

## Acknowledgements

sented at the World Conference on Natural Disaster Reduction, Yokohama, Japan; Fig. 5.1 from *Armed Conflicts Report 1995*, Institute of Peace and Conflict Studies, Conrad Grebel College, Ontario (Spring 1995); Table 5.7 from a table containing estimates of Landmines per country from Department of Humanitarian Affairs news, *DHA News* Sept./Dec. 1993, UNDHA; Table 5.9 from *Journal of Refugee Studies* p.7 and p.9 by permission of Oxford University Press; Fig. 4.1 (pp.104–6) and Table 10.7 (p.108) from *Living with Risk*, Hodder & Stoughton Ltd (Cutter, S.L.); Fig. 8.4a from *At Risk: natural hazards, people's vulnerability, and disasters* p.176, Routledge (Blaikie P.T., T. Cannon, L. Davis, & B. Wisner, 1994); Figs. 8.4b and c from *Geohazards: natural and man-made* p.101, Chapman and Hall (McCall, G.J., D.J.C. Larning & S.C. Scott eds, 1992); Fig. 9.1 from Afghanistan: the destination of the people, *Orbis* 31:1 pp.39–56, p.54, Foreign Policy Research Institute, Philadelphia (Sliwinski, Winter 1989); Fig. 10.5 from *The price of war: Urbanisation in socialist Vietnam 1954–86*, pp.147 and 154, Routledge. (Thrift & Forbes, 1986); Table 10.6 from *The AIDS disaster* p.56, Yale University Press (Perrow, Guilen, 1990); Table 10.8 from *Victims and Survivors*, Quorum 1982 (Weisner, 1988) reprinted with permission of Greenwood Publishing Group Inc., Westport, Conn. © 1988.

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## Introduction: danger and modernity

'Repetitive disaster events chip away . . . at conventional ways of ordering reality. The disconfirming, anomalous cases, refuse to disappear. Where single disasters do severely shake existing conceptions of order, these conceptions were already under serious and protracted stress.'

(Michael Barkun, 1974, 81)

### The *Titanic's* century?

A luxury liner glides swiftly across a darkened ocean. Lights blaze on the upper deck, where an orchestra plays, and first class passengers, some of them well-known personalities, are set to dine and dance the night away. Below decks is another world. More than 1500 persons prepare for sleep, many of them quite poor families in crowded berths, who dream of a better life in America. Here too, however, passengers and crew seem to have complete confidence in the safety of the ship. It is of the latest design. There are novel features said to make it 'unsinkable'. Its name, *Titanic*, speaks of colossal strength. They are entering ice-infested waters of the North Atlantic, south of the Grand Banks, Newfoundland, but reports of icebergs, from ships up ahead, go unheeded. The captain and his company, facing strong competition from other shipping lines, worry more about completing the voyage in a record time.

Just before midnight the vessel strikes an iceberg while travelling at about 41 km per hour. A huge gash in the hull causes it to sink two and a half hours later; 1522 people are drowned and 705 survive in lifeboats or rafts. Rich and poor perish, but deaths are disproportionate among those from the lower decks. The lifeboats prove insufficient for the number of passengers on board. Some cannot be launched and the crew seems to lack the training for such an emergency. There are stories of women and children being pushed aside or abandoned.

The date is 14 April 1912, early in a century that will bring many other and even larger calamities, but the sinking of the *Titanic* continues to fascinate and trouble later generations. Thanks largely to some costly safety systems put in place then, there has not been another such disaster in the North Atlantic.

Let us now move to 1995. The century is coming to an end. People are talking of the next millennium, about to start. Few places seem better placed to grow and prosper in it than the Japanese city of Kobe. Located on Osaka Bay, it has been a major centre in the development of international trade. This, in turn, has made Japan an economic superpower. The city is a favoured place for foreign corporations to base their activities. Most of Kobe's buildings have been erected since 1945, when a wartime incendiary raid devastated the city. Many of the main communications, port, municipal and industrial structures are less than 20 years old, built with the latest construction techniques. A rash of new building is underway in the ever-expanding industrial and container port areas.

It should be added Japan has a long history of earthquake disasters, but it is also a leader in the science of earthquakes, and in earthquake-resistant building design, engineering and planning. It has world-class institutions specialising in disaster research and training. Nevertheless, a great tragedy occurred in Kobe on 17 January 1995. An earthquake, centred about 20 km to the west, devastated the city, killing 4512 of its inhabitants (6336 in all). Some 122 500 buildings were destroyed. Arterial highways, the track of the famous 'Bullet Train' and most of the port works suffered major damage. The economic losses were put at around US\$110 billion to US\$150 billion – the highest ever actually quoted for a natural disaster. There were complaints of slow and ineffective emergency response, of official complacency and a history of failures to enforce building safety standards. Fires raged for days, unchecked, in crowded residential districts. A year later, almost 100 000 people remain in temporary, prefabricated housing. As many more are said to have moved to other parts of Japan in search of work and a new start.

Kobe is by no means alone in an apparent, remarkable lack of safe construction and emergency facilities in an earthquake-prone city. Japan is not the only wealthy country with a reputation for competence in dealing with certain hazards, yet these still cause major disasters. Recent earthquake, hurricane and flood disasters in the United States, for example, follow many decades of 'advanced' flood, storm and earthquake research. There have been vast outlays on protective measures against these dangers. Severe storm disasters in Britain afflict a nation that pioneered the study of the atmosphere and for long led the world in weather forecasting.

The sinking of the *Titanic* or the Kobe earthquake, like all great tragedies, were special and unique events, yet for those who study the problem of extreme risks there are compelling parallels with other disasters. We will find that many of the questions they raised are typical of the failures of technology and preparedness. They symbolise so many developments that are poorly constrained by concerns of public safety.

In many other ways, the modern world seems torn between conflicting visions of its achievements and its destiny. On one side are great improvements in material life, at least for some, and a promise of the same for all. On the other are expanding dangers from our own activities and evidence of human misery from uncontrolled natural forces or endangered habitats.

The main concerns of this book – dangers, disaster and the scope of human vulnerability to them – focus on one side of this dichotomy. They deal with daily reminders of the limitations and self-inflicted failures of modernity, but these, or how we view them, are not independent of the claims of technical and material 'progress'.

Destructive earthquakes in Japan or southern California, the AIDS epidemic in Canada, or several great oil spills on the coasts of Western Europe, are special cause for concern. They invite critical re-examination of the treatment of disaster in modern settings. Except in major wars, the human costs of disaster in wealthier countries tend to be less severe than in impoverished ones. Even so, they highlight the unfinished business in dealing with extreme risks where societies seem best equipped for the task.

Outside urban-industrial societies and wealthier enclaves, the dichotomy appears in terms of 'development' and disaster. Half a century of actual or promised modernisation is associated mainly with adoption or transfer of Western technical, educational, economic and administrative measures, and with economic globalisation. In nearly all countries, it has brought exponential growth in material production. With this, energy consumption, mechanisation, populations and urbanisation have surged. So too have poverty, disease, famine and social violence in most of the same countries.

The link between poverty and disaster is strongly drawn. We are told that perhaps a billion persons, a fifth of them children, suffer chronic hunger and malnutrition in a world where per capita, not merely total, food production exceeds that known in any other period. In poorer countries, natural disasters are singled out by huge death tolls, usually among the more impoverished people. Armed conflicts cause massive uprootings of defenceless folk and magnify disasters of famine and disease. An epidemic of human rights abuses afflicts civil populations and threatens the survival of minorities and indigenous peoples. A majority of the victims of disaster are not only relatively poor, but powerless, suggesting that lack of a political voice also places them at greater risk.

### The emergence of a problem field

It is in this context that a modern field of hazards and disasters has taken shape. It is not concerned with all forms of danger and loss or with only some particular types of disaster. Rather, it has become engaged with those that seem to lie beyond, or to overwhelm, existing arrangements for public safety. Disasters, or dangers that threaten them, are obviously of this kind.

Since the Second World War, risk and disaster have taken their place among a number of related problem fields. They include 'the environment', 'development', (over)population, 'security' and cultural survival. Often they are discussed as though they are self-evident empirical realities, age-old, if suddenly more serious. In fact, each has been given new or redefined meanings over the past half century, and become a focus of popular and highly politicised concern. Notions like 'disaster' have been gradually, but in the end radically, redefined to suit modern, instrumental agendas that link science to professional and administrative, especially governmental, practices. If not exactly coherent disciplines, these fields have developed around 'communities' of researchers and agencies. Distinct from but drawing upon traditional scientific disciplines, the fields are commonly described as interdisciplinary.

The problem field that the present text seeks to introduce and critically review concerns dangers to human societies, especially the more extreme or novel forms. Those having a calamitous potential are the major interest. They may involve natural forces, large technological 'accidents' or the more severe consequences of social violence. However, we must also consider some pervasive, usually novel, dangers that societies seem ill-prepared for or unable to deal with. They may arise from technological innovations, dangerous consumer products, toxic industrial pollutants, drug-resistant diseases, global environmental deterioration or violent social change.

Although the phrase 'public safety' has not always had a happy history, it seems appropriate to our concerns. They mainly address dangers to substantial parts of communities, regions or states, even the global scene. Private risks or the internal safety measures of well-defined organisations are of interest, but to the extent that they affect or reflect public dangers.

Hazards and disasters have been seen mainly as an 'applied' field for science and scholarship. However, distinct questions of concept and method are raised and we must address them. Enquiry must satisfy the usual requirements of logic and critique, yet the work is never far from questions of practice and priority, of ethical and responsible conduct.

Before saying more about the scope and implications of a hazards and disasters field, some of the reasons for its existence must be presented. Since just about everything involves risk and may be harmful, the choice of dangers assumes a special significance. For that it is useful, initially, to recognise two broad domains of risk.

## Chronic and extreme dangers

### Routine risks

There are dangers that seem ever-present in the life, work and habitat of a given society. They might include endemic pests and blights that reduce crop yields in every year; the almost continuous toll of traffic accidents worldwide; a variety of common crimes and illnesses; or the childhood malnutrition that

prevails in some regions. Household and occupational injuries, the risks of overeating, and substance abuse and cigarette smoking could be added. Such problems involve chronic or 'life-style' hazards. They are strongly reflected in gross statistics of a society's health, causes of death, life expectancy, nutritional status, disabled or unemployed workers, violent crimes and so forth. Some result in the largest overall, 'untimely' loss of life (Table 1).

Such risks tend to become integral or accepted, if feared, parts of everyday life. Their treatment is usually or mainly *routine*. They are not associated with marked or any interruptions in productive and administrative functions. They are, in some sense, absorbed within everyday activities, whether through public institutions or being left to households and personal decision. Permanent arrangements for dealing with them may, however, involve the larger areas of investment in risk reduction or management. Defence budgets and law enforcement in most countries, health, accident and unemployment insurance in some, direct a major share of public resources to particular dangers. This serves to define social priorities and shape the permanent risk environment. Specific examples would be the large and, for the public, largely 'hidden' costs of meeting standards for building materials and design in European cities, or the annual costs of winter snow removal and sanding of roads in Canadian cities to minimise traffic delays and accidents.

The practices associated with these chronic risks are as characteristic of a given culture as its food or festivals. They may be seen in hospital waiting rooms or funeral processions, a spot in the nightly news or the way word of premature death passes through a village. Increasingly, they include dangers associated with consumer goods and public services.

That they are common and widespread does not mean the dangers are shared equally by all. Some are accepted as 'occupational hazards', the necessary burden of a way of life or the tolerable price of a certain pleasure. Others are unwanted but inescapable predicaments – for the disabled, chronically sick or those obliged to cope with hazardous work places or not working at all. Risks may be forcibly imposed upon disadvantaged and exploited groups.

In sum, what links and distinguishes or perhaps contains these risks socially is their dispersed but widespread incidence, and routine treatment. Equally relevant to our concerns, in modern societies they are identified with prominent fields of study such as medicine, criminology, actuarial science, engineering safety and military history. To the extent that these chronic dangers are well-understood by established fields, and well-managed by responsible institutions, they are not the ones our field becomes involved with, though they are a key part of our working environment.

