Chapter 1

Introduction: Hazards, Risks, and Disasters in Society

Andrew E. Collins [1], Bernard Manyena [2,4], Janaka Jayawickrama [3,4] and Samantha Jones [1]

[1] *Department of Geography/Disaster and Development Network (DDN), Northumbria University, Newcastle, UK,* [2] *Humanitarian and Conflict Response Institute, Manchester University, Manchester, UK,* [3] *Post-war Reconstruction and Development Unit, University of York, York, UK,* [4] *Disaster and Development Network (DDN), Northumbria University, Newcastle, UK*

ABSTRACT

This introductory chapter outlines why it is important to explore in more depth the relationships between environmental hazards, risks, and disasters in society. It presents an introduction to the challenges presented by mainstream approaches to the human side of disaster studies, whereby perspectives on environmental hazards and human development meet policy and practice. This is informed by analyzing the influences of extreme environmental events on society, exposure factors, and the nature of emergent systems of response. In this field, people are considered as vulnerable and resilient to disaster impacts, suffering, or prospering in times of climate change, development, societal instability, and governance scenarios that can be unpredictable and out of control. This is in part balanced by hope in the emergence of new-found awareness and capacity, to be able to live with hazards and risks, cope with disaster, and prosper socially and economically. A challenge presented by hazards, risks, and disasters is to achieve the capacity to both anticipate the unexpected and act on the known. A wealth of well-grounded emergent knowledge and experience exists to facilitate this, some of the most enlightening and innovative of which is revealed in the selection of contributions to this volume.

1.1 OPENING

Hazards, Risks, and Disasters in Society presents an exploration of how people interrelate with environmental changes and shocks that are variously within or beyond their ability to alter. It includes accounts based on disaster prevention and response approaches with reference to threats that have become increasingly more prevalent. Risk of a disaster at individual or community level is dependent on exposure to emergent and resurgent hazards and the capacity to avoid, adapt, absorb, or control them. Furthermore, despite a rich debate as to

Hazards, Risks, and Disasters in Society. http://dx.doi.org/10.1016/B978-0-12-396451-9.00001-9

what a disaster is (Quarentelli, 1998; Perry and Quarentelli, 2005), definition and experience remain relative to the varied interpretations of heterogeneous people. Consequently, the collection of contributions herein provides critical comment from necessarily cross-disciplinary discussions about how best to deal with hazards, risks, and disasters in society through the societal perspective. We continue by outlining some relatively straightforward principles of hazards, risks, and disasters in society, followed by an overview of the chapter contributions that comprise the volume. We then return to overall emergent points in a concluding chapter.

Hazards, risks, and disasters in society include environmentally related catastrophes within concentrations of human development that can be interpreted in terms of historical, political, and economic contexts. As such, one rationale underlying this volume is that development largely determines the way in which hazards impact on people, whereas disasters alter the scope of development. A summative overview of the more recent state of this perspective is already outlined in some detail in *Disaster and Development* (Collins, 2009), among other sources. The collection of chapter contributions in *Hazards, Risks, and Disasters in Society* reflects how personal and corporate exposure factors, short-term reactions, and longer term responses mediate the manner in which people get understood as vulnerable, resilient, or otherwise. Societies that strengthen themselves or are strengthened mitigate decline and resultant further exposure to what are largely human-induced cycles of environmental, social, and economic change. In a simple delineation, this change may be experienced as improvement by billions of people in economically advantaged societies who become more able to protect against environmental hazards, but as deterioration for billions of other people who are exposed to increased risks. The delineation between those more or less at risk of disaster has been the focus of a long tradition of studies of disaster vulnerability (O'Keefe et al., 1976; Blaikie et al., 1994; Cannon, 1994; Lewis, 1999; Wisner et al., 2004; Bankhoff et al., 2004; Gaillard, 2010; Lewis, 2014). Moreover, in addition to the above, multiple origins occur in the emergence of vulnerability studies through specific hazard and risk categories. For example, it has been central to studies of health risk reduction to view human susceptibility as interacting with socioeconomic vulnerability in relation to both disease hazard and context (Doyal, 1987; Honari and Boleyn, 1999; Collins, 1993, 1996, 1998, 2001, 2003).

