



ROUTLEDGE

Critical Introductions to Urbanism and the City

Christine Wamsler

Cities, Disaster Risk and Adaptation

Cities, Disaster Risk and Adaptation

Worldwide, disasters and climate change pose a serious risk to sustainable urban development, resulting in escalating human and economic costs. Consequently, city authorities and other urban actors face the challenge of integrating risk reduction and adaptation strategies into their work. However, related knowledge and expertise are still scarce and fragmented.

Cities, Disaster Risk and Adaptation explores ways in which resilient cities can be 'built' and sustainable urban transformation achieved. The book provides a comprehensive understanding of urban risk reduction and adaptation planning, exploring key theoretical concepts and analysing the complex interrelations between cities, disasters and climate change. Furthermore, it provides an overview of current risk reduction and adaptation approaches taken by both city authorities and city dwellers from diverse contexts in low-, middle- and high-income nations. Finally, the book offers a planning framework for reducing and adapting to risk in urban areas by expanding on pre-existing positive actions and addressing current shortfalls in theory and practice. The importance of a distributed urban governance system, in which institutions' and citizens' adaptive capacities can support and complement each other, is highlighted.

The book takes a holistic approach; it integrates perspectives and practice from risk reduction and climate change adaptation based on a specific urban viewpoint. The text is richly supplemented with boxed case studies written by renowned academics and practitioners in the field and 'test yourself' scenarios that integrate theory into practice. Each chapter contains learning objectives, end of chapter questions, suggested further reading and web resources, as well as a wealth of tables and figures. This book is essential reading for undergraduate and postgraduate students of geography, urban studies and planning, architecture, environmental studies, international development, sociology and sustainability studies.

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To my family

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Yes, my angels! The book is closed, and I am done. The pages full of tasks begun. A little hope, a little fear, along with dreams, are written here.

Introduction

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1 Setting the scene

1.1 Rationale and scope

Disasters and other climate change¹ impacts are among today's most serious risks to sustainable urban development and an increasing concern for city authorities and planners. Worldwide, the number of disasters has almost quadrupled during the past 30 years (UNISDR 2012a) and there is widespread consensus that urban disasters are increasing exponentially,² resulting in escalating human and economic losses (Box 1.1). Earthquakes destroy whole cities. Flooding or landslides damage or wash away homes and infrastructure. Jobs and vital public services are lost. Heatwaves and water scarcity compromise people's health, reduce productivity, constrain the functionality of infrastructure and place cities in competition for water.

Whilst historically cities have been – and often still are – perceived as places of refuge and as buffers against environmental change, today they are better described as hotspots of disasters and risk. Recent decades have been characterized by changing climate conditions³ and a rapid succession of major urban disasters, and even more city dwellers have lost their lives in the many small-scale disasters.⁴ Risk is in fact becoming increasingly urbanized. Whilst it is the low- and middle-income nations that bear the highest burden in terms of the human lives and proportion of gross domestic product lost as a result of disasters, high-income nations are also increasingly affected.⁵ Cases in point are the 2012 heatwaves in New York City, Philadelphia and Washington in the United States, the 2011 earthquake and tsunami in Japan and the 2003 European heatwave. This last resulted in more than 52,000 deaths (Larsen 2006). The tragedy was not simply the outcome of a 'natural' disaster, but the outcome of high temperatures mediated through a complex set of local conditions that made urban citizens particularly vulnerable. The modification of the land surface with materials that effectively retain heat, inadequate house constructions, lack of social networks, reduced numbers

BOX 1.1

Urban disasters and risk

Words are important, slippery, relational things. We need to be able to make clear what we mean when we use the terms disaster, risk and city – three words in the title of this book. What is it all about?

In simple terms, **disasters** are the result of an interaction between so-called natural hazards and vulnerable conditions. Hazards such as floods, earthquakes and windstorms thus do not cause disasters on their own. It is only when they are combined with vulnerable conditions, such as people or systems susceptible to the damaging effects of these hazardous events, that disasters occur, i.e. ‘a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources’ (UNISDR 2009: 9). Disaster risk is thus the probability or likelihood that such a serious disruption occurs. The given disaster definition makes reference to different scales of impact (i.e. communities and societies) and consequently includes large-scale disasters as well as everyday small-scale disasters. Their occurrence can be related to both climatic extremes and variability.