### Extreme events

By contrast, there are threats and levels of damage that can overwhelm whole communities, or cripple aspects of everyday life. At least, they may bring widespread public anger and loss of confidence in existing safety measures. A period

*Table 1* Chronic dangers: the main causes of untimely death and death tolls in selected countries, 1990. For comparison, numbers per 100 000 males and females are also given. The figures dwarf those for disasters, except for some wars and epidemics. However, the concentration in space and time of disaster losses can drastically impair the coping capacities of societies and magnify impacts upon survivors (after World Health Organisation, 1994)

	USA	Canada	Mexico	Japan	United Kingdom	Italy
Population (million)	248.7	26.6	81.1	123.6	55.5	57.7
All causes	2 148 463	191 973	421 736	820 305	641 799	543 708
M (per 100 000)	918.4	793.9	566.6	736.5	1123.1	1006.5
F (per 100 000)	812	652.7	432.0	602.8	1113.0	882.9
Circulatory systems	920 245	74 091	84 792	304 448	295 827	234 763
M	366.8	269.5	97.4	244.4	509.7	387.5
F	373.0	269.0	100.7	251.7	520.6	425.7
Malignant neoplasms (cancers)	505 382	52 426	44 125	217 413	161 230	145 036
M	221.3	220.4	46.1	216.4	300.4	304.2
F	186.0	174.7	51.2	139.3	262.2	201.7
Infectious and parasitic heart disease	30 424	1273	40 897	12 006	2785	2000
M	12.3	5.0	52.4	11.9	5.1	4.1
F	12.2	4.6	44.1	7.7	4.6	2.9
Pneumonia	77 415	6410	21 773	68 194	32 628	7649
M	29.8	24.1	27.6	64.1	43.1	13.0
F	32.4	24.1	24.0	47.4	69.9	13.5
Perinatal and at birth	17 482	1159	19 947	1756	2724	2806
M	8.2	4.9	30.3	1.5	5.3	5.4
F	5.9	3.6	21.4	1.1	3.9	3.7
Accidents	91 983	8849	39 240	32 122	14 008	22 901
M	51.1	44.6	71.7	36.8	30.3	48.2
F	23.6	22.3	21.2	15.9	18.8	31.7
Motor vehicle accidents	45 827	3645	13 926	14 398	5628	9123
M	26.1	14.4	26.1	17.2	14.3	250
F	11.1	8.2	6.9	6.5	5.5	7.1
Suicide	30 906	3379	1938	20 088	4643	4402
M	20.4	20.4	3.9	20.4	12.6	11.4
F	4.8	5.2	0.7	12.4	3.8	4.1
Homicide	24 614	554	14 455	744	413	1527
M	15.9	2.7	30.7	0.7	1.0	4.8
F	4.2	1.5	3.6	0.5	0.4	0.6

of acute distress ensues. If there is great material damage, outside assistance may be provided through governments, charities and international agencies. Sometimes the survivors, if any, are dispersed permanently and the society, or part of it, is brought to an end. Such are the features of disasters and catastrophes.

The news headlines, or 'Disasters' page of the yearbooks, are sad testimony to the continuing realities of extreme distress and devastation. They give us a preliminary overview of the landscape of calamities most often reported. Between 1989 and 1993, for example, the news media identified about 110 'technological' disasters, and almost 50 natural disasters in a given year (Table 2). If there are more of the former reported, natural disasters include more of the most catastrophic events, as do epidemics and wars.

The problems of uneven reportage and coverage in such information must be noted. Yet the major media, virtually alone, establish the commonly recognised, public events on the world scene. That in itself has a pervasive influence upon how disasters are perceived. In the so-called information society, people's view of the world beyond their immediate horizons depends increasingly on the mass media, as does the political importance given to problems. Disasters are among the items deemed most newsworthy.

While all the events reported involved or threatened the general public, many, especially technological 'accidents' such as air crashes, are fairly localised and dealt with by responsible agencies on the spot (see Chapter 4). They do not enter our concerns with the same force as disasters that bring huge, concentrated losses and overwhelm whole communities or even the resources of states. A profile of larger disasters or catastrophes over the past 10 years indicates the scope and scale of more extreme dangers in the late twentieth century (Appendix 1).

In addition to natural and technological disasters, roughly 32 major armed conflicts were documented in each of the past several years. They enter our concerns primarily because many, often the majority, of the victims are civilians, and because of massive impacts upon human settlements, habitats and means of livelihood. The more powerful industrial nations have enjoyed half a century without wars in their lands – albeit in the aftermath of the two most

*Table 2* Extreme events: natural, technological, epidemic disease and war<sup>1</sup> disasters in the late twentieth century. A summary of reported incidence, 1989–1993 (after Encyclopaedia Britannica Yearbooks and Ploughshares Monitor, Waterloo, Ontario)

	1989	1990	1991	1992	1993	Total	Average
Natural disasters	46	52	54	32	51	235	47
Technological disasters	128	123	98	109	93	551	110
(New) epidemics	2	–	1	1	1	5	1
(New or continuing) wars*	32	31	30	30	35		32
						7	191

\*Those that caused at least 1000 deaths.

<sup>1</sup>see Chapters 3–5 for details and Chapter 5 on why contemporary wars are treated as 'disasters' here.

destructive wars in world history, and with the unique dread of nuclear war. Elsewhere in the world, dozens of wars have taken place, some of long duration and unprecedented destructiveness. Meanwhile, there have been hundreds of clashes, acts of terror and other uses of armed violence short of full-scale wars, affecting ordinary citizens and minority groups. The huge refugee crises around the world, groups reflecting the peculiarly geographical calamity of enforced uprooting, mostly involve flight from violence (see Chapter 5). Some of the greatest calamities of this century have involved the systematic use of state violence to expel or to kill whole peoples.

There is no indication that, worldwide, the number of disasters and newly emerging dangers is declining. Various studies have found deaths or property losses, or both, to be increasing in the last half of this century. Particular places and regions appear to experience dangers and losses of unusual and growing severity. Some represent a persistence of old problems. Many are magnified or created by dramatic social changes associated, for example, with rapid urbanisation, environmental destruction, globalisation of economies, energy technologies, megaprojects and armed violence.

### The problem of disaster

Many types and scales of disaster occur. What most have in common is concentrated harm, and often exceptional concentrations of death and injury. Damage is sufficient to disrupt significant parts of society's productive activity and administrative functions. Disaster overwhelms, at least for a time, the ability of established routines or responsible agencies to maintain public safety. Citizens cannot be supported and cared for in accustomed and acceptable ways, or only through extreme measures.

The shift from chronic or everyday risks to disaster brings out a different sense of the relations of risk to the social order. If most often defined by sheer quantities of casualties and damage, disaster also alters the conditions and scope of harm. Rather than being private and scattered, the tragedies are public and concentrated. The damages disrupt or destroy many different functions and institutions. They affect many different sorts of persons and domains at once. This makes them socially complex and uniquely perturbing.

The result can be a society-wide and systemic crisis, or at least, a collapse of public confidence. Such problems also burst out of, or cast doubt on, accepted areas of responsibility. There can be a breakdown or serious questioning of established social order and performance. Here too, is a basic difference from chronic risks.

It is possible, then, to distinguish two domains of risks, the 'chronic' and the 'extreme'. They tend to differ in incidence, social impact and treatment. However, the two are not separate in practice or, as will be argued throughout this text, in origin. The boundaries between them are uncertain and stretchy. Chronic or routine risks in one place or era become calamitous in another, and vice versa. Some dangers do not fit easily into either category, perhaps

because of unresolved social conflict and ethical debate about what is acceptable or unavoidable. There are also aspects of modern life that further complicate this distinction, drawing us into some risks that are widespread but not routine.

### Novel risks and shifting standards

Everyday life itself is far from static or merely repetitious. All societies are caught up in changes that may alter the scale and scope of common risks, or their awareness and tolerance of dangers. Developments that seem gradual or planned in themselves can, suddenly or imperceptibly, bring uncontrolled and disastrous outcomes. Such are problems of rapid urbanisation and motorised mobility, increasing or long-term loading of the environment with pollutants, deforestation, and soil depletion. Large-scale restructuring and relocation of industrial and commercial activity, or the arms trade, can undermine existing social and national security arrangements. The resulting novel dangers can have a singularly unsettling effect, seeming to threaten unnamed disaster if none actually occurs.

Extreme dangers can arise from novel developments, notably certain technological innovations or their deployment. Often presented as essential for the growth and improvement of countries and enterprises, these may introduce unprecedented risks. Meanwhile, nuclear power, supertankers and new biocides, for example, not only add new hazards and possible disasters; they also change the nature and course of everyday life. This is even clearer in the case of new, mass produced and widely distributed consumer products, when they prove to be dangerous or to lack adequate safety checks and safeguards.

Not least important for what separates 'routine' from extreme dangers are different standards and perceptions of acceptable and unacceptable risks. One group or society's 'normal', 'acceptable' risk may be intolerable to others. Novel risks and the globalising of concern and values as well as economy further complicate this. Some nations or cultures want to impose their own view of acceptable risks or standards upon others. Some do not hesitate to export a dangerous technology, product or waste product, or industry outlawed in their own country! These are ethical as well as material issues. They require awareness and understanding in terms of the geography of human differences.

Drawing these observations together, two broad concerns or constraints have shaped the preoccupations of hazard and disaster studies. The first involves questions of 'control' and the second of context and place. Both reflect how dangers appear in relation to modernity.

A concern with more extreme risks and disasters addresses problems that are seen to be *out of control*. This is also a construction placed on events as they relate to the expectations and practices of modern societies, where technical disciplines and official control are called upon to regulate all areas of national and public security. They involve the major uses of science and technology in

the modern state and corporate enterprise. Public safety, among other things, is divided up, defined and 'disciplined' as a task of professional fields and administrative institutions. Our concerns stand out as evidence of the *limitations* of this social order.

Disaster also involves destruction or disintegration of the extensive, orderly patterns that bind together the large space and many places of modern material life. In terms of human geography, disasters appear as spatial *disorganisations* – areas and linkages where control is lost. As public crises, calamities burst the bounds of particular organised activities, installations, sites, land uses and territorial units. Residential areas become 'wetland' in a flood. Life-threatening industrial chemicals enter people's living space. Fighting forces destroy defenceless settlements and unarmed populations. Hence the sites of these events also appear *out of place*, violations of good order and cultural space.

### Hazard reduction

A balanced view, and a full sense of our concerns, will hardly be achieved without recognising that much of the damage seen on the ground in natural and technological disasters is avoidable. Most or all of the deaths are 'unnecessary'. This is not merely so in principle, or as a matter of luck. The harm is avoidable with known practices, and is prevented in places and for persons where these are in use (see Chapter 7). Some great scourges of the past – notably certain lethal endemic and epidemic diseases – have been overcome entirely. There is every reason to think many other dangers could be reduced or prevented.

This is what gives to hazard and disaster studies a positive orientation. To help extend and improve safety and relief of suffering is surely the only acceptable purpose of research into extreme harm. It means we must identify, especially, the relations between the dangers to which societies are exposed and human practices that can and do increase, decrease or reallocate them.

Of course, the role of dangerous human agency and technological innovations raises special problems, the excesses of vicious political powers and ruthless groups even more so. Yet the despair or cynicism that these produce can be countered. There are peoples and political units, small and large, 'traditional' and modern, committed to maintaining public safety and improving social justice. We can point to a substantial decline in danger and damage from natural or human conditions in some places as a direct consequence of human effort. Admittedly, most are in wealthier states and enclaves with well-developed arrangements for personal and social security, but studies also reveal impressive arrangements for coping with danger and disaster in 'traditional' societies. A part, at least, of modern history has been the struggle to make public safety an integral and enduring feature of social life. It is mostly these human arrangements that divide the world into more and less secure people and places.

### Scope of the hazards and disasters field

In sum, the common ground that defines this field mainly reflects the history of investigation. It has taken shape in response to late twentieth century contexts, rather than some fundamental logic of enquiry. However, this does not mean it is just a collection of *ad hoc* concerns, or of isolated hazards studies, only that contemporary history and intellectual constraints have largely decided our preoccupations. The interests are socially and, in some respects, narrowly constructed within the entire range of modern dangers and damages. Most of the relevant literature considers particular geophysical and technological dangers and particular technical considerations of, for example, building safety, transportation accidents, forecasting, emergency measures and post-disaster reconstruction. In the social sciences, the field developed around notions of collective stress and mass emergencies, social responses to disaster or risk analysis and civil defence. Among geographers it is identified mainly with 'hazards', with studies of floods and droughts, nuclear accidents and toxic chemicals.

Yet many common issues and conditions draw different forms of danger and occasions of disaster into common frameworks. Any actual society, modern or otherwise, is confronted with a range of dangers. By design or default, their relative importance and severity will be prescribed by the on-going pattern of life. The origins of disaster and the patterns of impact invariably reach back into the general contexts of material life, its environmental relations and geographical setting. In this sense 'risk', a term embracing possible as well as actual threats, past and future losses, seems to encompass the whole field, although it also embraces dangers we may not consider (see Chapter 1).

Disaster is generally taken to imply social breakdown and even chaos. Disaster studies may focus on single natural, technological or social hazards, but as events and predicaments, disasters are 'whole' crises for a society and a place. Any actual disaster affects society, its technology and its natural environment. These jointly define the fabric that is threatened and destroyed. This leads on to consideration of the diversity of different risk situations, and comparison of responses in different places and, in the same place, of different dangers.

In an introductory text we must draw upon work in both specialised and hazard-specific studies, and the broad view. However, it seems necessary to choose between a systematic review of individual dangers and a conceptual overview that emphasises the common ground of risk and disaster. The present text adopts the latter approach. There is no lack of accessible works on specific risks, notably natural and technological hazards. Several recent works by geographers cover them very adequately. Most of the research literature to which the reader can refer is also specialised. Here the case is developed for seeing this as a general problem field, with important considerations embracing many or all of the dangers discussed. I also want to suggest that this is an appropriate and special role for the geography of danger and disaster.