Although the rationale of the vulnerability approaches to environmental hazards has become more mainstream discourse in recent years, it remains evident that exposure to risk and disaster remains far from being addressed in practice. An implicit argument is that it is not inevitable that major disasters will occur so much as it is possible for governments, communities, individuals, and industries to choose to affect change toward safer and more resilient societies. For a background to the use of resilience discourse and conceptualization in disaster studies, see, for example, Pelling (2003), IFRC (2004), UNISDR (2005), Paton and Johnston (2006), Manyena (2006), and

Sudmeier-Rieux (2014). A concern for the field of vulnerability analysis and disaster risk is that it is notoriously subject to cultural leanings and critique, whereby derivative notions of resilience become worryingly minimalist, overly accepting of crises, and are not much help for those vulnerable or extremely poor. It is therefore not surprising that following a decade of progress in the Strategy to Build the Resilience of Nations and Communities to Disasters (UNISDR, 2005), the aspiration remains to achieve awareness and capacity for what lies beyond resilience. This volume aims to not repeat the well-trodden ground of vulnerability and resilience studies in relation to hazard and risk, but instead compiles chapter contributions that tend to bring to the fore new detail and innovative ideas, also exposing some of the associated future challenges and opportunities.

Although such a volume is necessarily inductive and eclectic, an introductory and indicative analytical framework for the volume can nonetheless be represented through reference to individual environmental hazards. For example, here we refer to the case of flood risk that can be considered a function of (1) environmental change, (2) people's exposure, and (3) prevention and response systems. These are core drivers of flood risk analysis that lie behind identifying improved flood risk management. Some of the consequent analytical and practical challenges in approaching integrated flood risk management would therefore be as outlined in Table 1.1.

The analytical challenges presented in Table 1.1 suggest inherent complexity to flood risk management, requiring individual analyses at the level

TABLE 1.1 Analytical and Practical Challenges in Integrated Flood Risk Management

Domain of Flood Risk	Analytical Challenge
Environmental change	Predictability/uncertainty, opportunity for precautionary actions, "natural" versus built approaches—hard and soft catchment, river and coastal management, methods of long-term maintenance
People's exposure to flood risk	Perception, socioeconomic enablement, information, communication, expectation, risk culture, age, gender, and other forms of social differentiation
Prevention and response systems	Political will, market forces, capacity, connectedness with proximate and underlying causes, learning cycles, adaptive capacity, role management, centralization/decentralization, hard/soft catchment management (upstream/downstream), maintenance responsibility, insurance

of any one flood event, the weighting of importance of varying components a function of its nature and context. Therefore, rather than emphasizing development of flood risk models with limited applicability to varying environments, societies, and systems of development, progress would be through improving ongoing monitoring, evaluation, and learning for prevention and response. This informs what really is appropriate to addressing complex risks specific in time and relative to knowledge about particular places that are defined by intersecting environmental, social, and economic processes. The approach is key in both the applied and theoretical sense. It can assist in informing smart solutions that balance environmental, social, and economic policy drivers. Though partly idealistic, the aspiration of integrated analyses and action lies at the core of improving flood risk management. It has not yet become "main stream" but is aspirational of what it means to more fully engage hazards risks and disasters in society. The principles here can be extended to other categories of environmental hazards while also being considered as relevant to a multihazard framework.

1.2 CRITICAL PROCESSES AND OUTCOMES OF HAZARDS, RISKS, AND DISASTERS IN SOCIETY

By hazard categories we therefore emphasize critical processes and outcomes that significantly disrupt human well-being over both brief and long time frames. Although hazards, risks, and disasters impact society, individuals, groups, institutions, and organizations offset the effects by becoming strong, organized, healthy, resilient, caring, and creative. Alternatively, political processes and societies become corrupt, inept, and dangerous, exacerbating the impacts of environmental changes on people who are forced to become more vulnerable. Corruption in particular is increasingly recognized as a cause of disaster (Leoni et al., 2011). The situation is dynamic such that disruptive innovations can arise from social organization that is challenged during times of crisis, as well as during times of relative calm. The process of learning an innovation in disaster management is part of the 'development' in *Disaster and Development Studies*.[1] A role of developing prevention and response activities is to "get development out of disaster," otherwise expressed by the United Nations in the following:

1. The editors of this volume have contributed many years to the Disaster Management and Sustainable Development Program at Northumbria University, United Kingdom, the first globally to dedicate itself since 2000 to integrating disaster and development studies. While some understanding of disaster in development and vice versa is as old as development studies itself, there had been a hitherto remarkable lack of research, practice, and policy invested into this fundamental relationship. The approach has since become an aspect of many programs around the world and increasingly is considered central to United Nations strategies.

A disaster with all its negative consequences offers a good opportunity to formulate forward-looking policy concepts pertaining to social development and equity, economic growth, environmental quality and justice, i.e. sustainability.

Living with Risk, UNISDR, 2002 p.21

This aspect of disaster and development studies resembles disaster resilience as forward moving through processes that build back better, go upward, forward, and bring change (i.e., Monday, 2002; O'Brien et al., 2010; Manyena et al., 2011; UNICEF, 2012; Aldunce et al., 2014; Sudmeier-Rieux (2014), provide adaptive capacity (Folke et al., 2002), offset risk by shifts from vulnerability to well-being (Collins, 2009), and so on. This is key, though this concept needs to be perpetually balanced in realism presented by dual emphases of both development-induced disaster and conversely, disasters that prevent development. There is ultimately a need to know how one person's development opportunity can be safe from becoming someone else's disaster threat (Collins, 2009, p. 262).

