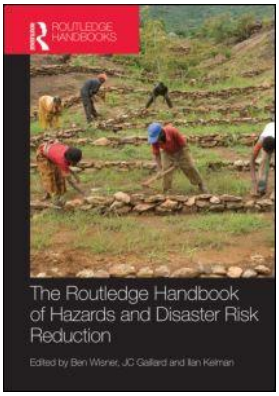

The Routledge Handbook of Hazards and Disaster Risk Reduction

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Framing Disaster

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Framing disaster

Theories and stories seeking to understand hazards, vulnerability and risk

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Introduction

How to organise a seeming chaos of facts and ideas?

While not all people are curious about how children acquire language or why some animals hibernate, those who have witnessed a disaster or heard about the destruction and suffering involved often want to know why it happened. Millions of disaster survivors are especially keen to have answers. The drive to understand hazards, vulnerability and risk comes in part from the questions that ordinary people ask, especially when these questions take on political salience and governments begin to question in turn. In part, the desire to understand emerges from compassion for those who suffer. Practical steps to reduce disaster risk must be informed by knowledge and wisdom. Finally, also playing a role in piquing curiosity is the sense that one learns a good deal about human society and about planet Earth by studying disasters.

So there is a commonsense and practical side even to a chapter with a word in the title that might scare away most readers: the word 'theory'. The ancient Greek word *theorein* means nothing more demanding than 'to look about in the world' in the sense of the German *Weltanschauung* (Jung 1989: 327). So looking about the world at flood disasters in South Asia,

earthquake disasters in the Caribbean, drought disasters around the Horn of Africa or hurricane disasters in the USA, there is a lot to take note of and to ponder. What assistance can one seek in organising what one sees or has experienced? There are 'facts' about a wide spectrum of processes and events – physical and biological, political, economic, social, psychological and cultural. A framework assists in organising this welter of facts. It is a first step toward understanding that marshals, arranges and reminds one not to forget to ask certain questions.

Vade mecum*: Reminder of good questions to ask*

Young physicians can carry with them small, dense reference books that remind them of differential diagnoses. The *Handbook* framework serves a similar function to the medical companion, a printed friend that invites the hospital intern to 'follow me' (*vade mecum* in Latin). Quite understandably, someone trained as a civil engineer would be inclined to ask questions about structures and forces. S/he needs to be reminded by the framework also to ask about processes at work in society – and vice versa for the sociologist and other perspectives.

It is equally likely that someone trained as an economist will ask about losses and costs. The framework reminds her/him to ask also about the natural hazards (which could also be termed 'environmental hazards') themselves. Writing about post-Katrina attempts to plan for an even worse hurricane in New Orleans, Verchick (2010: 247) lists the various components of a disaster scenario for half a page and then asks, 'How will this mass of information be organized and communicated to legislators and the general public?'

This chapter provides an organising and nudging reminder framework, an *aide-mémoire*, for those seeking to develop an holistic view of natural hazards, disaster risk management and reduction. It also serves to extend remarks in this *Handbook*'s introduction by showing how the editors see the topics treated by individual chapters fitting together.

Theories and stories

Caveats are required at this point. Just as the *Handbook* makes no claim to being exhaustive, the framework presented in this chapter is only one possible way of organising the reality of disaster. It is the framework that the editors believe arranges a wide array of information to reveal key questions that lead to risk-informed, evidence-based decision-making for the long term.

All frameworks are grounded in and derived from generalisations about the world that the framers judge to be sound and reliable. On the whole, these generalisations help to answer the question, 'why?' They concern cause and effect. Thus, frameworks – and the one presented here – assume the validity of various theories that collect repeatedly observed causes and effects in nature, society and the arts. As Chapter 61 on university research shows, a large number of academic disciplines have applied their theories to various aspects of hazard, risk and disaster.

'Cause and effect' may sound too straightforward and deterministic. That is not intended. Uncertainty and contingency is rife in the study of disaster at all scales and within all disciplinary perspectives. Challenges continue: understanding the failure of welding in the steel frames of modern buildings in Northridge and Mexico City earthquakes; determining where the cholera bacterium survives in the environment in between outbreaks; and how to overcome the 'moral hazard' created by flood insurance if it perversely encourages people to live in a flood plain. These are amongst the many challenges to understanding hazards and vulnerabilities.

Also, importantly, the framework includes non-Western, oral and vernacular understandings of hazards, risk and disaster. This is the reason why the word 'story' appears in the chapter title

alongside the word 'theory'. Ordinary people have a variety of ways to discuss among themselves the existential and practical questions that emerge when confronting hazards and taking risks. The framework welcomes and embraces local attempts to understand in collaboration with outside specialist efforts.

Myths and facts

Anyone who works on disasters as a planner, first responder, researcher, journalist, policy-maker or other role has heard statements that swallow or assume more general propositions about the world and people's lives and behaviours. 'Looting is common after disasters'; 'dead bodies must be disposed of quickly'; 'the poor are superstitious and fatalistic'. These kinds of statements are myths (Eberwine 2005). They are based on generations of anecdotal observation, or claimed observation, and reaffirmation, perhaps just repetition of what others said. They are not grounded in a coherent and consistent body of observations about the world.

Theories arise when these bodies of fact have been accumulated by following systematic methods, which allow generalisation and accumulation of new facts by asking questions guided by those methods and generalisations. The distinction between myth and fact is vital to clear thinking and good work in fields that address natural hazards, disaster risk management and reduction. That said, it is nevertheless one of the goals of disaster studies to explain why such myths persist.

Our framework and some key definitions

The following presents the framework in six variations, written around a suite of six diagrams. During the discussion, a series of key terms are introduced, clarified by their context and, in some cases, formally defined:

- Resource and hazard
- Vulnerability and capacities
- Livelihood and location
- Access and marginalisation
- Disaster and recovery

Social construction of resource and hazard

Figure 3.1 represents the physical and socio-political worlds in a highly schematic way. At one end is the natural environment (box 1). At the other end (box 8) are international- and national-scale political and economic systems. It is fair to suggest that, today, economic systems seem to influence many aspects of life and, consequently, what should be done to change the value system within which the globe currently operates.