### The 'geographicalness' of risks

As a geographer, I approach the field from a geographical perspective, anticipating that other geographers are my most likely audience. Nevertheless, I argue that geography is an intrinsic aspect of risks, and of central importance to all aspects of this field. Any given risk or disaster event is distinguished by its geographic location and setting. These are important keys to the origins of danger, the forms of damage and whom they most affect. They are critical for the appropriateness and deployment of organised response.

The scope of knowledge and concerns relevant to extreme, public dangers resembles the once dominant interests of geographical enquiry. We must take account of the interrelationships and distinctive mix of conditions that define human settlements and regions. Risks arise from or within the situational realities of particular places and their problems. Disaster causes an unravelling of those forms and associations variously termed 'people and place', 'land and life', society, and habitat. It is defined by the destruction of living space or ways of life. Great disasters invariably bring enforced displacement of resident communities, sometimes permanent exile. Refugee crises, the destruction of settlements and habitats, genocide and ecocide in extreme cases, describe some pervasive forms and painful consequences of disaster in the twentieth century. These are not only geographic aspects of disaster but *geographical calamities*.

Social hazards and disasters involve, in particular, the unique dangers of life and residence in areas subject to misuse and organised violence. Wars and civil strife often lead to flight or expulsion of populations, and annihilation of their places of settlement and sources of livelihood. These and many natural and technological disasters have their most severe impacts as destroyers of dwelling places and resident communities. They undermine the security of belonging to and living in a supportive habitat or larger cultural milieu. The security of home, neighbourhood, community or native land is threatened and destroyed. As such, they involve 'geography that matters' to those who are the main victims. These ideas will be developed in Chapter 2, where the 'geographicalness' of risks and calamity is a particular focus. Several of the case studies in Part 2 were selected to emphasise the significance of danger to people's geography, and the hazards of its destruction.

### Geographers and hazards

A broad concern with danger and disaster problems can be found in the earliest work of geographers. Strabo's first century AD 'Geography', while intended to describe the known world, is a mine of information on earthquake disasters around the Mediterranean. He saw environmental stresses helping to explain the variety of peoples and places. Even earlier, Hippocrates' famous fourth century BC 'On airs, waters and places', formulated the classic Western view of health and disease, well-being and danger, as fundamentally dependent upon the geographical environment in which one lives. This prefigured environmen-

tal determinism, the prevailing general framework of geographical studies early in this century. It has been in disfavour for several decades, like the racial and imperial geography it tended to support, but an interest in the role of extreme weather events and other adverse environmental conditions has continued.

In the past half century, work by geographers developed from studies of particular natural hazards, especially floods (White, 1945), particular damaging events, such as the 'Atlantic Storm' of 6–7 March, 1962 (Burton *et al.* 1969) and the Managua, Nicaragua, earthquake of 1972 (Kates *et al.* 1973; Ebert, 1988). Experience, often unanticipated, in places subject to disaster has played an important role too (Waddel, 1975; Watts, 1983). In recent years, interests have broadened to include a variety of technological risks, some diseases such as AIDS, and social violence (Zeigler *et al.* 1983; Hewitt, 1983; Kates *et al.* (eds), 1985; Kirby (ed.), 1990a; Cutter 1993). Throughout, Gilbert White's work has been a major inspiration. Moreover, he placed questions of policy and practice at the heart of the field (see Chapter 7). This has always required consideration of issues going beyond a particular hazard or event, and attention to the geographical setting and the people involved. White recognised that hazards and disasters have broad social implications. He placed humanitarian concern at the heart of our professional responsibilities, and he wanted technical and managerial considerations to follow from, and be judged in terms of, that.

However, as with other late twentieth century problem fields, such as population control and environmental damage, the geography of disaster has been constructed as one of global and general human predicaments. But, also like them, it tends to be defined and treated, as Sachs (1990, 26) has said of 'development', according to 'how the rich nations feel'. Until very recently, the Cold War geography of two uncompromisingly different political worlds was superimposed upon that.

Disasters, and problems of responding to them, have come to be seen mainly in terms of a United Nations geography of 'worlds' – First, Second, Third, etc. – defined by certain economic parameters. This is clear in the agenda for the 1990s International Decade of Natural Disaster Reduction (IDNDR), which was committed primarily to deploying existing knowledge in the richer nations and advanced sciences, and training or technology transfer, for others (Table 3). This sense of geography has become so entrenched in the thought and language of these problem fields that it can seem almost impossible to speak of other and different geographies. At least they do place questions of geography at the heart of these problems.

Like a growing number of geographers, I would challenge the general validity of this picture of how the globe is divided up, and its automatic usefulness for our concerns. One is surprised that so many working in the international arena are comfortable with it. Meanwhile, transfers of knowledge and assistance between those 'worlds', and in terms of their stereotypical differences, can create more problems than they solve. The measures expressed in such gross and stereotyped divisions hardly recognise the actual

Table 3 International action on natural disasters

- (a) Extracts from the United Nations resolution declaring the 1990s an 'International Decade for Natural Disaster Reduction' (Resolution 42/169, December, 1987)
- Recognizes the importance of reducing the impact of natural disasters for all people, and in particular for developing countries;
  - Recognizes further that scientific and technical understanding of the causes and impact of natural disasters and of ways to reduce both human and property losses has progressed to such an extent that a concerted effort to assemble, disseminate and apply this knowledge through national, regional and world-wide programmes could have very positive effects in this regard, particularly for developing countries;
  - Decides to designate the 1990s as a decade in which the international community, under the auspices of the United Nations, will pay special attention to fostering international co-operation in the field of natural disaster reduction;
  - Decides that the objective of this decade is to reduce through concerted international action especially in developing countries, loss of life, property damage and social and economic disruption caused by natural disasters, and that its goals are:
    - To improve the capacity of each country to mitigate the effects of natural disasters expeditiously and effectively, paying special attention to assisting developing countries in the establishment, when needed, of early warning systems;
    - To devise appropriate guidelines and strategies for applying existing knowledge, taking into account the cultural and economic diversity among nations;
    - To foster scientific and engineering endeavours aimed at closing critical gaps in knowledge in order to reduce loss of life and property;
    - To disseminate existing and new information related to measures for the assessment, prediction, prevention and mitigation of natural disasters;
    - To develop measures for the assessment, prediction, prevention and mitigation of natural disasters through programmes of technical assistance and technology transfer, demonstration projects, and education and training, tailored to specific hazards and locations, and to evaluate the effectiveness of those programmes;
  - Calls upon all Governments to participate during the decade for concerted international action for the reduction of natural disasters.
- (b) From the 'Draft Strategy and Plan of Action for a Safer World', which came from a mid-term IDNDR World Conference in Yokohama, Japan, 23-27 May, 1994. The extracts show, in places, some much revised emphases (after UN/DHA, 1994c, 33-4)
- development of a global culture of prevention as an essential component of an integrated approach;
  - adoption of a policy of self-reliance in each vulnerable country and community, including capacity-building as well as allocation and efficient use of resources;
  - improved risk assessment, broader monitoring and communication of forecasts and warnings;
- The Conference also affirmed the relationship between sustainable development, environmental protection, and disaster prevention, mitigation, preparedness and relief.

Table 3 contd.

However, even regional action may not reach far enough. The modern world is highly independent and in some cases international initiatives will be necessary. In particular, the Plan of Action adopted by the Conference hoped for:

- disaster prevention and mitigation will become an integrated component of development projects financed by multilateral institutions, including the regional development banks;
- the activities of the United Nations, Governments, NGOs, the private sector and other disaster mitigation actors will be more closely co-ordinated.

The General Assembly will be asked to consider adopting a resolution endorsing the Yokohama Strategy.

differences among settlements, regions, countries and environments. The sets of state units defined miss many of the complexities within, and decisive linkages between, places and peoples.

We will find that danger and damages in disaster are often more strongly differentiated within countries, communities and events than between them. They can arise through dangerous interactions of the different 'worlds', rather than what distinguishes them. Their treatment can hinge mainly on how countries in these seemingly different worlds interact, and whether they share or ignore common concerns.

### Contested views and approaches

In fact, we begin our investigations at a time of re-examination of approaches to risk and disaster. This includes the International Decade, as the revised agenda from the mid-term Yokohama Conference suggests (Table 3,b). These debates will be addressed especially in the concluding chapter, but they have been an important factor in deciding the balance of concerns and emphases in the present text and need to be raised here.

In preparing this book, another aspect of the dichotomy discussed at the start has influenced my sense of purpose and direction. On the one hand, a remarkable number of new texts, compendia, conference reports and manuals have come out in the past four or five years, or revisions of older ones. The quality is often high. They deal well with many of the topics that I had expected should be covered here, and I will direct the reader to them.

What troubles me is the impression so many give, that hazards and disasters are much better understood, more cut-and-dried problems, than seems warranted. Authors tend to plunge as directly as possible into presenting technical knowledge developed by their own discipline, or of specific conditions, processes, events and organised actions. They present them as though they are unproblematic and clear understandings of the key issues. And even an intro-



ductory text like this one, whether for educational or professional use, must try to be clear, if not authoritative. It can hardly be written by someone who is confused or negative. However, overconfidence here seems more likely to confuse or mislead the reader than a certain scepticism, for, on the other hand, there is the dismaying incidence and scope of the disasters that keep occurring. They seem to outpace our knowledge and texts as much as the ability to reduce risks. The disasters we will consider reveal extraordinary and, in many places, growing vulnerability and loss for growing numbers of people. As discussed earlier, this is not confined to places notable for their impoverishment and harsh environments or corrupt administration. It applies, if in different degree, to countries and places where one could expect that our best understanding and practices are, or should be, available.

A spate of recent disasters overwhelms more than just existing arrangements to reduce or respond to crises. They challenge relevant understanding, cherished beliefs and expectations. The events might seem to be age-old problems of flood or storm; building collapses or transport accidents; malaria or tuberculosis epidemics in crowded, impoverished populations; or another war between old enemies. But they occur where it had been thought the problems were solved or unlikely to recur. Too often, it turns out that 'new' developments have fatally ignored, or have given a new potential to, old problems.

Meanwhile, reports of novel technological and disease 'scares' come across one's desk weekly, with claims that they are poorly researched, lacking even 'base line data'. It might be a new strain of drug-resistant disease, the side-effects of a popular technology or habit that could fill the hospitals to overflowing a few years down the line. Seemingly, new groups, social movements and weapons deployments exist against which there are few or no defences. Conference proceedings and compendia draw attention to these emerging dangers: sea level rise, the hole in the ozone layer, 'mad cow' disease, the Ebola outbreaks in Zaire, radon gas in homes, nuclear terrorism, contaminated blood – the list could go on and on. And this is to highlight the sorts of fears and crises that have caught the attention of the media and governments. New charities, lobby groups and even 'disciplines' spring up to address emerging or poorly recognised dangers, and to champion the needs of their victims. Often they demand new forms of risk assessment. They question the system of priorities or recommend radical changes to legislation and expenditures. No doubt this follows, in part, from the real pace of change and innovation in industry and employment, consumer fashion and geographical linkages. But it also creates doubts about established scientific and professional approaches.

In this book, the field of public safety and disaster will be examined as itself being problematic. This is already a familiar theme in the related problem fields of economic development, population control, health care and national security. There is more to such public and global concerns than just applying the latest knowledge, or well-crafted legislation, to problems that occur 'out there'. A critical and searching approach, rather than a merely prescriptive one, seems warranted by present conditions.

### *Suggested reading*

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**Part 1**

**Approaches to risk and disaster**

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## CHAPTER 1

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### Risk and damaging events

Anything can be a risk; it all depends on how one analyses the danger, considers the event.

Francois Ewald (1991, 199)

All kinds of intangible notions . . . are put forward as being the 'facts' of violence, but violence is an event not a condition. Violence is always an event, some say it is the most decisive kind of event possible.

Gil Elliot (1972, 15)

#### Approaching danger

##### Damages and risk

The understanding of hazards and disaster involves two broad areas of enquiry. We are concerned with actual damages, their incidence and distribution; and with how to explain them.

Damage is the empirical evidence of just how, where, and for whom danger is realised in harm. Death and injury, destroyed crops or buildings, and failed projects and emiseration are of foremost practical and humanitarian concern. Moreover, the processes or phenomena of damage tell us what needs to be addressed. Harm done is the unequivocal measure of the protection people did not have, but do require.

We pay attention to actual devastation and violence because they are more terrible, or at least, more final, than their possibility. When they occur, the community, civil society or technical plans have already failed. Efforts to respond to and reduce disaster pay, or should pay, most regard to its victims. In the places where disaster has occurred, our enquiries can be informed by the experience and concerns of survivors, those who have been 'at the sharp end' of these dangers. Safety measures, the limits of people's ability to cope, and the practices and performance of responsible agencies are truly tested in damaging events.

Second, however, there is the question of how people are placed in danger; the conditions that lead to disaster or may do so. What is it that promotes, limits or destroys public safety? In answering this I begin by rejecting a view of disasters, or most of them, as 'bolts from the blue' and so-called Acts of God; whether from unpredictable natural forces or human accident and failure. Earthquake and flood or oil spill and explosion may be the immediate or 'proximate' causes of disaster, and they may or may not be predicted. However, the severity and form of damages depend primarily upon the pre-existing state of society and its environmental relations. The argument supported here is that safety, and lack of it, are set up in the time before disaster happens. Security or danger are created and changed by human action. Thus, the assessment of danger goes well beyond actual damaging events. We find disasters being prepared by everyday life, in chronic areas of neglect and in disregarded implications of social change. This is not to say there are no surprises. Most people, even specialists in the conditions involved, often fail to anticipate the disasters that happen. But particular failures to anticipate future events are not the same as saying they are independent of preceding human activities and risk-taking choices.