Pertinent evidence of the challenges ahead are the hundreds of millions of people around the world exposed to impoverishment by development activities, living with polluted environments upon which they depend or who are entrapped by poverty into more risk-exposed locations. The problems of development as disastrous are vast and beyond the scope of this volume, but in summary are to do with "over," "under," "uneven," "sustainable," "appropriate," and more personal aspects of change that define human well-being, being both forward and backward moving. Here we focus more specifically on how predominantly environmental hazards impact societal exposure to disaster through an array of changing risks, and conversely how response strategies variously involving societies may interpret and interact with the hazards and risks that are created.

This volume therefore includes much of use to practitioners and policy makers. Notably, as people better engage prevalent hazards and risks they exercise a process that has become known as disaster risk reduction (DRR), which is frequently referenced throughout the volume. In a context of climatic risks this is also indicative of climate change adaptation (CCA), a further recurrent topic. Ultimately, both DRR and CCA represent quests for development of sustainable environmental and societal futures. Throughout the book, case studies provide the more detailed context and interpretations of hazards risks and disasters in society that shed light on what actions can be built upon and applied within the next generation of DRR, CCA, and development policies.

For hazards, it is important to note that in the context of this volume, no claim is made to "naturalness" as in "natural hazard," instead addressing people's interaction with pertinent threats. By "society" it is acknowledged that a day-to-day positioning and interaction exists of people one with another through a variety of lived interpretations of homogenous and heterogeneous

social categories. Variance within society in its simplest demographic form includes differentiation on account of age, gender, wealth, culture, education, skills, rights, location, and health, to name some.

Across the range of contributions, it is accepted that multiple approaches exist to the quantification and qualification of "risk." Although "disaster discourses" are acknowledged as involving oft-referred-to subjective conjectures, the context here is where the likelihoods and impacts of disruptive events are real, wide ranging, and large scale. Away from the challenge of definition, it is known that people around the world are exposed to hazards by force, coercion, or choice, being more or less vulnerable or resilient to the effects of environmental hazards on those terms. For example, mass migrations of people around the Sahel in the face of famine have often not been due to drought and famine directly but to the political gerrymandering of totalitarian governance (Ohta and Gebre, 2007). Meanwhile, millions forced to move out of the way of industrial level developments, such as dam projects, for biofuel development, or through urban redesign did not invite such developments. Many of those displaced people then became impoverished, being also more exposed to environmental hazard. This is charted in detail, from dam projects in nearly all continents, to the impact of coastal industries (such as in South Asia), removals to make way for farms (such as in Brazil), displacements from mine pollution, and power supply accidents (such as in areas Eastern Europe and Russia) to name some.

However, coercion can involve a more subtle process of adjustment whereby human hopes and aspirations are driven by mobility for a better life with greater security, the so-called pull factors in migration studies. In relation to environmental hazards, migration in effect becomes a form of adaptation (Black et al., 2011a). However, for those too poor, infirm, or controlled by political boundaries, migration ceases to be an option—people become entrapped in hazardous locations (Black et al., 2011b; Foresight: Migration and Global Environmental Change, 2011; Collins, 2013a). Although many cannot move out of the way of hazard and risk, recent figures from the United Nations High Commission for Refugees UNHCR) show that the number of refugees and displaced people in the world has exceeded 50 million in 2014, the first time since the Second World War (UNHCR, 2014).

Hazards can be considered environmental, economic, social, psychological, or otherwise. However, consistent with this series as a whole, this volume remains more significantly oriented by driving ecological and climatic concerns of our times. It nonetheless reflects Earth-related hazards and risks that generate disasters or catastrophes within society dependent on historical, political, and economic contexts. Moreover, culture mediates how people may interpret, become more vulnerable or resilient to, hazard exposure. The cycles of environmental, social, and economic degradation to which we have referred are mediated by cultures of practice. The latter includes forms of land management, beliefs about environmental quality, spirituality, and ultimately the

maintenance of ecosystem services (Renaud et al., 2013). Of growing importance across the myriad of interpretations of environmental value and sustainability, however, is the observable outcome that societies that strengthen themselves, or are strengthened, mitigate decline and resultant further exposure to these human-induced circumstances.