The reader should note two aspects about the 'natural' environment. First, it is not entirely 'natural' but is influenced by human activities (economic decisions, land use, policy, etc.), represented by the four arrows that originate in boxes 5–8. Second, the natural environment (as dynamically modified and 'constructed' by human action) is the origin of both a series of possible opportunities and a series of possible hazards. This is the dual-faced character of nature that has been the focus of students of natural resource management and natural hazards since at least the 1950s (Zimmerman 1951). It is a well established element – perhaps even an axiom – of a major branch of human geography theory that treats society–nature relations.

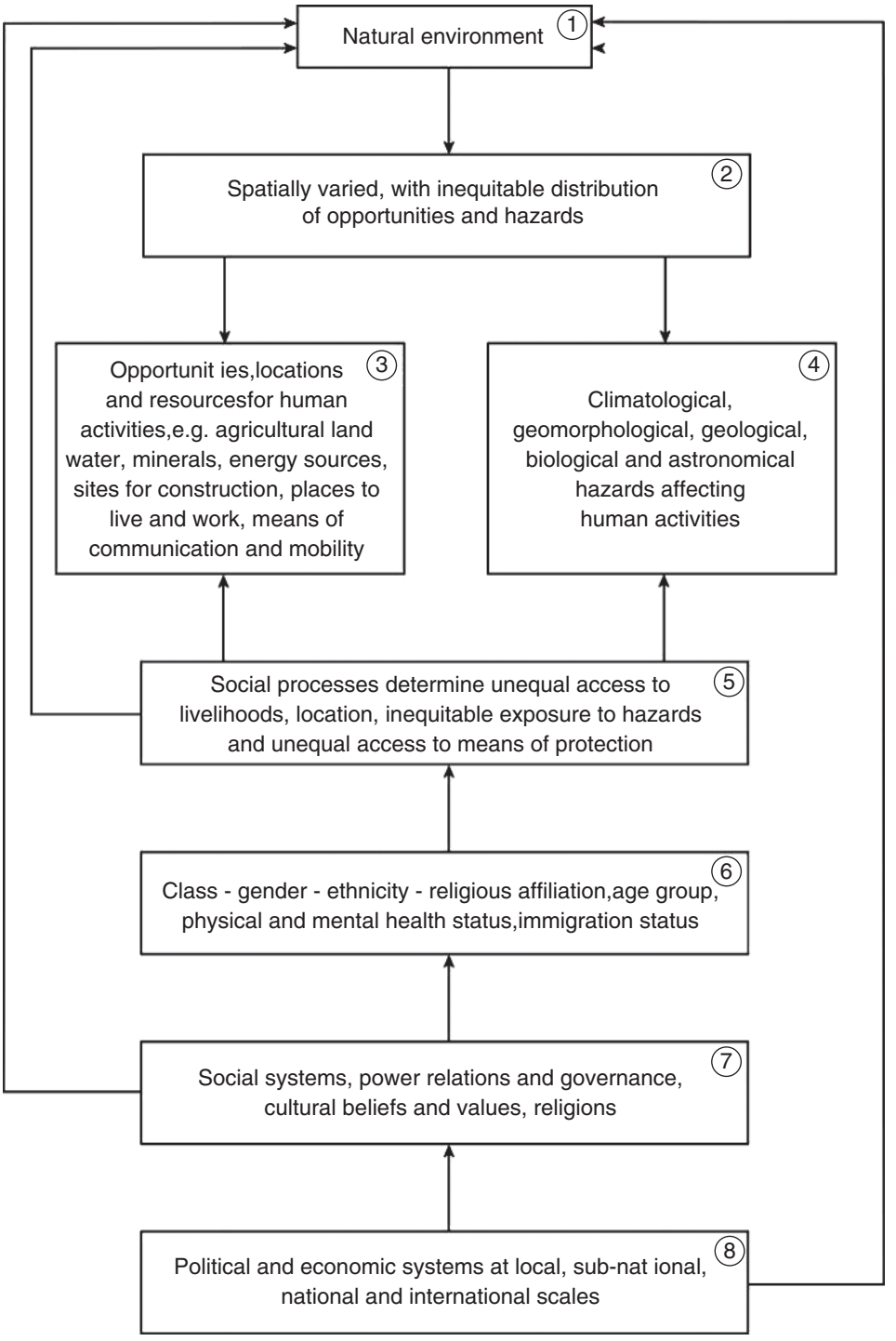

Figure 3.1 Nature's two faces: resource and hazard

The central significance of this version of the framework is to reveal disaster risk as a doubly contingent situation. Given the action of boxes 6–8, which contain nested political, economic, social and cultural processes, access enjoyed by a given household to 'nature-as-opportunity' or 'nature-as-hazard' varies (box 5). Access to natural resources upon which to build a livelihood is inequitably distributed, as is access to safe home sites, infrastructure enabling mobility (including evacuation), communications and marketing, spatial and temporal exposure to natural hazards and means of protection. Figure 3.1 is adapted from a figure developed by Terry Cannon, one of the co-authors of *At Risk*, where the dialectical character of disaster risk is elaborated (Wisner *et al.* 2004: 6–8): '[T]he natural environment presents humankind with a range of opportunities … as well as a range of natural hazards … But crucially, humans are not equally able to access the resources …; nor are they equally exposed to the hazards'.

Defining vulnerability

Chambers was one of the first to introduce formally the term 'vulnerability' into the analysis of rural poverty. It came as one of five elements that interlocked with each other, producing what he termed a 'ratchet effect' or 'deprivation trap' (Chambers 1983: 112): a condition of 'integrated rural poverty' from which it is very difficult to extract oneself. The other elements were political powerlessness, physical weakness (ill health), isolation and income poverty.

Building on this pioneering work, and that of Blaikie and Brookfield (1987), the framework here uses 'vulnerability' to denote the degree to which one's social status (e.g. culturally and socially constructed in terms of roles, responsibilities, rights, duties and expectations concerning behaviour) influences differential impact by natural hazards and the social processes which led there and maintain that status. Thus, depending on the society and situation, social characteristics such as gender, age, physical and mental health status, occupation, marital status, sexuality, race, ethnicity, religion and immigration status may have a bearing on potential loss, injury or death in the face of hazards – or resources made to be hazards – and the prospects and processes for changing that situation.