The idea of 'risk' conveys a fuller sense of the field, in that it embraces exposure to dangers, adverse or undesirable prospects, and the conditions that contribute to danger. Thus, risk analysis considers, especially, potential and assessed dangers. The well-developed approach to insurable risks employs past damages to define profiles of danger attached to groups, activities and places having particular attributes. It provides a sense that risk resides in the fabric of everyday life or given projects. We do not have to wait for a disaster to say and to do something about it. If a certain material or design of building increases the fire hazard, replacing or changing it changes risk, hopefully with no fire.

For our purposes, this also directs attention to the human ecology and geography of conditions that promote or reduce safety. It suggests that risk is, in the broadest sense, continuously and socially constructed. It promotes an active and adaptive view of the responsibilities of human societies. That is how the notion of risk will be developed throughout the text. It is not, however, the only one in this field.

### Assessing risks

Modern notions of risk developed especially from economic enterprise, or 'speculative risk', in which both favourable and adverse future results are at issue – benefits or profit, and losses. There is also a deep connection with gambling and games. Through the 'theory of games' it has been applied to some of the dangers of interest here, notably conflict situations. The problem of risk is also seen to apply to the chances of 'winning' and 'losing'. However, questions of public safety and social security, of insurable and disaster risks,

have generally focused on adverse outcomes, their likelihood and possibilities for prevention or mitigation.

The adverse side of financial and property risks is helpfully discussed in texts on insurance. Risk estimation from empirical evidence is used especially in the 'actuarial' approach of the insurance industry. This employs tables or profiles of risk for persons, property or enterprises based upon their past performance. Unfortunately, the approach is poorly developed for the more extreme and novel dangers that concern us. The use of census-type, mass statistical indicators, such as probability of death, an 'accident' or a certain financial loss, is useful in exploratory work and to establish broad comparative overviews of risk. It helps clarify issues and debates over national priorities and broad regional or social differences, as seen in those between countries and by gender. However, there is a danger of greatly oversimplifying problems, the way in which they arise, and the concerns of those at risk.

There is a struggle between a narrow, essentially quantitative, technical view of risk and a broad social and cultural one. The narrow view seeks to estimate the probability of a certain measurable (adverse) outcome in a specific system or population. The purpose is to predict the frequency of, say, deaths and injuries, accident or monetary loss, over time or space, and in a way commensurable with other risks. Some regard this type of risk analysis, or even more rigorous formulations, as the only 'scientific' or sound approach. It is well-suited to technical work for well-defined practices and in planned projects, major areas of concern in which specialised technical knowledge is essential. However, the damaging events and human losses that concern us most are primarily threats beyond, or that break out of, technical and institutional frameworks. Where public and environmental safety are involved, we have to consider substantive issues not amenable to narrow and detached definition. Indeed, in such cases, problems of equity and responsibility, values and expectations loom larger and must be taken into account.

Technical risk assessment seeks to lay a grid over all eventualities in quantitative, standardised terms that are permanent and independent of the experience and the event. It may be in terms of probabilities of occurrence, costs, indemnity as percentages of all losses, or tabulated against other risks. And perhaps these are sensible methods for establishing impartial government policy, viable insurance schemes, and the resources needed for emergency preparedness. But in a human ecology of civil responsibility, danger and disaster involve more considerations than such grids of calculation. The sources and realities of danger for the people and places affected are of another order. For the person who loses the possessions of a lifetime, a loved one or a limb, damage is unique and irreparable. For the community whose town is destroyed by an earthquake or a bombing raid, the difference between before and after the event, between this lost place and surviving places round about, is profound and irreversible. Meanwhile, in many contexts around the world, there are few or no standard and representative data suited to formal risk assessment. What there is can be misleading or irrelevant. The researcher who

wishes, or is required, to present the problem in that way must begin on the ground with direct observation and, often most effectively, by listening to the concerns and observing the ways in which those who live there cope with dangers.

Technical risk analysis has developed mainly with high-technology-high-risk dangers in mind, and in the hands of technical specialists. It has been applied in such areas as nuclear power, liquefied natural gas, oil pipelines, space weapons, genetic engineering or toxic chemical facilities. A special preoccupation has been the, as yet unrealised, potential for harm in new high-energy innovations and megaprojects. There has also been growing concern with the risks of 'global change' in, for example, future impacts of climate variability or sea level rise. These too are important issues. However, the vast majority of hazards and damages we consider involve dangers to or from more commonplace technologies and everyday activities. They have no lack of precedents. They occur especially in places and for people who lack or have been denied modern, technical protection. To the time of writing, well-known if not age-old threats are the largest part of the actual landscape of human misery – losses in flood and storm; rail, road and marine transport 'accidents'; cholera epidemics and famines; and environmental or civil disasters brought about by 'conventional' warfare.

With these issues in mind, a broad, vernacular interpretation of risk is employed here. It seeks to take account of the varieties of experience and contexts, action and interactions around the world. A human ecology of risk is presented whose purpose is to describe and interpret the conditions that endanger or improve the security of communities.

## Perspectives on risks

### The conditions that endanger

For any form of danger or disaster, four broad sets of influences over risk or safety can be identified. Each contributes to danger and the form of damaging events, and describes major ingredients of a human ecology of disaster. They may be defined in terms of:

- hazards,
- vulnerability and adaptability,
- intervening conditions of danger, and
- human coping and adjustments.

You could call them the conditions or 'elements' of risk. Each involves a particular view of the realities of danger and response. In a disaster, they provide a perspective on the origin and nature of impact and loss, of survival and destruction. However, in most of the literature in this field they are found as distinct perspectives, often developed alone, with one or another taken to be more fundamental or useful.

### Hazards

Often used to describe the whole field, a 'hazards' view emphasises phenomena, usually 'physical agents', in the natural or artificial environment that pose threats. Strictly speaking, something is a hazard to the extent that it threatens losses we wish to avoid. It is not the flood that creates risk, but the possibility of drowning or losing one's home. An earthquake or explosion that cannot adversely affect a society is not a hazard for it.

More careful discussions reflect these intrinsic meanings. For example:

A hazard is a negative outcome which may take such forms as loss of life . . . risk is the probability that a particular negative outcome will occur . . .

Ziegler *et al.* (1983, 17)

The concept of hazards as external events impinging on unsuspecting people has been shed in favour of the interpretation that they emerge from interactions between people and environments.

Mitchell *et al.* (1989, 107)

Yet, looking at the range of hazards work, these more sophisticated definitions apply to a small part. Most studies continue to treat hazards as objective conditions or agents in our environment – earthquakes or droughts, industrial explosion or oil spill, armed insurrection or economic blockade (Table 1.1). They are usually investigated as particular natural, technological or social processes. They may be considered as events like a tornado or forest fire, or conditions such as high temperatures or civil unrest. It is sometimes useful to look at specific harmful processes or substances, such as structural stresses, waterlogging, high-energy radiation, carbon monoxide or dioxin.

Because of our interest in the more extreme and novel dangers, hazards are also often defined in terms of *thresholds*. It may be the depth at which flood waters will start to do damage; the wind speeds or snow loads sufficient to damage buildings; or the radiation or toxic chemical dosage at which unacceptable harm may begin (see Chapter 3).

The investigation, modelling and attempts to predict such hazardous physical agents have been the main thrust of this field. Most work still tends to construct risk in terms of the attributes of dangerous conditions or processes. Hazard-based and hazard-specific work has been so pervasive that a *hazard perspective* prevails. It will be the focus of Chapters 3, 4 and 5. However, although hazards described as objective agents are necessary, they are not sufficient conditions for damage or to initiate a disaster. Other conditions of risk are also involved.

Risk and damaging events

Table 1.1 Hazards: broad classes of dangerous agents that may cause exceptional damage and disasters

<i>Natural hazards</i>	
Atmospheric	e.g. hail, snow, tornadoes, hurricanes, blizzards
Hydrological	floods, sea-ice, glacier advances, drought
Geological	landslides, earthquakes, volcanic eruptions
Biological	epidemic diseases, blights, insect plagues, forest fires
<i>Technological hazards</i>	
Hazardous materials	physical (asbestos fibres), chemical (dioxin), inflammable (toluene), biotech (genetically engineered)
Destructive processes	structural failure, explosions, mass fires, ionising radiation
Devices, machines	explosives (e.g. TNT), aircraft, oil tankers, biocides
Installations	power plants, dams, LNG terminals, pipelines
Sector, organisation	petrochemicals, airlines, road transportation, mining
<i>Violence and war hazards</i>	
Weapons	conventional (firearms, bombs), 'dubious' (incendiary, chemical, biological, nuclear)
Release of dangerous natural forces	fire setting, triggering landslides, avalanches, floods, weather modification
Release of dangerous technological forces	targeting fossil fuel stores, nuclear facilities, chemical plants, dams and dykes
Armed forces and weapons systems	'special forces', strategic air power, guerilla forces
Strategies and tactics	economic blockade, environmental warfare, ethnic cleansing, sieges, counter-city bombing

Vulnerability and adaptability

This refers to attributes of persons, or activities and aspects of a community that can serve to increase damage from given dangers (Table 1.2). Decisions or actions relating to a hazard, whether deliberate 'risk taking' or preventive measures, are obviously relevant but will be treated separately. Meanwhile, much of human vulnerability arises, or is decided, with little or no regard to the particular hazards of, say, earthquake or toxic chemicals release. Rather it derives from the activities and circumstances of everyday life or its transforma-

Table 1.2 Vulnerability: some of the basic forms in which it arises

1. *Exposure to dangerous agents* and environments.
2. *Weaknesses*: predisposition of persons, buildings, communities or activities to greater harm.
3. *Lack of protection* against dangerous agents and for weaker persons and items.
4. *Disadvantage*: lack of the resources and attributes to affect risks or respond to danger.
5. *Lack of resilience*: limited or no capability to avoid, withstand or offset and recover from disaster.
6. *Powerlessness*: inability to influence safety conditions, or acquire means of protection and relief.

tions. How vulnerable people are may depend upon their age, gender and health status, and how society treats its members or different groups. Vulnerability also depends upon the quality and siting of buildings and land uses; public infrastructure and services; and ways of life and political authority. These are critical features of the exposure, safety and resilience of people in the face of dangers. A major concern in the modern and modernising world is how vulnerability can be affected more or less drastically by social change and patterns of development.

Like 'risk' and 'hazard', vulnerability describes a potential state of affairs. I am vulnerable to things that can happen to me, but they may not. I share a similar vulnerability with other persons similar to me in age, gender, life-style, wealth, or proximity to a dangerous facility. I am more vulnerable to certain dangers, less so to others, according to my characteristics and situation. My relation to some specific danger is not all that counts; the aspects of my life that may affect my ability to withstand, avoid, or cope with particular stresses are also important. In that regard, my personal attributes are much less important than my relations to and participation in collective life – the rights, protections and shared responsibilities I enjoy, or lack of them.

Vulnerability to natural and technological hazards has been treated in a variety of ways, often as simply exposure to hazards – 'being in the wrong place at the wrong time' (cf. Livermore, 1990). That is how it appears in notions of 'high-hazard locations' and 'harsh lands'. The geography of vulnerability is then defined by human occupancy of flood plains, drought-prone areas and war zones, for example. Vulnerability then becomes essentially part of a hazards perspective. However, its main significance as a distinctive element of risk arises with danger uniquely dependent upon the state and capacities of those at risk.

Vulnerability involves, perhaps above all, the general and active capacities of people – what enables them to avoid, resist or recover from harm. Whereas a

hazards perspective tends to explain risk and disaster in terms of external agents and their impacts, vulnerability looks to the internal state of a society and what governs that. In relation to collective life, access or rights to services, information, support and protection may be crucial. Vulnerability in the modern world depends, perhaps most fundamentally, upon the legal, political and moral frameworks of civil society. In more traditional societies, it depends upon customary obligations and communal support structures. People vary greatly in such terms.

When Mary Douglas (1985, 27) defined 'hazards' as, ' . . . inability to cope', in a sense, she subsumed *hazards* under what is here being described as a vulnerability perspective. Danger from whatever may be 'out there' becomes primarily a question of whether societies have the means and ability to respond adequately. What is regarded as 'adequate', as Douglas's work emphasises, will itself be strongly dependent upon culture.

While 'vulnerability' suggests weakness and defencelessness, studies in this perspective actually challenge a common view of people as merely passive or unwitting victims of disaster. It is as much a question of the protection and active capacities people have, or are permitted, as the hazards they are exposed to and their innate weaknesses. We will find the geography of risk or disaster, in this regard, depends most critically upon *differential vulnerability* within and between societies. Moreover, danger and damages in disasters often relate to the most dynamic aspects of people's lives and history, social movements, environmental changes, and economic development. These are invariably reflected in changed, increased or decreased vulnerabilities. Likewise, social change tends to dramatically improve or undermine people's capacities to cope with, and adapt to, dangers.