The volume avoids solely pessimistic accounts of humanity, also showing how a myriad of innovations arise from social organization in times of crisis. Beyond the surge of academic-, policy-, and practice-related definitions of resilience, a wealth of practical actions have been going on around the world aiming to strengthen communities in the face of both disaster risk and climate change. These arguably move beyond resilience. Actions representative of locality- and community-based resilience are regularly brought to the attention of the United Nations through its series of Global Platforms for an International Strategy for Disaster Reduction (UNISDR various, though see United Nations Chief Executive Board for Coordination, 2013). A drive has also occurred to draw together the hitherto disparate policy communities of DRR that underpin the Hyogo Framework for Action of UNISDR (2005) with the findings and aims of the Intergovernmental Panel on Climate Change (IPCC, 2007, 2014), and through the SREX report of 2012 (IPCC, 2012). While increasingly reflective of the demand to address both DRR and CCA together, these have at times been remarkably separate arenas of institutional structure within national and local governments, and also at the United Nations itself.

Some clear examples of documented approaches to locality and community resilience to disaster reduction that are in turn synonymous with actions for protecting against the impacts of climate change, can be read about in the annual *World Disasters Report* of the International Federation of Red Cross and Red Crescent Societies. For example, Chapter 2 of *World Disasters Report* (IFRC, 2009) details a series of projects facilitated by the Disaster and Development Network (DDN) of Northumbria University demonstrating how working alongside local authorities and civil societal partners can be achieved, including the case of establishing (and subsequent analysis of) risk and resilience committees in South Asia and Southern Africa.

Many interesting cases exist of reaction to hazards, risks, and disasters in society. For example, the rapid reactions of the United Kingdom local government and civil society, or longer term, planned responses to flooding, can be compared and contrasted with other experiences around the world. It is notable through this example that at the core of emergency planning and longer term prevention strategies, a commonly identified tension exists between the rights and responsibilities that occur within human agency and institutional structures. The former is dependent on varying levels of community organization, but is made complex by culture. For example, experience from our projects in Nepal showed how community organization with the involvement of municipal authorities allowed for a more effective locality-based risk governance than for self-administered community groups (Jones

et al., 2013). However, it is reasonable to argue that the nature and context of hazard, risk, and governance in Nepal is different to the UK—indeed that most countries, subregions, communities, and individuals are different one from the other when considering reactions to risks. It is also pertinent to note examples more associated with specific nation-states.

For the case of the United Kingdom, in the follow-up from the Pitt Review (2008) for flooding, out of 97 or so recommendations, only three had referenced community.[2] The vast bulk of the post-Pitt consultation centered on infrastructure and engineered solutions to flood risk. Although this is in itself a critical infrastructure aspect of protecting people, experience from around the world demonstrates it to be woefully insufficient for dealing with the totality of disaster risk that is by necessity society-centered. This is further emphasized by shifting to greater integration of singularly defined disaster risk categories (such as flood, hurricane, disease epidemic) to multihazard approaches (Cutter et al., 2000; DFID, 2012). It also emphasizes the need to be attentive to slower onset hazards and multiple risk brought about by persistent vulnerability in society, accentuated for the more marginalized and economically compromised members of society (Collins, 2009; Ray-Bennett, 2009; Akerkar and Devavaram, 2014 in this volume; Maldonado, 2014 in this volume; Bradshaw and Fordham, 2014 in this volume).

Regarding what can be done moving forward, it is pertinent to gather a balance between the burgeoning wealth of conceptualizing that surrounds the intellectual debate on resilience to disaster risk and climate change. This would be done by considering the ways in which locality and community are evidenced as advancing this agenda through more sustainable development trajectories (Collins, 2013b). Although this can be analyzed from within the context of individual countries and societies, it is pertinent to explore what has been found in economically advanced states (i.e., a wealth of studies look at lessons about community resilience to Hurricane Katrina, USA) and those classified as low income. In Bangladesh, one of our collaborative research initiatives found location-specific details of improved health and well-being at community level brought a critical meaning to disaster resilience (ESRC, 2006, 2010; Ray Bennett et al., 2010; Nahar et al., 2013). This supports the need for appropriate forms of self-care (Edgeworth and Collins, 2006; Edgeworth, 2014 in this volume) in dealing with a complex of vulnerability issues before, during, and after climatic-related crises in that region (Alam and Collins, 2010). Further work examines the manner in which risk reduction or climate adaptation discourses are operational at multiple levels of governance, and work better as internally or externally driven processes (Mohammad and Collins, 2013).

2. "Citizens and Flooding," Presentation and Panel Discussion by Collins, A.E., for Centre for Public Policy Westminster Seminar on How do we Prevent the Likelihood of Future Flooding: Taking Forward the Select Committee and Pitt Reports—Achieving Proper Infrastructure for the 21st Century, Royal Commonwealth Society, London 14th July, 2008.

1.3 COMPONENTS OF THIS BOOK

The volume responds to three key aspects of hazards, risks, and disasters in society through the following core ingredients.