Many other definitions of vulnerability exist (e.g. Wisner *et al.* 2004: 13–16; IPCC 2007a; Naudé *et al.* 2009b; Gaillard *et al.* 2010; UNISDR 2009c), which interpret the word from different points of view: social, economic, public health, climate change, amongst other sectors and topics. Nevertheless, the definition used in framing the *Handbook* overlaps sufficiently with others that its 'family resemblance' should facilitate mutual comprehension across disciplines.

The progression of vulnerability

Root causes

Figure 3.2 turns Figure 3.1 on its side and expands the short-hand descriptions in Figure 3.1's eight boxes. In the search for the answer to the question, 'why?', Figure 3.2 adds to the framework's nudging reminders a series of 'root causes' about which one should enquire. These overlap with the 'political and economic structures' mentioned in Figure 3.1 (box 8), but suggest that one should trace the origins of such structures historically and explain the ideological and cultural assumptions that give those structures perceived legitimacy. A number of the *Handbook* chapters in Part I deal with these root causes: chapters dealing with political power, history, religion and culture.

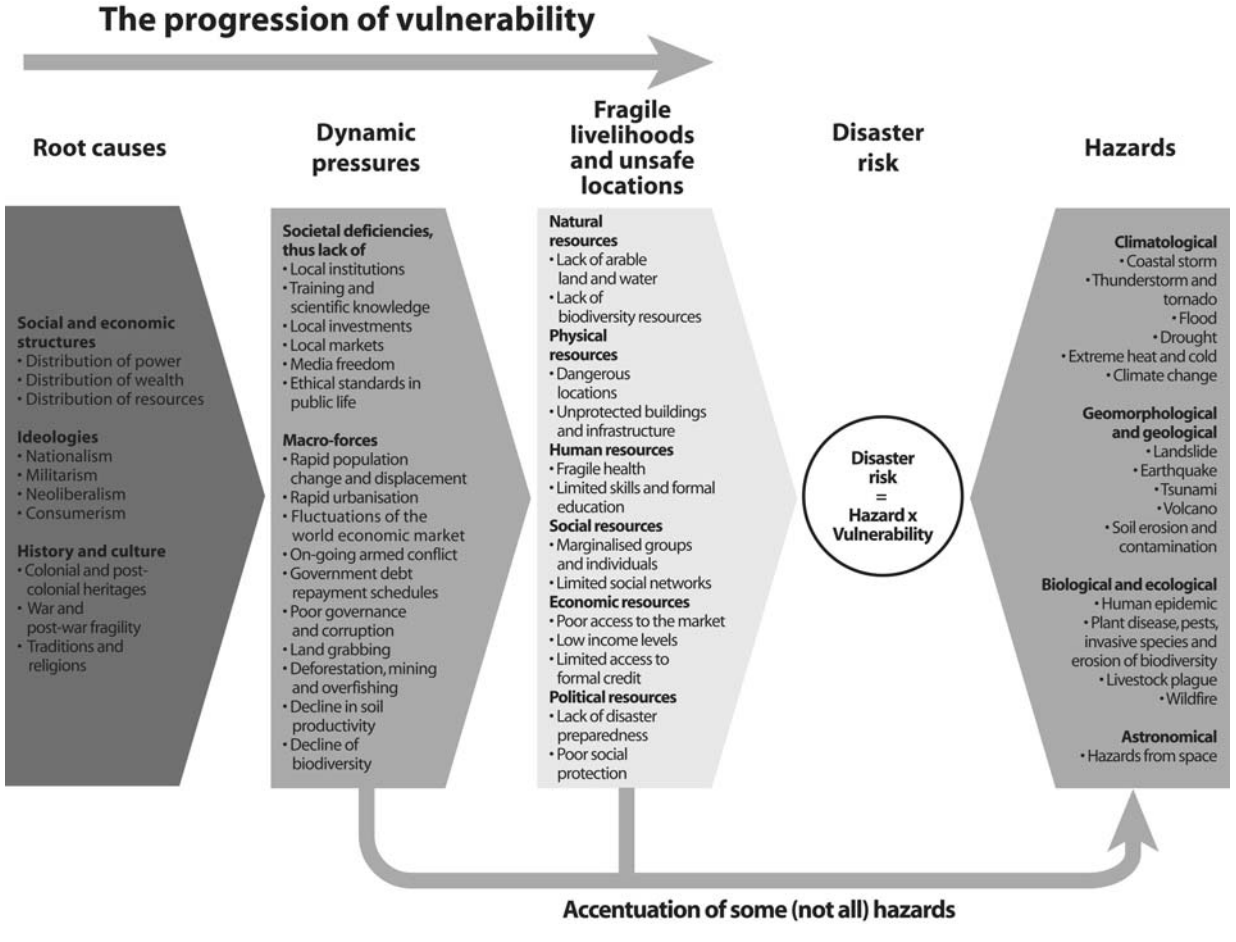

Figure 3.2 The progression of vulnerability

Disaster risk

A formal definition of disaster risk is contained at the core of Figure 3.2:

$$DR = H \times V.$$

As with everything else in the versions of the framework presented, this is meant as a mnemonic device, not necessarily a mathematical equation to be used for calculation. It is a reminder to enquire about both vulnerability (V) and hazard (H) – correcting a long-standing bias toward physicalist or hazard-focused research and policy. The definition has the appearance of a mathematical function, which has led to some confusion over the years since *At Risk* first appeared (Blaikie *et al.* 1994).

Disaster risk is a function of the magnitude, potential occurrence, frequency, speed of onset and spatial extent of a potentially harmful natural event or process (the 'hazard'). It is also a function of people's susceptibility to loss, injury or death. Also, some people are better placed to recover quickly from such losses than others. Taken together, susceptibility to harm and the process that creates and maintains that susceptibility to harm can be called 'vulnerability'. Vulnerability, in turn, may be counteracted either by individual and local capacity for protective action (C) or by protective actions carried out by larger entities such as government (M, which stands for mitigation and prevention). So, in fact, $DR = H \times V$ can be expanded and rewritten as the following mnemonic (Wisner *et al.* 2004):

$$DR = H \times [(V/C) - M],$$

where DR is disaster risk, V stands for vulnerability, C represents capacity for personal protection and M symbolises larger-scale risk mitigation by preventive action and social protection. Numerous definitions exist for all these terms, which are frequently ambiguous leading to contentious discussions and frequently disparate understandings.