Although not as widely employed as the hazards viewpoint, there is an emerging *vulnerability perspective*. The sense in which it is important will be developed in all chapters, but is the particular focus of Chapter 6.

### Intervening conditions and contexts of danger

These draw attention to aspects of the habitat and society not directly related or tied to a given hazard, or human vulnerability to particular stresses. The emphasis is on circumstances that may intervene between the two. For instance, soil type, topography, vegetation cover and water tables can have a decisive influence upon the severity and impact of earthquakes on built structures. But these conditions themselves depend neither upon seismicity nor the built environment. They have their own, distinct geographic patterns. They intervene between seismic events and vulnerable structures, and to a different extent from place to place. Similar arguments apply to the way topography and tree cover can intervene to magnify or moderate impact and damage in severe snow storms, or topography and temperature inversion in the problems of photochemical smogs.

Equally, institutional and cultural phenomena may buffer or focus damage, without being tied to specific vulnerabilities or agents of damage. The form and development of settlements, occupations, and who is obliged to live where, also happen to be critical for storm or flood risks. International grain prices and local grain stocks can influence whether famine will be allowed to develop in a particular country. Food distribution policies and market prices can decide who, and how many people, will starve, even where sufficient food is actually available.

There is some artificiality in speaking separately of 'intervening' conditions. They could be called secondary hazards or contingent vulnerabilities. However, the issue is one of developing an adequate awareness of the circumstances that shape risk, loss and human response in different places. It is to make the case for looking more broadly at the *social and environmental context* of dangers. That avoids a common tendency to neglect influences not peculiar to a given hazard or aspects of society that are wreckable by it. Risk is recognised as part of the circumstances and settings of people's lives, and essentially a predicament integral to ways of life.

In modern societies, work and the responsibilities of most people tend to be specialised, even highly fragmented and alienated from each other. Yet our 'ecology' is pervasively mediated by and connected through artificial structures and public institutions. The energy and water supplies of cities, highway systems and police, mass media and the courts, taxation, education and national security are interrelated infrastructures or regulatory systems. Together they mediate and allocate danger. They not only stand between society and nature, but between the general public and particular institutions, and between different technologies. That surveys have found most North Americans and Europeans tend to rank socioeconomic and technological dangers higher or worse than natural hazards makes sense in terms of their experience. However, even where technology is less powerful, or people are in close and continuous contact with natural conditions, social arrangements are equally critical to danger and response.

The mediating conditions and contexts of risk are, in many ways, the key to its human ecology. They should show how particular vulnerabilities and exposure to hazards are prefigured by the social order and material life, and their relations to the habitat. Unfortunately, social change and economic development often occur without reference either to given hazards or changing vulnerabilities. Yet they are context-altering forces that drastically affect people's resilience and ability to recover from losses. This is the main concern of the case studies in Chapters 9 and 10.

### Coping in disaster and adjustment to risk

Here we consider both what people do when confronted with dangers and crisis, and communal plans to reduce danger or prepare for emergencies. In an impending crisis or disaster, people's capacities to respond and what they

do, how well or quickly they recover, involve active responses. These in turn relate to who the victims are, their situation or responsibilities, what conditions were like before the disaster and contexts of recovery. Hence, the social geography of disaster responses, and what the testimony of survivors reveals about their concerns and losses, are important considerations.

Professional studies have given more attention to planned and official measures, especially by governments. These may be directed at hazardous processes and conditions, or at reducing vulnerability. They may be intended to adapt settlement and land use more favourably to intervening conditions. Organised emergency measures and humanitarian assistance in disaster are also major areas of study. These can reduce damage and speed recovery. Less often considered but perhaps more effective is how societies can improve public safety in a broader sense through general material uplift, social security measures, and broad legislation to protect people's rights.

The notion of 'a range of adjustments' to hazards, developed by Gilbert F. White and co-workers, was a major initiative by geographers and will be discussed at some length in Chapter 7. The idea had its origins in the 'multiple use' view of natural resources. It seeks to establish the set of possible accommodations to given hazards, and the best mix of them, that is, rather than undue reliance upon single solutions such as had prevailed, for instance, in the approach to flood hazards in North America through engineering control works.

The notion of alternative adjustments has also been directed mainly at planned responses by government. However, White emphasised the question of choice and the adjustments people at risk choose or would prefer. Much of the work which he set in motion considers the *choice of adjustments*, and the willingness of responsible agencies to pay attention to public preferences. The result has been to situate hazards problems in the realms of human decisions and public policy.

An important theme is the way the adjustments which people consider and make depend upon social organisation, and the *capacity* to choose adjustments – or lack of it. Choice is constrained by status and rights within a society. It is found to turn, for instance, on the way children and the elderly are treated, the position of women, or the situation of disadvantaged groups generally. Those least likely to have a voice in public safety and risky developments are so often the ones to suffer most in disasters. Freedom to choose seems to be as important as knowing or working out possible choices. And here questions of response are linked, especially, to those of vulnerability – which, in turn, is linked to the influence and resources of people at risk. Drawing these concerns together, we can begin to define an *active perspective* on risks, the focus of Chapter 7.

Four sets of factors enable us to define an initial profile of the conditions involved in danger (Fig. 1.1). At the same time, the risks which may arise from each imply, and are realised in, particular dangers and damages. Damage occurs when the relationships are unfavourable, disaster in the worst cases.

	HAZARDS	VULNERABILITY	INTERVENING CONDITIONS	PLANNED INTERVENTION
<b>Elements</b>	Agents Natural Technological Social	of Persons Property Activity Land use Value system	Context Habitat Built Environ. Social Cultural	Control works Forecasts Insurance E.M.O. Religious
<b>Damaging Events</b>	Impacts Casualties Damages Duration Areal extent Recurrence	Victims Losses Displacement	Damage process Primary Secondary Tertiary	Emergency measures External Aid Reconstruction

Fig. 1.1 Elements of risk and their place in damaging events

#### Damage: primary, secondary, tertiary

Each condition of risk has a bearing upon the forms of damage, whether they occur, and how severely they are realised in:

- loss of life, injury and impairment of persons;
- destruction of property, resources and heritage;
- disruption of activities, and denial of supplies and services;
- cultural, spiritual and ethical violations.

Each of these involves a variety of specific processes. They relate to the impacts of particular hazards, the vulnerabilities of particular persons, groups or activities and the concern or values of collective life (Table 1.3).

An important part of the case for a broader, human ecological perspective on risk and disaster stems from the observation that not all, and not always the main, losses come from the immediate impact of a given danger. Damage may be started by, say, earthquake shaking, falling snow, or industrial explosion. But other damages can follow on in *secondary* or *tertiary* processes. For example, the destruction of San Francisco in 1906 or Tokyo in 1923 was largely by fire, a *secondary* consequence of the earthquakes with which the disasters are generally identified. The presence of domestic fires and fuel stores in densely occupied, inflammable areas and windy conditions transformed earthquake damage into an even more devastating process, urban mass fires.

Secondary impacts generally involve secondary hazards. The Vaiont dam disaster of 1963 in northern Italy was initiated by a large landslide, but most of the 2500 lives lost and much of the property destruction were due to a flood wave. The waters were forced out of the reservoir by the landslide, over the dam and into the valley below, where property and population were exposed.

Tertiary damages may come from impairment of general social functions. Disease outbreaks can follow floods or typhoon destruction. There may be



delayed economic effects and forced migration, as survivors are unable to find work. Sometimes these can harm more people than the primary damages. We encounter examples where the worst of a disaster seems to have come *after* destruction by flood or earthquake, fire or warfare. It may even involve inappropriate, exploitative or unduly delayed actions by government and international agencies. A community may prove incapable of resolving conflict and blame arising from the disaster.

Relief measures are often critical to the course which a damaging event may take, perhaps heading off secondary and tertiary damages. Timely relief may spare people a range of other hurt, for example from exposure to the elements if their homes are destroyed, or starvation if their means of livelihood are lost. The extent and focus of rehabilitation and rebuilding may decide whether a

*Table 1.3 Profiles of damage in three disasters*

**a) Hurricane Alicia, Texas, 17–18 August 1983 (after US National Academy of Sciences, 1984)**

Total loss estimates		
Human lives lost	17	
Injured	3243	
Temporarily evacuated	25 000	
Made homeless	3000	
Property damage	US\$0.7–1.6 billion	
Housing units damaged or destroyed:		
	Destroyed	Minor damage
Single-family homes	1209	12 472
Mobile homes	455	1034
Multi-family units (apartments, etc.)	633	2857

**Losses in Galveston, Harris, Brazoria and Chambers counties**

Types of loss	Value (millions of dollars)	
Residential	100	(9500 structures)
Commercial	9	(300 structures)
Industrial	4	
Public facilities	1	
Roads and highways	1	
Utilities	60	
Vehicles	19	(6250 vehicles)
Agriculture	51	
Marine	10	
Total	250	

*Table 1.3 contd.*

**b) Earthquake, Mexico City, 19 September, 1985 (after Oliver-Smith and Hanson (eds), 1986)**

Total human lives lost (officially 7 000)	20 000*
Total injured	40 000*
Total left homeless or with damaged homes	350 000*
Total receiving temporary shelter	30 000
Total persons unemployed	150 000
Total schoolchildren without classrooms	650 000
Total buildings destroyed (listings by category not available)	1091
Total buildings damaged:	
Residences	5025
Schools	3072
Offices	800
Services (public markets, recreation centers, theatres)	254
Commercial	244
Industrial	81
Hospitals (500 beds, 30% total)	24
Total vehicles destroyed:	
Private	1200
Public transport units	300
Total small industries affected:	
Retail damage	526
Total loss	800
Total insured damages	US\$4 billion

**c) Urban air raid: the 'firestorm' raid on Darmstadt, Germany, 12 September, 1944 (see Chapter 11)**

Casualties (civilian)	Total	Women	Children
killed	10 550	41%	32%
injured	3 750 +		
Homeless (bombed out)	50 000		
Built-up area razed by fire	2km*		
Inner city destroyed	82%		
Buildings	Totally destroyed	Heavily damaged	Moderate to light damage
Residential: Buildings	4 563	891	12 687
Homes	17 332	2385	22 209
Commercial	871	243	869
Public	69	45	120
Industrial	5	27	38

\* Estimates

### Risk and damaging events

community, or parts of it, suffers severe tertiary consequences, or fails to survive at all.

In fact, it is doubtful if many disasters, for some or all people and activities, conform to the stereotype of a single, massive blow, followed by a process of recovery. Perhaps relief goods do pour into an area, buildings pop up quickly and certain economic activities are resumed. The media or relief agencies are then likely to lose interest. Yet there may still be many, perhaps a majority, of the community suffering delayed harm or demoralisation. Follow-up studies that recognise this situation are few, but sufficient to give weight to such concerns. In the case of social violence, of course, there may be long-term, systematic undermining of groups targeted for oppression or successive blows against a place or population. Unless they are relieved, find effective means of resistance and protection, or are annihilated, the disaster has no real end.

What these points emphasise is that, although a particular hazard may initiate the damage process, its later course depends upon other conditions in and around the impact zone. The sense in which all four conditions of danger enter risk and damage is reinforced, as well as the need for human ecological understanding of context and community.

### Events and places

To neglect any of the elements of risk, or the damages when they combine adversely, is to miss essential ingredients of risk. Nevertheless, as the previous section began to reveal, the most significant aspects of risk relate to how these elements can and do interact. That requires us to move from types or lists of factors to the features of damaging events and extreme situations. Then, the elements of risk appear and combine in specific processes of harm and constraints upon human response.

Most damages considered in this field occur in more or less well-defined events, especially crises and disasters. 'Routine' dangers may kill more people or cost more, but the large damaging event, concentrated in time or space, is clear evidence of out-of-control and out-of-place dangers. It is an *event*, in the sense described by Gil Elliot at the head of the chapter: a rift experienced in the routine or developmental.

A disaster is, also, always peculiar to and identified with a place, the inhabited area where destruction occurs. Disasters are remembered by and especially *in* the places where severe losses occurred. Sometimes the disaster and the place coincide almost completely, as with Bhopal, Aberfan, Love Canal or Nagasaki. Sometimes a particular place, perhaps where a disaster began, or the worst hit and most horrific location, comes to symbolise a much more widespread calamity. The 'San Francisco earthquake' (1906), Chernobyl (1986), or Auschwitz (1941–1945) were the most concentrated places of harm in, or epitomised, much more widespread calamities. Nor is this just a question of labelling an event with a place name. It draws attention to the essential context of harm, the setting of the event, the importance of geography.

In this sense, I would reject a common view of disaster as, essentially, about forces or conditions from 'outside' a human settlement, an industry or a society, or erupting accidentally within it. That is, when natural disasters are attributed essentially to the incidence and scale of earthquake or storm; technological or social disasters to 'unscheduled' or human failings, accidents or violations. These may trigger the damaging event, but its possibility has deeper roots. Responses are as much about whom and what is affected as the immediate source of harm.

### Disasters

Concentrated, diverse damages and a collapse of the social fabric or its safety measures define disasters, or most of those that will concern us (Table 1.4).