Disasters that occur in **cities**, i.e. in an urban and not a rural context, can be called urban disasters. There is no commonly accepted definition of what is meant by the terms ‘urban’ and ‘city’.^a Today, however, the term ‘urban’ is generally viewed within the perspective of a **rural-urban continuum** spanning villages, small towns, secondary (or medium-sized) cities, metropolitan areas and megacities. Nevertheless, for practical reasons the words ‘urban’ and ‘city’ will be used interchangeably in this book.

Urban disasters are unique in the sense that they occur in an environment that has adapted to absorb large populations and services leading to specific urban characteristics in respect of (a) scale, (b) densities, (c) inhabitants’ livelihood strategies, (d) economic systems and resource availability, (e) governance systems, (f) public expectations, (g) settlement structures and form, (h) likelihood for compound and complex disasters, and (i) potential for secondary impacts on surrounding rural areas and regions (see Chapter 2).

^a Many countries define as cities or urban centres all settlements with populations above a threshold, for instance 1,000, 5,000 or 20,000 inhabitants, influencing the proportion of the population said to live in urban areas.

of health staff during summer periods and no contingency plans for heat-waves are only some of the contributing risk factors. Most victims were elderly people who were trapped inside their homes, living alone in neighbourhoods that lacked a sense of community and where there was a perception of danger in the streets (Dorell 2012; IPCC 2007a).

Two points can be taken from this story. First, the impact of hazards, and thus the likelihood of disaster occurrence, is strongly dependent on urban planning⁶ practice and related governance processes. Second, in contrast to the notion of urban centres as places of refuge, cities actually generate hazards, both directly and indirectly – in this case, directly through increased temperatures caused by urban heat islands and indirectly because climate change and its related impacts are a result of greenhouse gas emissions, to which cities are said to be the main contributors (see Section 3.4). Consequently, there are no such things as ‘natural’ disasters in cities, and urban planning is capable not only of counteracting disasters and climate change impacts, but also of strongly reinforcing them (Boxes 1.1 and 1.2).

The fact that disasters are not ‘natural’, but rather a socio-economic construct, is also illustrated by the many poor or underprivileged who are particularly at risk, in both the southern and the northern hemisphere. They often settle on marginal land, have substandard housing and infrastructure, do not receive early warnings or, as in the case of Hurricane Katrina in New Orleans, are not able to leave the city. While poor and marginal living conditions reinforce people’s vulnerability to hazards, disasters make their already precarious conditions worse, creating a vicious circle of increasing risk that all too often results in poverty traps.

As a consequence of the described situation, city authorities and planners are increasingly facing the challenge of finding ways to include risk reduction and adaptation strategies in their work, although related knowledge and competence is still scarce and fragmented. During the past two decades, increasing attention has been given to the field of disaster risk reduction, at first mainly within the context of disaster response (DFID 2004; Twigg 2004). It is only in recent years that more and more consideration has also been given to the need to address disasters and risk through development work so as to attain sustainable risk reduction *and* climate change adaptation (Box 1.3). A range of different policy documents allude to this need, including the Millennium Declaration and the Hyogo Framework for Action 2005–2015, which urges governments to address the issue of disaster risk in different sector work (UNISDR 2005).

To put cities in the spotlight and bring city authorities and planners ‘on board’, the 2010–2015 World Disaster Reduction Campaign on ‘Making Cities

BOX 1.2

Urban disasters and climate change

Disasters are triggered by so-called natural hazards, which include both climatic and non-climatic hazards. Climatic hazards are, for instance, precipitation, floods, windstorms, droughts, fires, heat- and coldwaves, sea-level rise (water surges) and landslides. These hazards can arise from, and materialize in the form of, both climatic extremes and variability. Non-climatic hazards include, for instance, earthquakes and volcanic eruptions. Disaster risk refers to risk related to climatic and non-climatic hazards, whilst climate risk only refers to risk related to climatic hazards.

The terms weather-related or non-weather-related hazards are commonly used as synonyms for climatic and non-climatic hazards, although climate is not the same as weather. The average pattern of weather is called climate and usually stays pretty much the same for centuries if not exposed to external influences. However, the Earth is not being left alone. According to the Intergovernmental Panel on Climate Change (IPCC), concentrations of greenhouse gases, including carbon dioxide (CO₂), methane (CH₄), chlorofluorocarbons (CFCs) and nitrous oxide (N₂O), have increased dramatically since 1750, primarily as a result of human activities, leading to climate change (IPCC 2007c; Bulkeley and Betsill 2003).