Hazards

Many of the chapters with fine-grained focus in Part II of the *Handbook* deal with specific natural processes and events that are potentially harmful to people and their assets and disruptive of their activities. These are listed on the right-hand side of Figure 3.2.

As in Figure 3.1, hazards are not entirely free of human influence, although some hazards are difficult to influence at a large scale such as space weather and earthquakes. At smaller scales, the electromagnetic pulse experienced by specific components in satellites can be altered by shielding. Similarly, the peak ground acceleration experienced by a given building in an earthquake is affected by how the building and the land around the building are constructed.

The arrow labelled 'accentuation' at the bottom of Figure 3.2 is meant to suggest the influence of human activities, just as similar arrows showed that in Figure 3.1. One weakness of most frameworks is that they either focus on the human (left) side of Figure 3.2, making only a slight reference to natural hazards and the physical environment, or they focus mostly on the physical (right) side of Figure 3.2, giving only a nod to or brief treatment of the many underlying risk factors on the human side (for example Smith and Petley 2009; Turner *et al.* 2003; UNISDR 2004: 15; Burton *et al.* 1993).

Unsafe livelihoods and locations

A livelihood is an arrangement for making a living. Chambers and Conway (1991: 1) define sustainable livelihoods as follows: 'a livelihood comprises people, their capabilities and their means

of living, including food, income and assets'. Livelihoods thus encompass all resources required to sustain durably people's basic needs. Basic needs refer to food, shelter, clothing, cultural values and social relationships.

The livelihoods concept is often associated with that of sustainability, especially in hazardous environments. Chambers and Conway (1991: 1) emphasise that 'a livelihood is environmentally sustainable when it maintains and enhances the local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generations'. Natural hazards, as well as economic shocks and social disruption, may thus be of serious threat to people's livelihoods.

The concept of sustainability implies that basic needs are met on both an everyday basis and in the long term. It is therefore essential to consider everyday life when dealing with both the sustainability of people's livelihoods and their vulnerability to natural hazards. Social and economic threats to daily needs, especially to food security, are almost always more pressing than threats from rare or seasonal natural hazards. This is particularly true when hazards turn to resources, such as for fertile volcanic lands or flood plains, or dumpsites for those who have no alternative than scavenging rubbish to make a living (Gaillard *et al.* 2009). In common with various versions of the livelihood approach in development studies and practice, Figure 3.2 lists six categories of resources that are vital to dealing with hazard events as well as being central to sustainable livelihoods: natural, physical, human, social, economic and political.

Dynamic pressures

Figure 3.2 also shows a set of macro processes that 'transmit' the historic weight of root causes along the 'chain of explanation', as an intermediary between them and fragile livelihoods and unsafe locations and conditions. The list is not meant to be exhaustive but indicative of the large-scale, external drivers of significance. They fall into two parts.

First, there are societal deficiencies. The United Nations' (UN) road map for decreasing disaster impacts (UNISDR 2005b), on which a number of *Handbook* chapters have commented, lists numerous actions that national governments should undertake. Since 168 governments signed this Hyogo Framework for Action in 2005, one would expect that they would be getting on with the job. Yet serious lack of positive government action persists in building local institutions for disaster risk reduction (DRR), training and scientific research into hazards and disaster risk, credit and investment in households' economic resources, provision and maintenance of farm-to-market roads and other transport and market infrastructure, as well as failure of attention to such prerequisites for trust in government and good two-way communication as media freedom and ethical standards in public life.

Another dynamic pressure includes socio-political and economic processes as well as negative trends in conservation of land, water and biosphere. Many of these dynamic pressures are taken up in detail in Part I *Handbook* chapters, including rapid and unplanned urbanisation, population change and displacement, global economic conditions and violent armed conflicts.

Continued erosion of biodiversity and devastation of ecosystems, including deforestation, is a major factor. Globally, extinctions are proceeding at a rate that threatens keystone or 'backbone' species in many ecosystems, a fact acknowledged in 2010 when 193 countries met in Nagoya, Japan and negotiated a new Convention on Biodiversity (www.cbd.int), and by the International Union for Conservation of Nature (IUCN) list of threatened and endangered species (IUCN 2010). Soil erosion and fertility decline, waste and contamination of increasingly scarce fresh water, pollution of coastal waters and over-fishing all also weaken already fragile livelihoods.

Figure 3.2 is an elaboration and adaptation of the 'progression of vulnerability' framework developed in the course of two editions of *At Risk* (Blaikie *et al.* 1994: 21–45; Wisner *et al.* 2004: 49–86). However, it has a much longer history, as recounted in Box 3.1.

Box 3.1 Origin of the pressure and release framework

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During 1976, while writing *Shelter after Disaster* (Davis 1978), I covered both post-disaster shelter needs and the vulnerable conditions that caused buildings to collapse under earthquake loading. I had been impressed with a paper in *Nature*, 'Taking the naturalness out of disasters' (O'Keefe *et al.* 1976). Its purpose was to define the characteristics of vulnerability. The paper seemed particularly relevant since it reinforced evidence that was coming from Guatemala following a devastating earthquake in February 1976. The earthquake had been described as a 'classquake' on account of the selective impact on poor families. I was present a few days after the quake and walked through largely undamaged streets of upper and middle class neighbourhoods in Guatemala City, then to arrive suddenly at one of the precipitous ravines that criss-crossed the city. There poor families had illegally perched their homes and suffered appalling casualties and damage from landslides and building collapse.

Considering all this, I began to sketch in an attempt to visualise vulnerability and hazard as a pair of converging arrows, meeting in a disaster, or meeting where there was the potential for a disaster. I decided to include the diagram in my book, and the rather crude first version of the 'crunch' diagram appeared. I placed 'types of hazard' on one side of the 'vulnerability to disaster interface' and on the other, I listed six 'dangerous conditions'. These were selected to relate to the construction of buildings, the theme of the book.