*Table 1.4* Distinctive social conditions of disaster and disaster response

1. Disaster overwhelms and destroys some or all:
  - facilities and organisations responsible for caring for the sick, injured, dead, impaired
  - services and professions that usually respond to damage and restore facilities, i.e. fire-fighting, repairing public utilities, broken appliances, household plumbing and wiring faults
  - essential life and work support systems or 'lifelines', i.e. roads, pipelines and power lines; stores and outlets for food, fuel, clothing, etc.
2. Disaster prevents or destroys some or all of the activities or functions of society.
 

These may include:

  - economic production in fields, factories, workshops, etc.
  - service industries
  - consumer/retail trade
  - commercial business and services
  - schools, places of entertainment, civic institutions
3. Spatial disorganisation: isolating and fragmenting of communities or parts of communities from each other, and the larger administrative and economic space
4. Disaster not only fragments society, but breaks down or dissolves the separation of:
  - public and private domains
  - divisions of labour
  - age, gender and class barriers
  - institutional and professional responsibilities
  - levels and jurisdictions of governmental agencies

Disaster engages our attention because there is a fundamental shift in the scope and conditions of harm. Established responses break down, are destroyed or prove ineffective. Rather than private and scattered, the tragedies are public and concentrated. However, they may be concentrated in particular vulnerable sections of society.

Disaster damages are not only more concentrated or massive. They are socially complex and uniquely disturbing. Sometimes that is because particular types of person are victims – children, ‘innocent’ bystanders, defenceless groups. That brings a special anguish, blame or a sense of the violation of accepted values.

A disaster can disrupt or destroy many different sorts of functions and institutions all at once. It may bring society-wide or systemic crises. Hence, survival and recovery require the reintegration of a wide range of responsibilities which, in modern communities at least, tend to be carried out within particular institutions and distinct professions. Their collapse calls forth spontaneous, unofficial and non-specialist responses. That is one of the aspects that we refer to as *coping*, the actions of ordinary people or disrupted remains of institutions, in contrast to official and planned responses.

In the language of human geography, disasters are identified with landscapes of violence, and the disintegration of productive activities and public infrastructures. In human ecological terms, they destroy or undermine life support, the resources and established arrangements for producing and distributing supplies, and the relations with the habitat and surrounding communities. For survival, or at least to satisfy basic needs, an adaptive crisis response is thrust upon survivors – in due course, perhaps, with outside help.

The disaster itself is the core of our concern, but not necessarily of our work. For we are also, and in some ways more, concerned with why a disaster occurs and how losses might have been reduced. These are not only and from our perspective not mainly a function of the crisis itself. Rather, they appear as a result of pre-existing arrangements, or lack of them. In this regard, it is of note that disaster events are usually seen to involve ‘before’, ‘during’ and ‘after’ problems. Table 1.5 gives a more elaborate scheme.

Disaster work has focused mainly upon II, ‘the disaster’ and its particular phases. A danger of too much preoccupation with this, however, is the way it may minimise or disregard the preconditions and aftermath of disastrous damages. These seem to be the keys to the origin of disasters, and people’s ability to cope with and to escape from a disaster-prone condition. We will repeatedly look at disaster experiences, but especially as they reflect the harm to and problems of everyday life.

Famine is perhaps the best-documented case, where it has been shown repeatedly that starvation primarily affects, uproots and kills the already hungry. But the principle will be shown to apply much more widely. Social and environmental change are found to prefigure disasters for some even as they may improve life for others. Defence expenditures can end up fuelling aggressive wars, and the civilian and environmental disasters they cause. In the case

Table 1.5 Temporal sequences or phases that may be involved in disasters, with reported durations and selected features of each phase (cf. Barton, 1969, 50; Turner, 1978, 85)

<b>I Preconditions</b>	
Phase 1	<i>Everyday life</i> (years, decades, centuries) ‘Lifestyle’ risks, routine safety measures, social construction of vulnerability, planned developments and emergency preparedness.
Phase 2	<i>Premonitory developments</i> (weeks, months, years) Turner’s ‘incubation period’ – erosion of safety measures, heightened vulnerability, signs and problems misread or ignored.
<b>II The disaster</b>	
Phase 3	<i>Triggering event or threshold</i> (seconds, hours, days) Beginning of crisis; Barton’s ‘threat’ period: impending or arriving flood, fire, explosion; danger seen clearly; may allow warnings, flight or evacuation and other pre-impact measures. May not, but merging with:
Phase 4	<i>Impact and collapse</i> (instant, seconds, days, months) The disaster proper. Concentrated death, injury, devastation. Impaired or destroyed security arrangements. Individual and small group coping by isolated survivors. Followed by or merging with:
Phase 5	<i>Secondary and tertiary damages</i> (days, weeks) Exposure of survivors, post-impact hazards, delayed deaths.
Phase 6	<i>Outside emergency aid</i> (weeks, months) Rescue, relief, evacuation, shelter provision, clearing dangerous wreckage. Barton’s ‘organised response’. National and international humanitarian efforts.
<b>III Recovery and reconstruction</b>	
Phase 7	<i>Clean-up and ‘emergency communities’</i> (weeks, years) Relief camps, emergency housing. Residents and outsiders clear wreckage, salvage items. Blame and reconstruction debates begin. Disaster reports, evaluations, commissions of enquiry.
Phase 8	<i>Reconstruction and restoration</i> (months, years) Reintegration of damaged community with larger society. Re-establishment of ‘everyday life’, possibly similar to, possibly different from pre-disaster. Continuing private, and recurring communal grief. Disaster-related development and hazard-reducing measures.

of technological disasters, especially, Phase 2, or Turner's 'Incubation period' (1979), has been shown to be critical. This is when seemingly minor developments, conditions or evidence in the uncertain margins between jurisdictions can change the likelihood and form of disaster. Places outside the view or concerns of safety agencies, expertise or effective communication often prepare the ground for failure. Progressive changes in the character of everyday life may also create the conditions for disaster.

### Disasters and catastrophes

Disaster is usually identified with sheer numbers or concentration of casualties and damage. In these terms, however, if you want an exact definition, there will be many events in grey areas. What constitutes a disaster, by any given measures, varies enormously from place to place – as we would expect if geography and the composition of human societies are important in them. The problem varies according to the size and capacities of the social unit affected, the things it values and its ability to cope or receive help.

Events called disasters occur at many different scales and show wide differences in scope. Those reported as transportation and other technological 'disasters' in the media, for instance, may be only marginally the sort of event described above. They have some impact on or casualties among the general public. They are briefly the subject of national or international debate, perhaps with some people agonising over their implications, but they are still dealt with largely or wholly in a routine way. Response remains within their controlling institutions and specialised measures, or by existing police, hospital and other facilities. A Chernobyl or Bhopal, or the 1976 Tangshan earthquake, is of a very different order. Then again, there are disasters whose casualties and costs appear modest but which affect whole communities that lack arrangements for coping, or whose losses are specially tragic, insupportable or final.

Quarantelli (1984) has proposed a way to address these issues by recognising two levels of calamity, which he terms 'disasters' and 'catastrophes'. Each has some of the extreme, crisis features discussed above, but a 'catastrophe' arises if:

- Most or all of the total residential community is impacted.
- The facilities and operational bases of almost all emergency organisations are themselves directly hit.
- Local officials often are unable to undertake their usual work roles, and this extends into the recovery period.
- Finally, most of the normal everyday community functions are sharply and simultaneously interrupted.

For individuals and local groups there may be no discernible difference between the two cases, which depend on community or society-wide consequences. How they apply will also vary widely according to the culture, size and organisation of societies. If a society or segment of it is small *and* weak,

there may be more and smaller hazards that threaten catastrophe than if it is large and strong. Nevertheless, this sense of at least two levels of crisis or emergency highlights important differences among events that may be lumped together as disasters.

### Summary

The radically impaired social context in catastrophes transforms the terms on which trauma and loss are, and perhaps can be, treated. They create a distinctive area of human experience and social concern, but it is not one of merely static or 'impact' phenomena. Disaster is a context of active or emerging responses. Survivors as well as emergency organisations do act and adapt. That too, however, depends upon pre-existing conditions, and the experience and concerns of those involved. And it depends upon where and how people live, or 'geography that matters'.

### Suggested reading

- Barton, A. H. (1969) *Communities in disaster: a sociological analysis of collective stress situations*. Doubleday, Garden City, New York.
- Blaikie *et al.* (1994) *At risk: natural hazards, people's vulnerability, and disasters*. Routledge, London.
- Burton, I., R. W. Kates and G. F. White (eds) (1978) *The environment as hazard*. Oxford University Press, New York.
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- Mitchell, J. K., N. Devine and K. Jagger (1989) A contextual model of natural hazard. *Geographical Review*, 79 (4), 391–409.
- Shrader-Frechette, K. S. (1991) *Risk and rationality: philosophical foundations for populist reforms*. University of California Press, Berkeley.
- Waterstone, M. (ed.) (1992) *Risk and society: the interaction of science, technology, and public policy*. Kluwer Academic Publishers, Boston.

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**CHAPTER 2**


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## The 'geographicalness' of disaster

Geography does not denote an indifferent or detached conception: it concerns that which matters to me, or interests me, the most: my fears and cares, my well-being, my plans and ties.

Eric Dardel (1952, 46)

Of course, being out of Sarajevo, for people from Sarajevo, is also hell.

Ademir Kenovic (1993, 14)

### The space of danger and places of disaster

The geography of phenomena involves their whereabouts and distributions. It identifies their associations in spatial patterns, exchanges and interactions over the Earth. Human geography records, especially, the various, distinguishable habitats and cultural 'worlds', the places of shared existence around the globe. They are the subjects of the geographic or coexisting order of human life and environments. Three broad aspects appear important in the geography of danger and disaster.

#### The map of risk

First, there is a formal or mappable layout of risk-related conditions and damaging events. It was suggested in Chapter 1 that danger is a product of four sets of conditions – hazards, vulnerability, intervening conditions and context, and human responses. Each of these, or the particular phenomena they involve, has a distinct geographic arrangement. One cannot move from place to place, country to country – even within a village or urban neighbourhood – without some or all of them, and their mix, changing. With that, the degree and forms of risk change.

The variable overlap and interactions of these conditions create the map of risk. Damage and loss define the geographic space of their unfavourable overlap and its severity. Disasters mark the places where the interaction is most adverse.

If these dangerous conditions and relations, or suitable measures of them, can be identified, they provide a framework for technical analyses and practical response. Modern uses of geographical information are mainly in the realms of strategy and planning, monitoring, and administration. Work by geographers in this regard has been devoted especially to hazards mapping in such cases as flood plains or unstable slopes, and information systems for overlaying various ingredients of risk.

#### Spatial disorganisation

Second, hazards represent threats to the relations of society and habitat, to the practices and interactions that link human life over the Earth. Disaster is a disruption and unravelling of spatial or geographic order. Areas of death and destruction are more or less cut off from the organised functions of the larger society to which they belong. There is a breakdown or isolation of part or parts of the large space of political economy and civilised culture. That is obvious when roads or telephone lines are destroyed, when flood waters, deep snow or dangerous materials prevent movement within, or in and out of, an area. In the disaster zone itself there is a disintegration or ruin of living space. Its internal geography is a complicated map of worst hit, less severe, and unharmed people and property. Harm and survival, and human impairment and adaptive response, exhibit strong spatial variations.

As out-of-control or out-of-place problems for modern life, damaging events appear, especially, as geographic or spatial *disorganisation*. In the modern city and, increasingly, the modernised countryside, every aspect of life is linked to networks of control and supporting infrastructure. Disaster turns especially on loss of what are termed 'life lines' – the supporting structures that provide food, water and energy, or along which social and medical services are delivered. Destruction of these may threaten or harm people not touched directly by, say, storm or fire. Increasingly, rescue and relief in disaster zones, and their most costly aspects, are directed to restoring or replacing life lines, often superseding direct assistance to the victims.

#### The geography of fears and cares

A third aspect involves, in many ways, a different face of geography. It raises questions only hinted at thus far. This is the geography to which the quotations from Dardel and Kenovic speak – the geographicalness of experience and 'geography that matters'. It enters all levels of human organisation, from political decisions and legislation to popular concerns and humanitarian response. However, it is rooted primarily in shared identity with place and community values. The security of persons and ways of life, and our sense of

safety, are most intimately bound up with the place of residence and the world to which we belong.

As with other fields there is a tendency to talk in terms of 'expert' and 'lay' views of risk and disaster. Lay knowledge is often regarded as 'soft', 'subjective', even uninformed. That may well be true compared with specialised knowledge of any particular threatening phenomenon, or a larger geographical context. However, there is a basic aspect of geography that reverses this sense of expertness. It concerns the knowledge acquired by 'being there', of knowing conditions on the ground and as a member of a community.

The geography of belonging in or being estranged from places turns upon first-hand involvement and socially acquired knowledge, upon speaking the language in every sense. The known context and shared expectations frame the experience of danger and disaster. Place and memory give it meaning. Geographic understanding in this regard begins with and should not lose sight of the people and places in danger. And if our concern is with the places of risk, it is their inhabitants who are most knowledgeable about them, at least as they affect the lives at risk. The experience and concerns of those who go through damaging events involve insights which we do not have. We were not there. In many cases we have never been exposed to such threats or degrees of danger in our own lives.

