disabilities have specific increased vulnerabilities in the face of hazards due to their impaired mobility or interruption of the special attention to their hygiene and continuous health care needs in disasters (UNDRO 1982b; Parr 1987, 1997; Tierney et al. 1988; Kailes 1996; Wallrich 1998; Wisner 2003c); they may also have particular needs when it comes to warnings and evacuation (Van Wilkligen 2001; Norman 2002, 2003).

47 The role of religion has not been as well studied, but consider recent events. The Burmese fleeing into Bangladesh during 1992 were a Muslim minority in their home country. The 400,000 people forced to leave squatter settlements around the city of Khartoum for an uncertain future in 'resettlement camps' in the desert were mostly a Christian or animist minority, refugees from war in the south, in the predominantly Muslim north of Sudan.

48 The role of caste has been most fully explored in studies of famine in India (see Chapter 4); however there is also a suggestion that caste-based locational segregation homes in rural and urban India may have a bearing on vulnerability to riverine flood and cyclone (see Chapters 6 and 7). The Burakumin 'caste' in

Japan is also subject to discrimination and may have suffered disproportionately in the Kobe earthquake (see Chapter 8).

49 Ethnicity and race emerge as an important factors in explaining vulnerability in studies by Regan (1983); Franke (1984); Perry and Mushkatel (1986); Bolin and Bolton (1986); Winchester (1986, 1992); Rubin and Palm (1987); Laird (1992); Miller and Simile (1992); Johnston and Schulte (1992); Bolton et al. (1993); Bolin and Stanford (1998b); Fothergill et al. (1999); Steinberg (2000).

50 Perception, experience and discourse about risk are never straightforward. For example, perceptions of risk are sometimes deeply rooted in cultural understandings of ritual purity and danger (Douglas and Wildavsky 1982) and claims of suffering (or their absence) can sometimes be gambits in games over local political power (Richards 1983; Laird 1992; Steinberg 2000: ch. 1).

51 We do not disregard or underestimate the intellectual challenge of dealing with the complexities and uncertainties vividly brought to mind by the attack on the World Trade Center. There are some who think that an enormously complex system such as a mega-city cannot possibly be fully understood, and hence cannot be protected properly (Mitchell 1999b; cf. Homer-Dixon 2001; Rubin 2000). Perrow (1984) put forward that argument some years ago regarding even 'simpler' systems such as single large jet aircraft or a nuclear power station – a view that was possibly reconfirmed by the 'surprising' destruction of the US space shuttle Columbia in early 2003. It also may be that when one adds the additional level of complexity and uncertainty of a global economy and the relations and histories that constitute 'international relations' among 191 nations, it is impossible to predict the consequences of actions. For example, in a case that falls more within the scope of our book, there was a deadly mudslide in Algiers in 2001 (Wisner 2001b). A key factor was heavy rain, to be sure. However, in addition, in their own 'war on terrorism' the Algerian authorities had cut and burned the forest on the mountain above Algiers and blocked up the storm water drainage system. Both actions were taken to deny 'terrorists' a hiding place. Both official acts exacerbated the flood.

52 Such technological hazards are discussed by other authors, including Ziegler et al. (1983); Perrow (1984); Weir (1987); Kirby (1990c); Shrivastava (1992); Button (1992); Jasanoff (1994); Dinham and Sarangi (2002).

53 A gateway to web sites dealing with environmental justice is: www.ejrc.cau.edu/.

54 See discussions and debates about the relationship between disaster and human rights: http://online.northumbria.ac.uk/geography_research/radix/.

55 For example, it is hard to disentangle risks associated with construction technologies (Chapter 8) or agricultural innovations (Chapter 4) with such hazards as earthquake and famine.

56 The USA offered Zimbabwe, Zambia and Malawi genetically modified maize as part of the international response to a famine in the region that affected 15 million people (see Chapter 4). These countries refused the maize because it was unmilled, and their scientific advisers were concerned that if planted (and not eaten), there might be contamination of local varieties of maize (a staple in the region) with unforeseen, but potentially grave, consequences for the future.

57 The social and ecological consequences of building high dams worldwide have been systematically reviewed by the World Commission on Dams (2000c).

58 There seems to be uncertainty in the figures for the number who died. The UK Disasters Emergency Committee report (DEC 2001a) accepts an official figure of 20,000 deaths as being accurate.

59 The unintended consequences of 'development' are documented by Trainer (1989); Shiva (1989); Wisner (1988a); Lipton and Longhurst (1989); Johnston

(1994, 1997); Adams (2001: ch. 8). Special note should be taken of a 'classic' early paper on disease and development by Hughes and Hunter (1970) and the contrast with the role of other kinds of 'development' in restoring the health of communities (Wisner 1976a).