Later, while developing a series of slide presentations for the United Nations Centre for Human Settlements (UNCHS) (now UN-HABITAT) to accompany the *Shelter after Disaster—Guidelines for Assistance* (1982), as published by the Office of the United Nations Disaster Relief Co-ordinator, I used the same diagram. However, it suddenly dawned on me that the dangerous conditions needed to be further unpacked into root causes of vulnerability, leading to pressures that in turn led to dangerous (or unsafe) conditions.

In the late 1980s, I began to work with Piers Blaikie, Terry Cannon and Ben Wisner in the early development of *At Risk*. On one occasion (probably in 1992), I recall drawing the diagram on a blackboard during a discussion. My co-authors were enthusiastic to adopt the diagram. Within thirty minutes, one of my co-authors (I forget which) suggested we go further and develop a reverse of the pressure or 'crunch' diagram with the arrows pointing outwards, to symbolise the release of pressures away from a disaster. In that way we could introduce 'capacity' into the model. So we also used this 'release' diagram throughout *At Risk* in both its first and second editions. The twin diagrams became known as the PAR (Pressure and Release) framework.

The triangle of vulnerability

Figure 3.3 probes more deeply into the nature of vulnerability by highlighting access and marginalisation. All of the elements of the framework are here, but they are rearranged to provide such emphasis.

Root causes and dynamic pressures are rolled into the three large circles at the triangle's three apexes. These serve as structural constraints which determine the degree and reliability of different people's access to the six sets of resources familiar from earlier diagrams, depicted in the inner, smaller circles. Many chapters in this *Handbook* illustrate that these resources are often available locally, but many people are unable to access them because of their age, gender, caste, ethnic and religious affiliation, and physical ability or because of poor governance, patronage politics and inequitable distribution of wealth. Part II of the *Handbook* covers many of these as fine-grained processes, complementing those that appear in Part I.

Poor and unstable access to resources results in marginalisation in both daily life and in facing natural hazards. Access to resources defines how resistant, diverse and sustainable people's livelihoods are on an everyday basis and how much they are able to secure a decent daily living. The extent, resistance and stability of livelihoods also determine people's ability to avoid harm when dealing with natural hazards (Gaillard *et al.* 2009).

Vulnerability, located at the centre of the triangle, ultimately reflects people's position within society (not only poverty) as a consequence of their ability or inability to secure access to a large, resistant and sustainable set of resources. The triangle further shows that root causes of vulnerability are interacting and so are the resources that enable people to make a daily living and protect themselves in facing natural hazards.

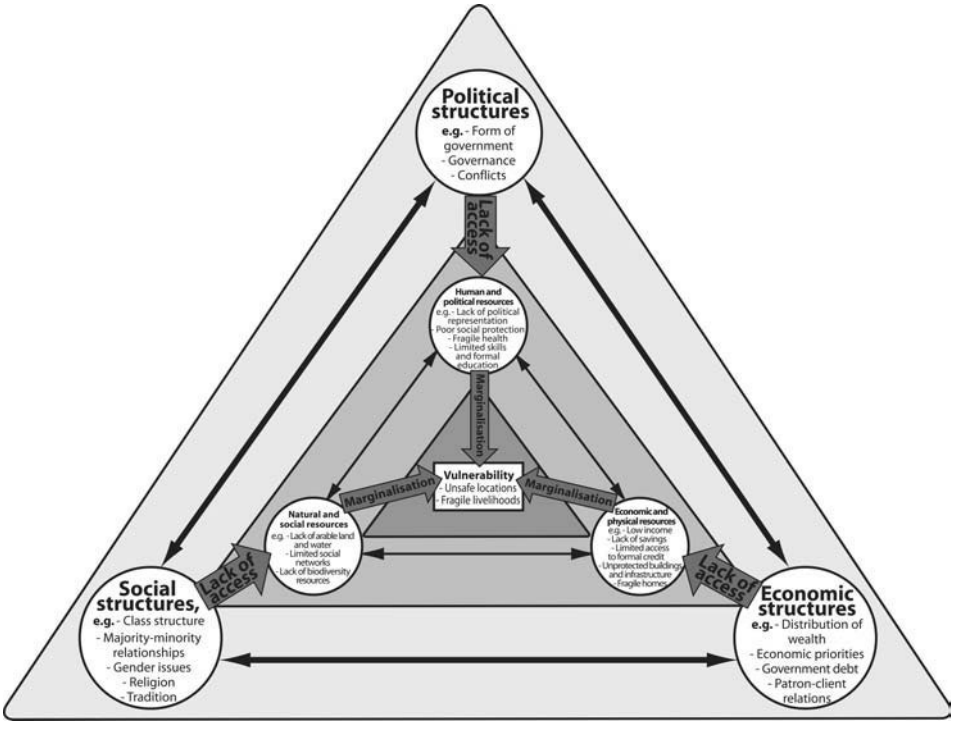

Figure 3.3 Triangle of vulnerability

Use of an access framework can become complex (Wisner *et al.* 2004: 98–112); however, for purposes of the *Handbook*, full detail is not always required and is not provided. While most of the access categories in the inner circles of Figure 3.3 are intuitive, 'political resources' perhaps needs a few words of explanation. Research has shown that people who are spatially isolated, living from the base of a poor or depleted ecological endowment and poor in terms of financial and livelihood resources also tend to have limited 'voice' or access to administrative officials and politicians. They are simultaneously spatially, ecologically, socially, economically and politically marginalised (Gaillard *et al.* 2010; Wisner 2010d).

The circle of capacities

Capacities refer to the resources and assets that people possess to resist, cope with and recover from disaster shocks they experience (Wisner *et al.* 2004; Gaillard *et al.* 2010). The concept of capacity also encompasses the ability to either use or access needed resources, and thus goes beyond the mere availability of these resources (Kuban and MacKenzie-Carey 2001).