The geographicalness of danger, as of security, is closely bound up with what is happening in our surroundings, among those we trust or have meaningful dialogue with. Disaster is experienced as the upsetting or collapse of feelings of security. At worst, the home place is destroyed, one's people decimated, perhaps exiled never to return.

Although raised last, these considerations need special emphasis. Often neglected in the technical literature, in official and professional responses, they are an essential foundation for a geography of danger and disaster. Hence, *extreme experience*, especially the testimony of survivors of disaster, is the focus of the remainder of this chapter. That will serve to highlight the people and places whose plight is our foremost concern. It also shows how 'geography that matters' becomes more overtly recognised and expressed when severely harmed.

## Dangerous geography

### Geographic shock: of being lost, alone and 'strange'

Survivors of destructive disasters recall, among some of their first sensations, not knowing where they are, even in their own homes. They speak of being disoriented, lost and unable to recognise anything. A tornado survivor recalls:

I've lived in this little town all my life. I mean, I was actually lost. I didn't know where I was at because there were no landmarks, nothing to go by . . .  
 quoted in Wolfenstein (1957, 58)

A woman describes a friend after bombing raids on her home town, Southampton, in southern England:

. . . she could have cried when she saw all the shops down and everything. She didn't know where she was . . .  
 quoted in Harrison (1976, 173)

At Buffalo Creek, West Virginia, after the terrible flood disaster of 1972:

"We find ourselves standing, not knowing which way to go or where to turn," said one survivor. "They should call this whole hollow the Bureau of Mismatched Persons," said another, "we're all just lost."  
 Erikson (1978, 210)

To be lost has two related meanings: of not being able to find one's way, and of being *misplaced*. Both seem intertwined in survivors' recollections. 'Our' geography, geography that matters, is usually identified with knowing exactly where we are, and by a sense of belonging. Well-being is hardly possible unless one feels relatively secure and supported by the place where one lives. Disaster certainly destroys that. The known surroundings become unfamiliar. The members of a community are or feel forsaken.

A related feeling, in the aftermath of great damage, is of being alone or of loneliness. A child recalled going with her family to search for relatives in the burning streets of Hiroshima after the A-bomb:

I had a terrible lonely feeling that everybody else in the world was dead and only we were alive. Ever since that time I haven't liked to go outside.  
 quoted in Osada (1959, 140)

Another of the Buffalo Creek survivors links the loneliness and the lost place:

My lonely feelings is my most difficult problem. I feel as if we were living in a different place, *even though we are still in our own home*. Nothing seems the same.  
 quoted in Erikson *op. cit.* (211, my italics)

'Loneliness' has a special significance when thousands of other survivors, including many persons known to these individual victims, have gone through the same disaster. It reflects how much of a person, or of some communities, is tied up with a place. To lose that creates feelings similar to being abandoned by the people who are close to you. The lost place can come to signify and act as a constant reminder of the whole disaster.

A further way in which this is expressed is the sense of being 'a stranger' or of feeling 'strange' *in the home area*. A man returning to his home town, Hannover, in Germany, after it was destroyed by bombing said:

I have the feeling that I am a stranger in my home town.  
 quoted in Hewitt (1994a, 30)

A flood survivor echoes and amplifies these sentiments:

We don't have a neighbourhood anymore. We're just strange people in a strange place. We feel our lives have been completely turned inside out by what has happened.  
 quoted in Erikson *op. cit.* (211)

To be a stranger, in its usual meaning, is to *come from somewhere else* and from a different social context. It is an essentially geographic predicament. Only those who live in a place can try to make the stranger 'feel at home' – if they so choose.

A survivor of a tornado brought these various feelings and their geographicalness together in recalling how she felt when emerging from her ruined home:

It seemed like a strange place, another world. I felt like I was all alone. It was the loneliest feeling in the world.  
 quoted in Wolfenstein *op. cit.* (93)

Again, there is a special significance when people describe the sense of being 'lost' or 'a stranger' without having left the sites of their own homes. The geographic sense of this catastrophic experience appears here in a metaphor of uprooting. Their physical location has not changed, yet they are lost. What was familiar has become strange. Where people had felt at home, they now feel like aliens.

In the modern world, some even more problematic and sinister conditions arise for residents of many different environments, especially people still intimately connected with the land. This relates to the problem of 'hidden dangers' (Ehrlich and Birks (eds), 1990) and especially what Robert J. Lifton (1969) described at Hiroshima as 'invisible contamination'. We move to a city or buy a house because a job is available and it is what we had always wanted and can now afford. We do not see and are not aware of some deadly poison in the ground, or a distant factory whose chimneys quietly release dangerous pollutants in our direction. The habitat can even seem very healthy. Its waters look clean, its air pristine. And yet they are dangerous to our health. Perhaps as bad, or worse, are the unsettling psychological fears, the danger of unwarranted but debilitating paranoia over unseen threats, and the many reports of how such dangers have been covered up.

Human senses do not give warning of these risks. Their signs, at least initially, may be ambiguous or suggest other explanations. One thinks of such places as Love Canal, New York; Grassy Narrows, Ontario; or the Rocky Flats nuclear weapons plant, Colorado. Each has involved life-threatening health effects from invisible chemical or radioactive contamination.

How can one comprehend or express the scope of the 1986 Chernobyl nuclear disaster? Scientists could trace the fallout and rainout. But what of people on the ground who could neither see nor feel the radiation? The meaning, in terms of 'strangeness' and 'geographic loss' for those living close to the land that was contaminated, was expressed with great poignancy by a woman of the reindeer-herding Sami in Norway:

It seems sometimes that things have become strange and make-believe. You see with your eyes the same mountains and lakes, the same herds, but you know there is something dangerous, something invisible, that can harm your children, that you can't see or touch or smell. Your hands keep doing the work, but your head worries about the future.  
 quoted in Stephens (1987)

Of course, disaster survivors are also often uprooted physically, another major part of disaster experiences. A survivor of the 1985 Mexico City earthquake described how:

. . . afterwards, when I had to face saving all I could from my house and leave it behind and, of course, change environment completely. Then, yes, I felt incapable of moving from one place to the other. I did not want to leave that spot . . . It was dreadful, so lonely . . .  
 quoted in Salgado (1988, 23)

These are not feelings that go away quickly, and may never do so for survivors of the most extreme losses. A survivor of the Holocaust (see Chapter 12) reported that:

. . . after liberation, I suffered probably more from the loneliness and the isolation, more than during the Holocaust period . . . I suppose it has to do with the fact that after, the life around you seems normal but *you* are abnormal . . .  
 quoted in Langer (1991, 23)

As part of the geography of lived space, the significance of such sentiments goes back to the nature of *dwelling*. It resides, literally, in those practices and contexts with which people have had intimate and usually long attachment. Bachelard (1964) argued persuasively, in *The poetics of space*, that it derives especially from, and remains most deeply attached to, the critical learning and socialising time of childhood.

Wolfenstein's (1957) classic work on 'how disasters affect people' contains many other comments of this kind and a discussion of them in terms of the individual psychology of distress and, especially, the feeling of *abandonment*. Thus, it becomes identified with the deep-seated psychosomatic traumas of birth, and the fear or experience of being abandoned as a child.

Dardel discusses human relations to home and world as a more general, mature result of occupancy or residency, of coming to terms with the Earth and humanised landscapes as our larger 'home'. In these terms there is always a

play of contrasts. Even within a house, there is a dialectic of the known and mysterious. The familiar landscapes can appear quite frightening in a certain light. Forests may seem friendly as well as threatening. City streets can be 'jungles' as well as a neighbourhood.

Because we deal with the stark feelings and transformations of extreme experience, this should not imply that the geography of safety and fear is ever a simple one. There are even those who, if not themselves hurt, enjoy or find disaster a thrilling or liberating experience – something embodied in Cottard, a character in Camus' novel *The Plague* (1947). People watching bombing raids from a distance, or unharmed by them, describe a peculiar sense of fascination and exhilaration.

### 'Poor possessions': ecologies of disaster

A further problem with these feelings of lost geography is pointed out by Erikson (1978, 211), who says, 'Once one has said that one feels "strange" and "out of place", one has almost exhausted the available vocabulary.' In part that is because to belong, to be tied to or, at least, to be fully 'at home' in a place is much like having a healthy body. You hardly think about it. To be safe and feel secure also means being able to get on with life. One of the best clues to places that matter most is that 'geography' and space are not mentioned, although they are presupposed. This has been referred to as the 'unselfconscious' or 'taken-for-granted' world.

That helps to explain why the geographicalness of disaster experience does not reside in spatial abstractions so much as in the threatened ties to things and persons, activities and happenings. Lived space and dwelling are found in or realised through the phenomena, rather than a separate plan or dimension of them. This is also another way in which everyday life becomes the reference frame of extreme experience. We will hardly understand one without the other. The meaningful vocabulary is not of spatial abstractions but the concrete terms of everyday life.

The gravest losses for most people in public disasters are still those affecting the home and home area. So often this is the space that decides, or comes to signify, the disaster. The home is the site of a host of other possessions and memories, irreplaceable when lost. Another victim of a flood disaster said:

The whole thing is a nightmare actually. Our life-style has been disrupted, our home destroyed. We lost many things we loved, and we think about those things. Our neighbourhood was completely destroyed, a disaster area. There's just an open field there now.

quoted in Erikson (1978, 196)

A woman in Frankfurt, Germany, after a bombing raid:

The apartment house . . . was destroyed . . . and I lost my nice home. I am so depressed about it that I continuously cry. The only thing that keeps my mind

(off) the disaster is . . . running around trying to find . . . new pieces of . . . furniture etc.

quoted in Hewitt (1994a, 11)

People will often risk life and limb to rescue their possessions, or stay and hope to protect their home, as fire, flood or bombs threaten or whirl around them. Not a few victims die in this process:

We were in the cellar and noticed burning up above us, and ran out and tried to fight the fire. But we had no water and it always burned further down until the whole house collapsed . . . We saved about three pieces of furniture . . . [but] One is so distraught he left things which ordinarily he would have taken out . . . One's senses just stand still.

quoted in Hewitt (*ibid.*, 11)

Possessions, or some of them, are not just objects one owns, has worked hard for, or cherishes in themselves. They are part of the structure and evidence of continuity and *security*, symbols for family survival, even when damaged:

. . . there was no street door, that had gone. There were no windows. All that lot was blown in . . . I thought to myself: 'Well, this ain't too bad now – they ain't knocked it down yet.'

quoted in Hostettler (ed.) (1990, 9)

The home itself is a comfort, an assurance that all is not lost. A woman of Kobe, Japan, talks of the air attacks of 1945:

I was more or less used to the raids. But after [my] house was bombed I became more and more afraid

quoted in Hewitt *op. cit.* (11)

While drawing attention to place and the geography of experience, I do not want to put this ahead of, or separate it from, the *most* immediate and dire concerns of most disaster victims. Plenty of testimony shows that personal safety – in families, that of children and other dependents – comes first. The safety of neighbours and even strangers in distress may come ahead of one's own property. In these respects, there is great variety among and within disasters according to the severity of harm and impairment for individuals. Some people may be totally isolated and forced to attend to personal survival. The heroes, and many of the casualties of disaster, survive its initial impact. Then they throw themselves into rescuing and saving their loved ones. If there are some or many unimpaired survivors, they may devote themselves to rescuing others, even unknown to them. The same applies to the effort given to saving personal or communal property.

In all these cases, how people feel and react to danger and disaster is closely related to their pre-existing cares and responsibilities, to already established



priorities and values. The geographicalness of their previous life is part of these priorities and, perhaps, indivisible from their other concerns.

Risks to family members assume special meaning in a public disaster, since women at home and children, the elderly and disabled may be exposed in great, perhaps the greater numbers. These, the principal 'carers' and their dependents in most societies, will tend to respond to danger and disaster in terms of their relations of love, dependence and social responsibilities. One of the reasons why women are unusually vulnerable in disasters is their special responsibility for dependents in most societies, and closeness to them.

In such terms, the loss of homes and personal possessions has a very broad significance. Not only is the survival of the 'home' second only to the safety of self and loved ones. The public disasters or catastrophes that concern us most are singled out by concentrated threat to and great losses of homes. The majority of victims are residents of the places destroyed. The numbers and proportions of the homeless commonly define the severity of disaster, and the needs of survivors.

### Geography and security

When the home place is severely threatened, or has been destroyed, the sense of a safe and supportive context goes with it. The intimate connection of geography and security is revealed. Survivors at Buffalo Creek said, many months later:

It's insecurity I believe. You're afraid when you walk out the door that you don't know what's going to happen next.. [and]  
... you don't feel secure around people you don't know.

quoted in Erikson (1978, 240)

Charles Darwin described how feelings of security associated with the Earth itself are upset by natural hazards:

A bad earthquake at once destroys our oldest associations: the earth, the very emblem of solidity, has moved beneath our feet like a thin crust over a fluid: – one second of time has created in the mind *a strange idea of insecurity*, which hours of reflection would not have produced.