1. Prevention of and response to hazards, risks, and disasters in society—this provides analysis and case studies indicative of current action on hazards, risks, and disasters in society.
2. Hazards in social, technological, and political-economic change—this details some of the case-driven priorities relevant to current and future challenges of hazards, risks, and disasters in society.
3. Cross-disciplinary and nonmainstream dealing with hazards, risks, and disasters in society—this engages forward-looking theoretical, policy, or practice developments for addressing hazards, risks, and disasters in society.

Overall, the contributing chapters provide detail and synthesis on ways of addressing the nature and context of hazard, risks, and disaster reduction in society as part of this wider book series for which major environmental hazards (such as earthquake, drought, and flood) are addressed in great detail across the eight other volumes. This ninth volume presents societal prevention and responses to hazards, risks, and disasters extending also to insights on the human interrelationships with hazards of technological, social, and economic change that are often not addressed in the context of environmental hazards work. Contributions to the volume demonstrate innovation that can occur through cross-disciplinary working in this field, informing about the processes of human endeavors that can help deal with disaster.

1.4 SUMMARY

It is possible to arrange the 20 chapters that follow in many different ways to reflect the main title of this volume. Each chapter can be read individually as accounts and ideas independent of those presented in the other chapters. However, the contributions were solicited in particular response to three aspects of the subject, namely, prevention and response, contemporary hazards of change, and varied cross-disciplinary perspectives for dealing with disasters in society. Three book sections therefore comprise groups of chapters sourced along these lines, albeit each chapter also contributes in part to all sections. The approach sought is not to consolidate an existing status quo but to seek out new (or more in-depth) perspectives. Chapters are on the whole backed up by selective case-study material that reinforce particular perspectives on hazards, risks, and society demanded by this field that inevitably need to be put under further scrutiny with future research.

Section One introduces pertinent perspectives on people centered prevention and response to natural hazards through a series of six chapters reflecting

challenges to current intellectual, policy, and practice. The chapter by Atsumi provides a rich example from Japan of how people volunteering to be involved in disaster reduction avoid institutionalization of such a role, the manner of involvement being reflective of societal values and relationships one to the other. The chapter by O'Keefe et al. delivers what its authors present as a polemical and radical challenge to the field brought about by a political economic perspective on disasters of market forces, unmet climate change responses, and Western humanitarianism. Both chapters present a counterbalance to institutionalization in recognizing that disaster response comes first and foremost from the community affected by disaster. The issue of how disaster risk governance evolves is tackled by Jones et al. who find three dimensions exist to the changing distribution of influences and responsibilities—upward, outward, and downward. The latter represents decentralization characteristic of the more people-centered, preventative approach flagged variously in this volume. However, lack of resourcing for the overburdened societal level reflects tensions that exist in gaining the means to effective DRR investment.

A number of points made so far are then illustrated by the regionally orientated chapter of Becker and van Niekerk, who present their Southern Africa case study by way of flagging the manner in which capacity for disaster risk reduction can be progressed. The point is made that progress in building skilled capacity for disaster risk reduction is already evident through regionally based initiatives, but that these are only sustainable if driven from within the region. Understanding of the rights-based approach, beyond framings of dominant groups, is provided in a detailed account by Akerkar and Devavaram based on the case of marginalized poor women of Tamil Nadu, India, who were widowed in the Tsunami of 2003. The chapter shows how genuinely rights-based approaches demand listening, encouraging agency, attention to dignity, and long-term commitments in disaster recovery. This section of the book then completes with a call from Ray-Bennett et al. for "reflective response" to counter hyperrisks and develop organizational resilience. This is indicated to be the challenge presented by naturally triggered technical (NATECH) disasters, an imperative being that disaster risk reduction needs to operationalize for an interconnected world involving communities of practices and practitioners.

Section Two can be considered to either extend or illustrate some of the opening themes by providing analysis and case material around key areas of current and future hazards in social, technological, and political-economic change. First, the chapter by van der Geest and Warner provides quantifiable analysis of variable vulnerability, coping, and loss and damage in relation to climate events across a selection of countries. Use of the multidimensional vulnerability index and variety of coping measures of varyingly vulnerable households indicate that, even among less vulnerable households of developing-world countries, a majority are unlikely to be able to cope with loss and damage impacts of climate-related events. For the case of Bangladesh,

Rahman et al. reveals the example of coping going on through use of varying forms of flood shelter. However, the needs and aspirations of people living across these floodplains are shown to vary, requiring multiple versions of this infrastructural response sensitive to the nature of problems that people face during flood crises.