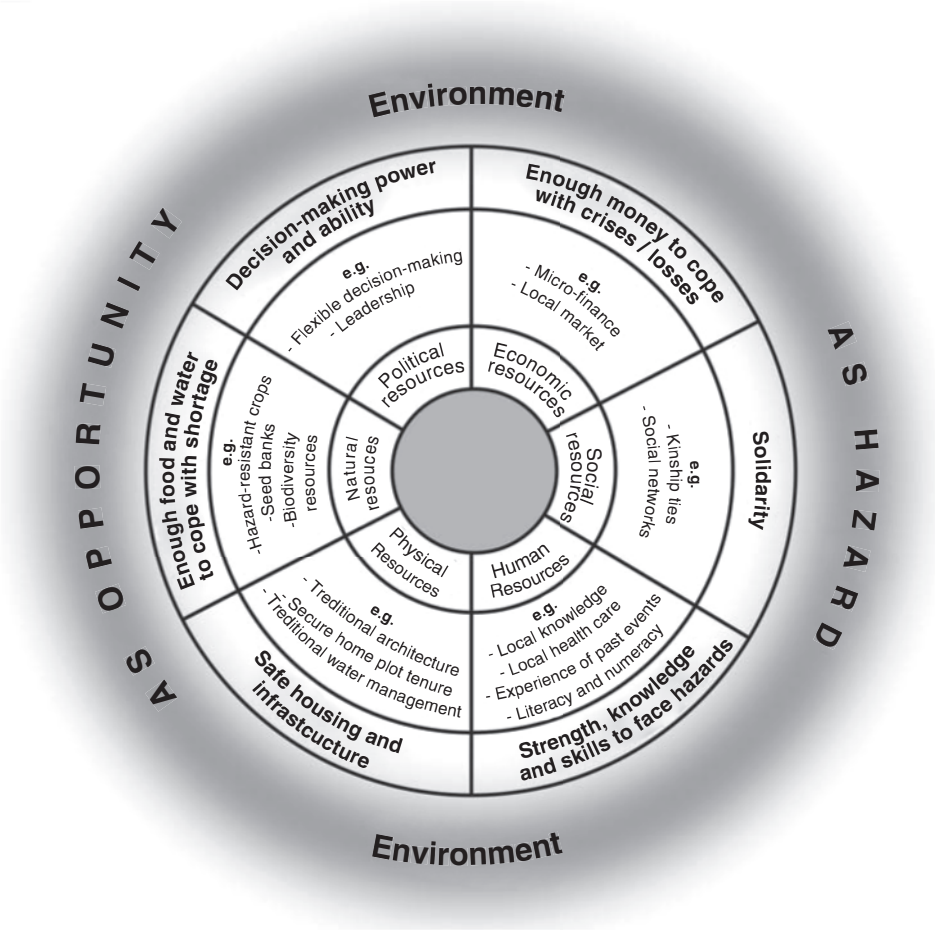

Figure 3.4 Circle of capacities

Capacities are not at the opposite end of vulnerability on a single, linear spectrum. Most people, including marginalised and vulnerable people, have capacities. These capacities fall within the same typology of resources used for assessing livelihoods and vulnerability, i.e. natural, physical, human, economic, social and political, as shown in Figure 3.4. People employ these in order to prevent, resist, cope with and recover from challenges wrought by natural hazards. No one is a helpless victim, nor should they be labelled only as such.

Figure 3.4 emphasises the fact that capacities are often, yet not exclusively, rooted in resources that are endogenous to the community facing hazards. By contrast, Figure 3.3 (the triangle of vulnerability) emphasises structural constraints on access, which are largely, yet again not exclusively, exogenous to the community, such as inequitable distribution of wealth and resources within the society, market forces, political systems and governance. People have more control over capacities, but they often have little purchase on external factors that create vulnerability (Gaillard *et al.* 2010). In practice, especially for those working at the community level (see Chapter 59), it is therefore often easier to enhance capacities than to reduce vulnerability. Capacities must therefore be recognised and used.

Enhancing capacities encompasses activities, often at the household or community level, which strengthen people's strategies to face the occurrence of natural hazards, such as agreeing on warning signals, infrastructure and livestock protection, meeting points, planning evacuation routes, vehicles and shelters, and preparing resources to cope with the disruption of daily life.

Marginalisation, disaster and failed recovery

In Figure 3.5 our framework takes yet another geometrical shape, but the basic concepts and logic behind it remain the same. The six livelihood and locational resources familiar from Figure 3.2 recur. Each descending wedge hits a crisis point, a disjuncture labelled 'disaster', as if pulled by the weight of the various aspects of vulnerability described in each case.

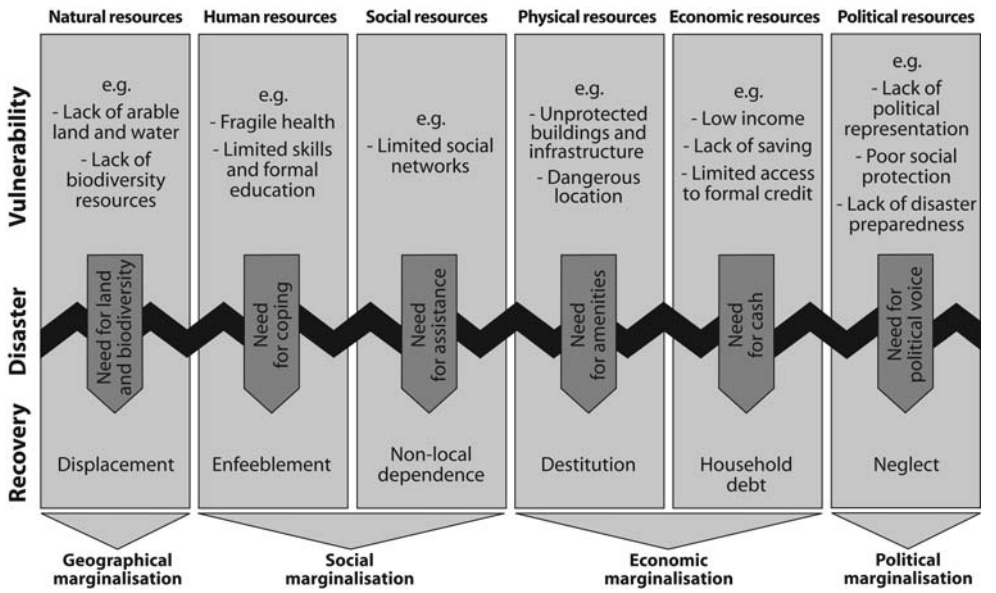

Figure 3.5 Road map to hell: from pre-disaster vulnerability to failed recovery

In the aftermath of a disaster, the affected have a series of needs indicated by the small central arrows. Failure to satisfy these needs leads to long delays or unsatisfactory 'recovery' and further marginalisation. This can become a vicious cycle (Chambers 1983; Susman *et al.* 1983; Gaillard and Cadag 2009). Instead of recovery, one finds displacement, continued weakening of human resources, perpetual dependence on anonymous, public or international charity, homelessness, indebtedness and unchallenged political neglect.