Darwin (1906, 289, my italics)

The catastrophic event severs the ties and expectations of on-going existence and destroys the safe haven. The physical fabric of the place is ruined, the nurturing habitat becomes a death-trap. People are forced to leave. The effect is one of being lost and deserted.

It may be added that in most disasters such feelings are followed more or less quickly by a tremendous reassertion of care and community. Disasters are often remembered as times of unusual 'togetherness' and unselfishness – at least in modern, urban communities where selfishness and alienation often

seem the norm. We will return to these aspects when discussing active responses to risk and disaster in Chapter 7.

### Inner space and outer world: the shock of remembrance

If the geography of security is set up in the time of residence and familiarity before disaster, the loss of it does not end with the destruction. The survivors must struggle with more than just losing those who are close to them, and the familiar surroundings. There can be an enduring pain of remembrance. It begins with finding that what has been destroyed 'out there', remains vividly 'inside'. Consider this woman's recollection after an air raid:

... when I returned my house was burned down. I had the house key in my hand, but there was no door there.

quoted in Hewitt (1994a, 19)

Her house no longer exists 'out there', but inside, and as the guide to action – where to go, to stop and take out her key – it remained a clear reality for her. Unless she was mad, why else was she standing there?

More than any other, the disasters of modern warfare have brought testimony to these realities of civil existence. From the city of Würzburg in Germany, after the annihilating firestorm raid of 16/17 March 1945, a survivor wrote to a friend:

We persevere here, in search of the city. We find we still carry its [lost] dimensions and form within us. They grew inside through the long years when the homeland protected us. This inner portrait is stronger than the bad dream round about and surges from within to cover the ruins with its former life. Only when this inner vision is extinguished will Würzburg be definitively dead.

Josef Dünninger, quoted in Hewitt (1994b, 270)

This is the shock of remembrance, a haunting realisation of so many survivors, like exiles and adults recalling childhood, that intact within them is the lost place. They fill in the ruined areas with that living mental place. Robert J. Lifton (1967, 29) quotes the words of a Japanese history professor after the bombing of Hiroshima:

I climbed Hijiyama Hill and looked down. I saw that Hiroshima had disappeared ... What I felt then and still feel now [1963] I just can't explain with words. Of course, I saw many dreadful scenes after that – but that experience, looking down and finding nothing left of Hiroshima – was so shocking that I simply can't express what I felt ... Hiroshima didn't exist – that was mainly what I saw – Hiroshima just didn't exist.

The Japanese writer and survivor of Hiroshima, Ota Yoko, expressed clearly how the destroyed city is felt as a loss of significant landmarks. With them goes the sense of continuity with the community's past, and of orientation and

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security in the present. She recalled, on coming to the site of Hiroshima Castle ' . . . toppled to earth and utterly flattened . . . ':

Hiroshima was a flat city with no hills. Thanks to its white castle, Hiroshima became three-dimensional and preserved the flavour of the past. Hiroshima, too, had its history, and it saddened me to march forward over the corpses of the past . . . .

Even in normal times, it was scary for me to cross Hiroshima's long, long bridge. But now the buildings of both banks that seemed to anchor the bridge were gone, as were the sections of the city that formed a distant backdrop. So the bridge seemed to be floating in the air, and I seemed about to be dragged off and down to the bottom of the river.

quoted in Minear (ed.) (1990, 226-7)

On a still darker note, a survivor of the Holocaust tells of how the world of the concentration camps and annihilations remained with her:

I am not like you. You have one vision of life and I have two . . . it seems to me that Hitler chopped off part of the universe and created annihilation zones and torture and slaughter areas . . . We can't cancel out. It just won't go away . . . I talk to you and I am not only here, but . . . I see all that . . .

quoted in Langer (1991, 54)

Without memory, of course, there is no disappointment and no achievement. If humans depended primarily upon 'instinct', if we were biological machines instead of socialised and adaptive participants in the world, disaster would hardly exist for us. At most it would mark a sudden drop in population, frantic activity, a special test of the inherited characteristics of survivors. The armchair or laboratory scientist and bureaucrat may see things in such terms and think them more 'realistic'. For those in crisis and calamity, however, memory is the framework for experiencing and finding meaning or meaninglessness in disaster. Moreover, remembrance after disaster is intimately tied up with actual and lost geographic space.

## Where can one be safe?

### Place and identity

A controversial issue involving the geography of risk is a widely reported desire of survivors to remain in or return to the devastated home place. Often they want to rebuild on the same spot in the same way or, perhaps, better than before. That has been a frequent source of conflict with governments and outside 'experts', who regard this as irrational and foolish, especially if, in their assessments, the old place remains hazardous. You may even hear comments of the form: 'Why would anyone live in California (or Bangladesh or Pompeii) after all the disasters, and threats of more?' It is not easy to see the

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complexities of security and danger, real or imagined, for other people in other places.

Among places destroyed in a disaster, the town of Yungay in Peru is a remarkable example of partly successful opposition of survivors to official plans for their relocation. In the great earthquake of May 1979, an avalanche from the nearby Mount Huascaran, which turned into a catastrophic debris flow, buried most of the town and killed almost 90 per cent of its inhabitants. Despite their extreme loss and emiseration, the few survivors determined to resist enforced relocation. One of them is quoted as saying:

We are the true sons of Yungay and one does not abandon an afflicted mother. We must defend our land.

quoted in Oliver-Smith (1986, 212)

Another was overheard to say:

This is where we want to be. We are accustomed to dying, to losing family. One dies everywhere. [Mount] Huascaran will keep on. We are strong-willed. We want to be here, to die where we were born.

quoted in Bode (1989, 201)

The case of Yungay is known to us not just because of the scale of tragedy but also because the condition and actions of the people there, in the months and years following the disaster, were carefully studied. There were two major studies, by Anthony Oliver-Smith (1986) and Barbara Bode (1989). Through extended periods spent in the area, and a sensitive effort to understand the local situation and concerns of survivors, they have provided a rare degree of insight. One of Oliver-Smith's main conclusions (p. 18) was:

The determination of the survivors to found and maintain a new Yungay, albeit one of vastly different appearance, near the avalanche which buried their old community, constitutes a refusal to allow part of their identity and their culture to die.

Bode (1989, 79) found the same feelings and determination in the nearby town of Huaraz, also slated for relocation:

To survivors, it would not be Huaraz were it not 'in its place' . . . To be 'in its place' was right and good. It was hoped that the streets, too, could remain in their places and could retain their own names. "We would be very sad and confused if streets were called by other names," people said.

Bode also reports (p.201) an exchange with local residents concerning Yungay that highlights the complexities of these questions:

. . . . with Cirila and Ruben one day, discussing the possible sites for a new Yungay, I found myself pointing to a place on the mountain side. "Is that strip of land there safe?" I asked. Serenely, Cirila answered, "The sierra is never safe."

Ruben added, "There is no security anywhere. If you're in the United States, then the Russians or the Chinese come."  
 "Where can one be safe?" Cirila challenged me.  
 I had to admit I did not know.

Ironically, one of the sites chosen for relocating people in official reconstruction plans had been overrun by a mudflow 30 years earlier.

Studies of the plight of residents in the aftermath of the Buffalo Creek flood in the United States illustrate the same themes, but with an opposite result (Erikson, 1976; Gleser *et al.* 1981). For a long time there was a preoccupation with imposing official measures, and defusing blame and grief. Survivors were removed and separated. They were obliged to wait for many months in temporary homes in unfamiliar places among strangers. In the end, the scale of their unresolved grief and demoralisation came to seem worse than the disaster. Their community became, in their own minds, beyond recovery. The prompt, strong relief and rehabilitation measures available in the United States increased this, not just the scale of the disaster. Survivors' concerns were met with official incomprehension and indifference. In due course, they filed a lawsuit claiming major psychic as well as physical damages. Several studies concluded the disaster was as much one of a total 'loss of community', aggravated if not caused by post-disaster measures, as of devastation in the flood.

In 1952, Argostollion, the main town on the Greek island of Kefallinia (Cephalonia), was largely destroyed by an earthquake. What remained was quickly demolished as unsafe by the army relief force – all except one house, whose owner told me it was saved only by his standing in front of the bulldozers! The Greek government also ruled that no houses or infrastructure could be replaced until plans were examined and approved. They had to meet strict earthquake-resistant standards. In itself this seems a wise decision, but it meant continuing and enormous hardship for the thousands of survivors evacuated, or living in tent camps and makeshift homes around their town. Most had also lost their means of livelihood in the disaster. Apart from the difficulties and costs of getting the necessary plans made, legal and bureaucratic hurdles took months and years to cross. It took a decade before the town began to recover its pre-disaster housing stock and facilities. By then, most residents had left in search of work and a future elsewhere. It was said the majority ended up and still live in Montreal, Canada. The new town was occupied largely by people from surrounding villages. The town that rose from the rubble looks very modern and smart and is, no doubt, much less vulnerable to earthquakes. Some old residents began to return in the 1970s, but the community, as well as the place that was there before the earthquake, was utterly lost.

It is true that the modern political economy, and the demands upon professionals who serve it, does not encourage a preoccupation with place, with people's feelings and concerns. We are not encouraged to emphasise the 'banalities' of everyday life, unless they can be reduced to some technical formula. Such age-old local concerns with family and neighbourhood tend to be dis-

placed if the people are not. If dealt with at all, they are commonly subordinated to or redescribed in terms of technical abstractions or broad economic and political goals, the impersonal forces of population, environment, technology or economics. But what are the preoccupations of those at risk, including ourselves on our own ground? They are about the safety of family members and home; fear of losing personal possessions and dependents; neighbourhood safety and security of support; one's bit of land or job. For many folk, the plight of the less fortunate or disadvantaged is also a concern, which seems to demand reliable practices and fair treatment even more than further safety measures. These seem the primary issues in a public perspective on safety and crises, and basic to a human ecology of risk.

### Geographical calamities

The concerns with place and attachment of communities to their long-time home areas may not seem 'modern'. Nevertheless, they do still loom large in the testimony of disaster survivors and perhaps involve the majority of people. At least, there is abundant evidence that people's attachment to place appears strongly in reactions to disaster and resistance to forcible removal.

These concerns define some particular forms or aspects of disaster that are essentially 'geographic'. The danger and loss comes from changes in people and place, the habitable Earth, or all of these. The forms of geographical disasters identified here and discussed later in the book are:

- *place annihilation*: meaning the destruction of the material reality, the landscapes and cultural foundations of life, especially in historic places of settlement;
- *enforced displacement* of resident populations: removal of the inhabitants of an area against their will;
- *ecocide*: destruction of the habitat or means of life in an area;
- *cultural annihilation*: the elimination of distinct societies. This involves, especially, an almost worldwide threat and atrocities against indigenous peoples or 'nationalities' – cultures fully interdependent with the land of their ancestors. Often this threatens or leads to:
- *genocide*: the deliberate, physical extermination of a people – their elimination from the 'map of man'.

These are all geographic disasters. They violate and destroy the basis of shared, settled existence in a land. They threaten and destroy the places of historic settlement or established communities. They eliminate them from the broader patterns and exchanges of human geography. The result is to produce or threaten to produce 'man-made' blanks on the map, or geographic 'extinctions'.

Natural disasters have, but rarely, annihilated both a people and all vestiges of a place. Even great epidemics have utterly destroyed only small commu-

### The 'geographicalness' of disaster

nities. In general, survivors can rebuild, or others may join them to re-establish a decimated community in the old place. The gravest danger and worst examples of all these geographical calamities derive from human violence, especially in wars and other uses of armed force. Some cases, of which the Holocaust is the great and shocking modern example (see Chapter 12), involve all five of these processes of annihilation by and of a people's geography. We will pay particular attention to them in Chapter 5.

### *Suggested reading*

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## CHAPTER 3

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# Natural hazards

Natural, as opposed to technological, hazards are those triggered by climatic and geological variability, which is at least partly beyond the control of human activity.

Palm (1990, 3)

## Introduction

### Hazards perspectives and the hazards paradigm

The study of hazards has had, as its primary focus, conditions and processes that are, or can be, direct causes of damage. As noted earlier, the term hazard, used strictly, has an interactive and an evaluative meaning. It depends upon the source of danger *and* the nature and concerns of human communities at risk. Nevertheless, in the language of most studies, 'the hazard' is fire or strong winds, toxic chemicals or nuclear weapons. The field is divided up mainly by work on natural, technological, biological or social hazards, and specialised studies of single hazardous agents within these domains (Table 3.1). Hazards are classified by particular dimensions or processes of nature, technology or society as dangers. However, danger is also realised in events composed of a mix of processes, even when only one of them is the main cause of damage. The latter part of Table 3.1 identifies 'compound' hazards and 'complex' disaster events. In the former, danger arises from the interaction of two or more of the main classes of natural, technological and social hazards. Disasters are 'complex' in the sense that they arise from damage by two of the different main classes of hazard. In reality, all disasters are 'complex', but in certain catastrophes the need to recognise the interaction of very different sources and forms of harm becomes paramount. Risk tends to be interpreted as a function of the properties of such agents.

Unfortunately, this has promoted a view of hazards as agents external to, or 'accidentally' erupting within, society. The geography of risk is then