Taking the recently intensified case of cyber security hazards, the chapter by Hyslop then considers the contrasting environments and difficulties created in the world of cyberspace. This highly relevant chapter to contemporary crisis management impinges on life through military, organizational, critical infrastructure, and criminal and moral domains, reluctantly leading the author to conclude that some form of regulation is required to protect generally unresilient societies from cyber security hazard. In their chapter, King and Mutter show how the wider threats evident through interrelated fields of natural disasters and violent conflicts create common consequences in society, and that this is therefore most likely an artificial divide. Bridging the divide between disaster and conflict studies is particularly relevant in prevention whereby both peacebuilding and DRR can save lives and improve human security. A further core case is addressed in the chapter by Maldonado who, focusing on the tribal communities of coastal Louisiana, shows how in the face of transformational changes, society may engage everyday forms of resistance as part of the adaptation process. More equitable distribution of knowledge sharing and integration, public participation, local input, and science with multiple perspectives are part of this process of creating greater justice in times of global environmental change.

The following two chapters that complete the second section look at two primary drivers of thematic investigations into the human side of hazard, risk, and disaster in society, being political response (Alexander) and disaster through the lens of gender (Bradshaw and Fordham). Alexander provides definitions of politics in relation to DRR and resilience. Having considered political organization of society in the context of architecture and effectiveness of emergency management systems it is concluded that the ethical framework within which politics are conducted has a strong bearing on the ability to manage disaster risk. This has been exemplified by lack of concern for women's issues and also underpins the rising interest in governance and participation. Bradshaw and Fordham then provide detail of the impact of disasters on women and girls, particularly in the developing world. This highlights how disasters are gendered events whereby women and girls experience them differently from men. The exclusion of gender from much policy in disaster risk reduction, and concerns about forms of women's inclusion, leads the authors to highlight gendered risk as demanding reconceptualization of "disaster," and disaster as a development issue.

Section Three provides chapters on topics currently considered to be nonmainstream aspects of dealing with hazards, risks, and disasters in society. Though aspects of this quest may be found in the other sections of the volume

as well, these chapters represent some of the less regularly cited cross-disciplinary analyses that may progress ways in which theory, policy, and practice touched upon in this book as a whole could further develop. Firstly, the chapter by Eburn advances how disaster risk reduction must advance in the "shadow of the law" whereby responsibility must be negotiated with stakeholders. In the interests of a safer community, Eburn, who is also a barrister (lawyer), identifies some of the legal boundaries that help define the limits of shared responsibility, albeit here based on a sample of nations with a shared legal history.

The chapter by Edgeworth focuses on the case of local-level resilience and risk reduction in relation to infectious diseases in Bangladesh demonstrating the role there can be for self-care. Though it cannot be a panacea for all forms of disaster reduction, it highlights how people are not passive observers of events that unfold around them. Adjustment to environmental hazards is here exemplified as being through self-care continuity of local strategies utilized in the home. The chapter by Hoffman, from an anthropological perspective, focuses more specifically on how culture matters as the critical factor in hazard, risk, and disaster recovery, to understand society and working with human behavior. Paton, in his chapter then contributes insights into the ingredients for conceptualizing and operationalizing readiness planning. This unveils some of the societal processes critical to the development of resilience and adaptive capacity within DRR strategies. Although indicated as needing of further work, the approach could progress at individual, family, community, and societal levels providing options for change within an all-hazards perspective. The chapter by Morimoto then returns in part to one of the mainstay tools for hazard and risk assessment, namely, the use of mapping. However, here it is used to demonstrate forward-looking engagement with the complex interpretational processes by which the combined earthquake, tsunami, and nuclear disaster in Japan in 2010 could be viewed. As such we discover explicitly here the imperative for disaster researchers to move forward aware of potential fallacies of using singular material frameworks in interpreting disaster risk.

In a chapter with some resonance to Chapter Two on disaster volunteerism, Phillips extends the discussion around healing that can be experienced post-disaster, citing findings and ideas about the role of therapeutic communities. Though remaining with many questions and the need for further work on this front, it is suggested that, if it were better understood, practitioners might be able to generate and better engage therapeutic communities of the future. The chapter by Ghafory-Ashtiany reawakens a religious perspective, the majority of the world's population residing within individual or societally organized faith and practice. For the case of Abrahamic religions, this can bring an opportunity for an effective risk communication and education approach to DRR, not compromising science, though creating a revived and reformed religious incentive to engage risk reduction.

REFERENCES

Foresight: Migration and Global Environmental Change, 2011 Foresight: Migration and Global Environmental Change., 2011. Final Project Report. Government Office for Science, London.

Alam, E., Collins, A.E., 2010. Cyclone disaster vulnerability and response experiences in coastal Bangladesh. Disasters 34 (4), 931–953.

Aldunce, P., Beilin, R., Handmer, J., Howden, M., 2014. Framing disaster resilience the implications of the diverse conceptualisations of "bouncing back". Disast. Prev. Manag. 23 (3), 252–270.

Akerkar, S., Devavaram, J., 2014. Understanding rights based approach in disasters: a case for affirming human dignity. In: Collins, A.E., et al. (Eds.), Hazards, Risks and Disasters in Society. Elsevier.