Those marginalised and vulnerable in facing hazards are often also those who struggle to recover in the aftermath of a disaster. Disasters increase the needs of resource-less survivors (Figure 3.5). Squatters settling in hazard-stricken areas need land to which they can relocate, although this is often a painful experience. People with limited skills and fragile health are often weakened when faced with changing social and economic environments. Survivors with fragile social ties and limited social networks need external assistance and thus increase their dependence on others. Those with poor economic resources often have to resort to high-interest, informal loans to provide for their need for cash to recover. They also often lose their sparse physical assets, including their house, thus leading to further destitution. Meanwhile, increasing needs of the most marginalised in the aftermath of disasters are frequently neglected by the authorities, for whom those survivors are often invisible. Disasters thus often further marginalise those who were already living at the margin before the events.

Box 3.2 Defining disaster and recovery

Disaster

Academics have spent a good deal of time debating the definition of 'disaster' (e.g. Quarantelli 1998; Perry and Quarantelli 2005). From a public administration and legal point of view, a distinction between disaster and emergency may make the difference in eligibility for outside assistance, and formal declarations of disaster by government authorities may have implications for some kinds of insurance.

Nevertheless, for purposes of this *Handbook* the editors suggest a common, simple definition: a situation involving a natural hazard which has consequences in terms of damage, livelihoods/economic disruption and/or casualties that are too great for the affected area and people to deal with properly on their own.

This situation is seen particularly for the uncountable small and 'neglected disasters' or 'invisible disasters' (Wisner and Gaillard 2009). Small, isolated communities often obtain no external assistance – or even recognition that a disaster has occurred there. The affected communities are forced to overcome the situation on their own, usually with unnecessary, extensive suffering. Such places could easily be given support to help themselves avert a disaster before it happens, or a little external intervention afterwards would avoid a small situation becoming a major disaster, yet that rarely happens.

In a sense, the true 'disaster' might be the failure to avoid suffering or to help when suffering occurs. For pragmatic purposes, rather than deep philosophical arguments, the definition of 'disaster' given above suffices.

Recovery

Recovery is an even more controversial and difficult term to define. Many policy-makers, donors, practitioners and researchers have broken it down into 'stages', which try to indicate clearly recognisable boundaries, but which cannot be partitioned so easily. The United Nations Development Programme's (UNDP) concept of 'early

recovery' is an example (UNDP 2010a). Others try to distinguish between 'relief', 'reconstruction' and 'rehabilitation'. The *Handbook*'s chapter on shelter and reconstruction (see Chapter 46) will take up some of these points.

The term 'recovery' is cloudier for other reasons. First, references to restoration of normality or normality may be of little use if 'normal' was the situation of vulnerability for some of the population now affected. Returning them to the pre-disaster status quo will almost assure that they will be affected again by another disaster in the future.

Second, recovery has many aspects at a variety of scales. Many of these are covered by chapters in Part III of the *Handbook*. A return to fiscal stability in a country affected by a large disaster is one aim, which might or might not avert a future disaster. Revitalisation and strengthening of the livelihoods of households affected is another aim, at another scale, which has the potential for reducing vulnerability, if enacted appropriately. Beside economic recovery, there must be recovery and improvement of the 'life space' of home and community, along with the social and public space of the location, especially its treasured landmarks. Re-establishment of public services and infrastructure, transport and communications are other aspects of recovery. Finally, there must be psycho-social recovery, through which the mental trauma is healed or at least addressed to the extent that the affected people (including children) are not or do not become dysfunctional.

The progression of safety

Figure 3.6 shows how policy and practice have sometimes strengthened livelihoods and made locations and conditions safer, confronted and countered dynamic pressures and, occasionally, even addressed some of the root causes of vulnerability through legislation and the process of 'peace and reconciliation'. This figure is adapted from one with the same title that is used several times in *At Risk* to frame actual situations, such as in Bangladesh and Mozambique, and appears in a general form at the end of the book (Wisner *et al.* 2004: 344; Blaikie *et al.* 1994: 220).

The reader will note that the large boxes that converged on 'disaster' in Figure 3.2 move outward in Figure 3.6. This represents the impact of public policy and investment, good governance at multiple scales, increased awareness and preparedness, mobilisation and organisation at the village and street level, along with measures directed at some of the hazards.

Again, an arrow channels human action at various scales back to the box containing 'hazards'. One must remember the lesson of Figure 3.1: the natural environment is usually neither hazard nor resource until human action makes it one or the other (or both: hazard for some, opportunity for others – or hazard and resource at the same time, such as a flood that fertilises farmland while damaging the poorly constructed farm buildings). Thus, reforestation, conservation of biodiversity, water and soil, land use and forestry policy (and enforcement) can all help to mitigate at least some hazards (drought, flood and landslide, for example).

Prevention can be active or passive. Active prevention includes all efforts that aim at avoiding the hazardous phenomenon occurring, such as dredging rivers, deviating winds to prevent the accumulation of snow in the path of avalanches or triggering artificial rains in the event of insufficient rainfall. Active prevention also refers to hazards that are triggered under control, such as avalanches triggered early in the morning of ski days by using dynamite.