Bankhoff, G., Frerks, G., Hilhorst, D. (Eds.), 2004. Mapping Vulnerability: Disasters, Development and People. Earthscan, London.

Black, R., Bennett, S.R.G., Thomas, S.M., Beddington, J.R., 2011a. Climate change: migration as adaptation. Nature 478, 447–449.

Black, R., Adger, W.N., Arnell, N.W., Dercon, S., Geddes, A., Thomas, D., 2011b. The effect of environmental change on human migration. Global Environ. Chang. 21s, 3–11.

Blaikie, P., Cannon, T., Davis, I., Wisner, B., 1994. At Risk: Natural Hazards, People's Vulnerability and Disasters, first ed. Routledge, London.

Bradshaw, S., Fordham, M., 2014. Double disaster: disaster through a gender lens. In: Collins, A.E., et al. (Eds.), Hazards, Risks and Disasters in Society. Elsevier.

Cannon, T., 1994. Vulnerability analysis and the explanation of 'natural' disasters. In: Varley, A. (Ed.), Disasters, Development and the Environment. John Wiley, Chichester, pp. 13–30.

Collins, A.E., 1993. Environmental influences on the distribution of incidence of cholera: a case study in Quelimane, Mozambique. Disasters 17 (4), 321–340.

Collins, A.E., 1996. The geography of cholera. In: Drasar, B.S., Forrest, B.D. (Eds.), Cholera and the Ecology of *Vibrio cholerae*. Chapman and Hall, London, pp. 255–294.

Collins, A.E., 1998. Environment, Health and Population Displacement: Development and Change in Mozambique's Diarrhoeal Disease Ecology. Making of Modern Africa Series. Ashgate, Aldershot.

Collins, A.E., 2001. Land degradation, health ecology and development. Land Degrad. Dev. 12 (3), 237–250.

Collins, A.E., 2003. Vulnerability to coastal cholera ecology. Soc. Sci. Med. 57, 1397–1407.

Collins, A.E., 2009. Disaster and Development. Routledge, London.

Collins, A.E., 2013a. Applications of disaster risk reduction to migration influenced by environmental change. J. Environ. Sci. Policy 27 (S1), S112–S125.

Collins, A.E., 2013b. Editorial - Linking disaster and development: further challenges and opportunities. Special Edition Environ. Hazards 12 (1), 1–4.

Cutter, S.L., Mitchel, J.T., Scott, M.S., 2000. Revealing the vulnerability of people and places: a case study of Georgetown County, South Carolina. Ann. Assoc. Am. Geogr. 90 (40), 713–737.

DFID, 2012. Department for International Development, Multi-Hazard Disaster Risk Assessment (V2). CHASE, DFID, London.

Doyal, L., 1987. The Political Economy of Health. Pluto Press, London.

Edgeworth, R., Collins, A.E., 2006. Self-care as a response to diarrhoea in rural Bangladesh: empowered choice or enforced adoption? Soc. Sci. Med. 63, 2686–2697.

Edgeworth, R., 2014. Self-care in Bangladesh: local level resilience and risk reduction. In: Collins, A.E., et al. (Eds.), Hazards, Risks and Disasters in Society. Elsevier.

ESRC., 2006 and 2010. Project Overview and Final Report documents of Collins, A.E. et al. - ESRC Research Grant RES-167-25-0241, The Meaning of Health Security for Disaster Resilience in Bangladesh: A Health Security Framework for Disaster Risk Reduction. Available at Economic and Social Research Council, UK. www.esrc.ac.uk.

Folke, C., Carpenter, S., Elmqvist, Gunderson, L., Holling, C.S., Walker, B., 2002. Resilience and sustainable development: building adaptive capacity in a world of transformations. Ambio 31 (5), 437–440.

Gaillard, J.C., 2010. Vulnerability, capacity and resilience: perspectives for climate and development policy. J. Int. Dev. 22 (2), 218–232.

Honari, M., Boleyn, T. (Eds.), 1999. Health Ecology: Health, Culture and Human-Environment Interaction. Routledge, London.

IFRC, 2004. Focus on Community Resilience. World Disaster Report 2004. IFRC, Geneva.

IFRC, Collins, A.E., 2009. The people centred approach to early warning systems and the 'Last Mile'. In: International Federation of the Red Cross and Red Crescent Societies (IFRC), Focus on Early Warning, Early Action, pp. 39–68. World Disaster Report, (Chapter 2).

IPCC, 2007. Climate Change 2007: The Physical Science Basis, Summary for Policymakers. Contribution of Working Group 1 to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. WMO and UNEP, Geneva (updated for 2014).

IPCC, 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, and New York, NY, USA.

IPCC, 2014. Climate Change: Impacts, Adaptation and Vulnerability. WMO and UNEP, Geneva.