Passive prevention encompasses all actions that do not prevent the phenomenon from occurring, but rather focus on reducing its spatial or temporal extent, such as in the case of levees and dikes along rivers. Passive prevention also includes hazard monitoring and mapping of hazard-prone areas. Attempts at prevention can inadvertently create or exacerbate hazards,

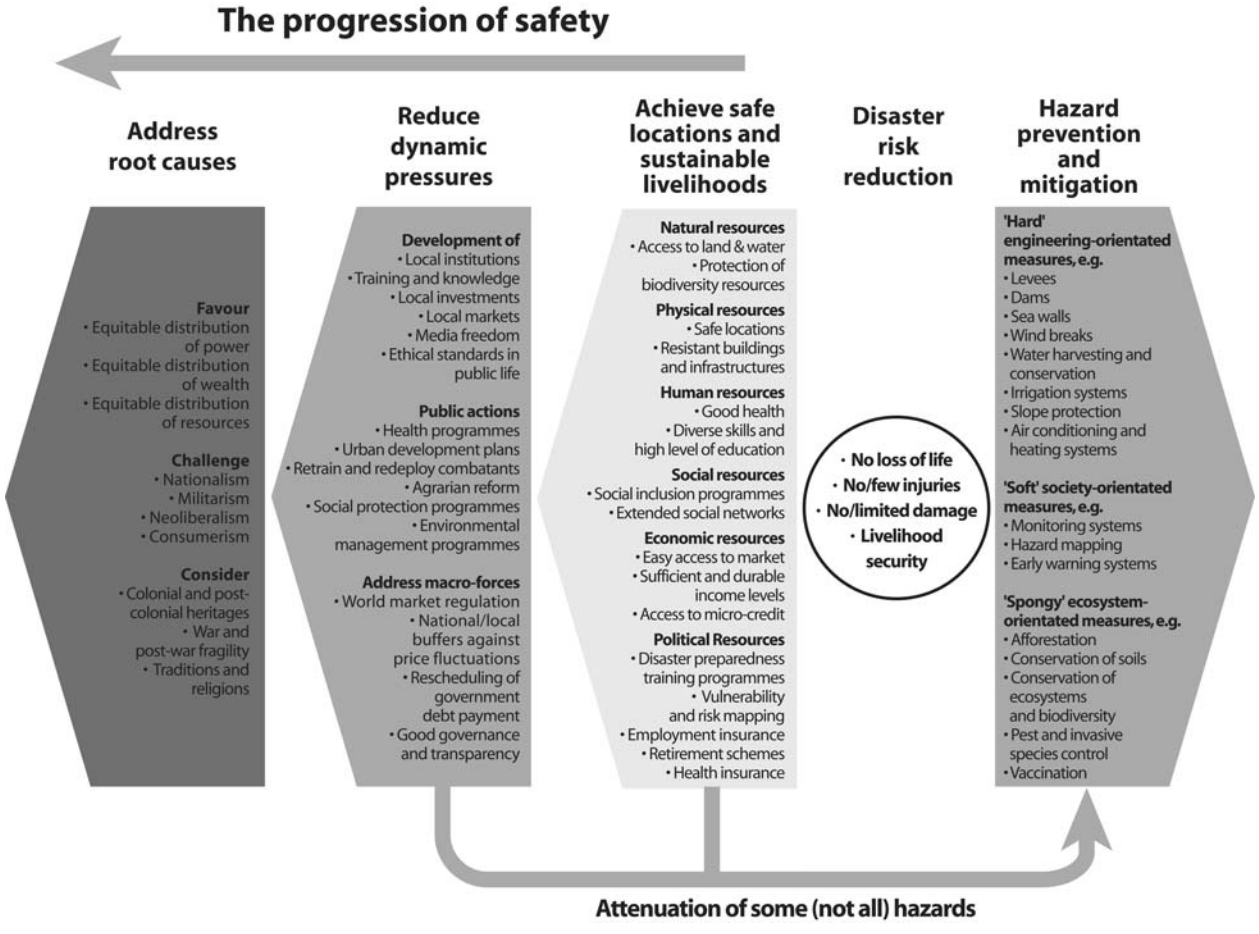

Figure 3.6 Progression of safety

such as using levees or dams to stop water spreading out in slowly rising floods, which leads to the possibility of a flash flood from levee or dam failure.

Mitigation can be direct or indirect. Direct mitigation activities address symptoms of vulnerability in the 'progression of vulnerability' diagram (Figure 3.2). Examples include building sturdy houses to face cyclone or earthquake hazards, and facilitating the exchange of hazard-related knowledge. Indirect mitigation addresses the root causes of vulnerability and is geared towards better access to sustainable resources.

Conclusions

Understanding hazards and disaster risk draws on accumulated knowledge from many areas of human experience and enquiry. Equally broad knowledge is required for evidence-based and disaster risk-informed decision-making, practice and policy. This *Handbook*'s chapters contain a sampling of that wide range of data, information and knowledge – and, it is also hoped, at least a small amount of wisdom. The first three are the building blocks that allow one to attain the last (IFRC 2005: 13).

Since none of us in the twenty-first century are in the fortunate position of being brilliant crafter–artist–counsellor–scholars of the Renaissance, we need a way of organising this large array of information, bridging disciplinary boundaries and, above all, reminding ourselves of relevant questions outside our individual areas of expertise and experience. The framework presented is designed to do that.

The disciplines and professions studying disaster are numerous, as are the kinds of knowledge created, the language of these disciplines and criteria for relevance and confidence (no one should claim 'truth'). In addition, the processes, events and phenomena that comprise the content of 'hazard', 'vulnerability', 'capacity', 'risk' and 'disaster' are themselves complex, highly connected, cross time and space scales, and are contextual.

A 'framework', then, is only a first step in addressing the DRR process, which is a long journey from principles to data to wisdom – and then the reverse. Researchers, policy-makers and practitioners will find this rough path easier to travel if competent authorities take the following recommendations to heart:

- University authorities should encourage interdisciplinarity, non-disciplinarity and exploration among young scientists. It is wasteful to require narrow PhDs and discipline-focused publication until a person attains tenure or the equivalent.
- Researchers and practitioners should exchange more knowledge and experience – a truism, perhaps, but nevertheless important for generating and sharing wisdom. Moreover, arrangements should be made and funding provided for researchers to sojourn for periods in humanitarian and other disaster organisations and government, and vice versa.
- International, national and sub-national authorities should open up their planning institutions and processes to a full range of knowledge-bearers, including those from the arts and humanities, social sciences and lay people who represent communities and themselves. Too often planning for disaster is done by economists, engineers, some natural scientists, military and police experts alone.

These starting points for recommendations anticipate many that appear in the chapters throughout the *Handbook*. They will also be developed further in the Conclusion (see Chapter 65).

There is a long journey yet to go. This *Handbook* can be one stepping stone.