Jones, S., Aryal, K., Collins, A.E., 2013. Local-level governance of risk and resilience in Nepal. Disasters 37 (3), 442–467.

Leoni, B., Radford, T., Schulman, M., 2011. Disaster through a Different Lens: Behind Every Effect, There Is a Cause. United Nations Office for Disaster Risk Reduction (UNISDR), Geneva.

Lewis, J., 1999. Development in Disaster-prone Places: Studies of Vulnerability. IT Publications (Practical Action), London.

Lewis, J., 2014. The susceptibility of the vulnerable: some realities reassessed. Disast. Prev. Manag. 23 (1), 2–11.

Maldonado, J.K., 2014. Everyday practices and symbolic forms of resistance: adapting to environmental change in coastal Louisiana. In: Collins, A.E., et al. (Eds.), Hazards, Risks and Disasters in Society. Elsevier.

Manyena, B., 2006. The concept of resilience revisited. Disasters 30 (4), pp. 433-350.

Manyena, S.B., O'Brien, G., O'Keefe, P., Rose, J., 2011. Disaster resilience: a bounce back or bounce forward ability? Local Environ. 16 (5), 417–424.

Mohammad, S.M., Collins, A.E., 2013. Disaster risk reduction in Bangladesh as an adaptation strategy for climate change. In: Proceedings of ANDROID Conference and Doctoral School, Limassol, Cyprus, 23–24th October, 2013, pp. 93–101.

Monday, J.L., 2002. Building back better: creating a sustainable community after disaster. Nat. Hazards Inf. 3, 1–11. Available at. www.colorado.edu/hazards/publications/informer/informer.html (Last visited: 19/06/2013).

Nahar, P., Collins, A.E., Bhuiya, A., Alamgir, F., Ray Bennett, N., Edgeworth, R., 2013. Indigenous indicators of health security in relation to climatic disasters in Bangladesh. Environ. Hazards 12 (1), 32–46. Special Edition - Linking Disaster and Development: further challenges and opportunities.

O'Brien, G., O'Keefe, P., Gadema, Z., Swords, J., 2010. Approaching disaster management through social learning. Disast. Prev. Manag. 19 (4), 498–508.

Ohta, I., Gebre, Y.S. (Eds.), 2007. Displacement Risks in Africa: Refugees, Resettlers and Their Host Population. Kyoto University Press.

O'Keefe, P., Westgate, K., Wisner, B., 1976. Taking the naturalness out of natural disasters. Nature vol. 260, 566–567.

Paton, D., Johnston, D. (Eds.), 2006. Disaster Resilience: An Integrated Approach. Charles Thomas Publishers, USA.

Pelling, M., 2003. The Vulnerability of Cities: Natural Disasters and Social Resilience. Earthscan, London.

Perry, R.W., Quarantelli, E.L., 2005. What is a Disaster? New Answers to Old Questions. International Research Committee on Disasters, USA.

Quarantelli, E.L., 1998. What is a Disaster? Perspectives on the Question. Routledge, London.

Ray-Bennett, N.S., 2009. The influence of caste, class and gender in surviving multiple disasters in Orissa, India. Environ. Hazards 8, 5–22.

Ray-Bennett, N., Collins, A.E., Bhuiya, A., Edgeworth, R., Nahar, P., Alamgir, F., 2010. Exploring the meaning of health security for disaster resilience through people's perspectives in Bangladesh. Health Place 16, 581–589.

Renaud, F.G., Sudmeier-Rieux, K., Estrella, E. (Eds.), 2013. The Role of Ecosystems in Disaster Risk Reduction. United Nations University Press.

Sudmeier-Rieux, K.I., 2014. Resilience – an emerging paradigm of danger or of hope? Disast. Prev. Manag. 23 (1), 67–80.

UNICEF, 2012. Build Back Better: A Twelve-month Update on UNICEF's Work to Rebuild Children's Lives and Restore Hope since the Tsunami. UNICEF, New York.

United Nations Chief Executive Board for Coordination, 2013. United Nations Plan of Action on Disaster Risk Reduction for Resilience. United Nations, New York.

UNHCR, 2014. United Nations High Commission for Refugees – Global Trends 2014. UNHCR, Geneva.

UNISDR, 2002. Living with Risk: A Global Review of Disaster Reduction Initiatives. UNISDR, Geneva.

UNISDR, 2005. Hyogo framework for action 2005-2015: building the resilience of nations and communities to disasters. In: World Conference on Disaster Reduction. United Nations International Strategy for Disaster Reduction, Geneva. http://www.unisdr.org/we/coordinate/hfa (Last visited: 19/06/2013).

Wisner, B., Blaikie, P., Cannon, T., Davis, I., 2004. At Risk: Natural Hazards, People's Vulnerability and Disasters, second ed. Routledge, London.