Climate change is closely related to 'global warming', which refers to an increase in mean annual surface temperature of the Earth's atmosphere and in turn results in changing climate conditions in terms of both climatic extremes and variability. Importantly, these changing climate conditions can aggravate both the existing hazards and the present vulnerable conditions (see Box 1.1), thus considerably increasing risk and disaster occurrence. Feedback loops between disasters and climate change are further reinforced by the fact that urban areas already at risk from disasters are those most likely to be affected by climate change in the future (see Chapter 3).

Resilient' was created. It supports the five priorities of the Hyogo Framework for Action by linking them to the urban context with the aim being to:

1. Make disaster risk reduction a priority in urban practices
2. Create a knowledge base on urban risks
3. Build understanding and awareness of urban risks at all levels
4. Reduce urban risks, and
5. Prepare cities, making them ready to act (UNISDR 2010a).

Further international key policy documents relevant to urban risk reduction *and* adaptation are, amongst others:

- Agenda 21, a product of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 and informally known as the Earth Summit. This is a non-binding action plan to support sustainable development, affirmed and modified at subsequent UN conferences.⁷
- The United Framework Convention on Climate Change (UNFCCC), an international environmental treaty, also produced at the Earth Summit in 1992. The treaty provides for updates (called ‘protocols’) that would set mandatory limits on greenhouse gas emissions. The principal update is the Kyoto Protocol.
- The Kyoto Protocol, initially adopted in 1997 in Kyoto, Japan, entered into force in February 2005.
- The Cancun Adaptation Framework, established at the 2010 Climate Change Conference in Cancun, Mexico in 2010 (i.e. the 16th session of the Conference of the Parties [COP 16] to the UNFCCC and the 6th session of the Conference of the Parties to the Kyoto Protocol).
- The Global Framework for Climate Services (GFCS), established during the Third Climate Change Conference in September 2009 in Geneva to enable better adaptation to climate change through the development and incorporation of science-based climate information and prediction into planning, policy and practice.

Finally, the Rio+20 world conference in June 2012 included for the first time the issues of sustainable cities *and* disaster risk reduction as (two out of seven) priority areas in the global sustainable development agenda.⁸ The final report of the conference states:

We underline the importance of considering disaster risk reduction, resilience and climate risks in urban planning.

(United Nations 2012: 26)

Apart from the international policy documents, there are relevant legislation and policy directives at regional levels. An example is the European Strategic Environmental Assessment (SEA) Directive, which legally obliges planners to consider climate change in urban development planning.⁹

Despite the advances at the international and regional policy level, city authorities, aid organizations and planners are still struggling to effectively tackle disaster risk through their everyday work. This is a result of, amongst

BOX 1.3

Urban risk reduction and climate change adaptation

Risk reduction and, even more, climate change adaptation are still relatively new areas of knowledge. Whilst they have in the main developed independently, they share the aim to reduce the occurrence and impacts of climate-related disasters and associated risk, which includes climatic extremes and variability (see Chapter 2). Risk reduction and adaptation can, therefore, not be meaningfully conducted without considering climate variability. In contrast to climate change adaptation, risk reduction also addresses non-climate-related risk and disasters. Importantly, both areas are cross-cutting issues. This means that both risk reduction and adaptation need to be integrated into urban planning and all kinds of sector work – implemented before, during and in the aftermath of disaster occurrence (i.e. the context of development, disaster response and disaster recovery). This book presents a holistic approach throughout in integrating perspectives and practice from risk reduction and climate change adaptation based on a specific urban viewpoint.

other things, the lack of (access to) adequate knowledge and tools that are relevant and applicable at a city and local level (e.g. Carmin *et al.* 2012; Pelling 2007; SKL 2011; UNISDR 2010a, 2010c, 2012c; Wamsler 2009a). Those working in urban planning still have a tendency to think about risk reduction and adaptation in a purely physical way,¹⁰ ensnaring themselves in constructive (high-)tech discussions and discourses. Such discussions, however, tackle only a small part of the necessary and possible measures, and too often ignore the root causes of vulnerability.¹¹ As a consequence, while city authorities and planners have the responsibility for developing secure and sustainable cities, they often contribute to the increase in risk and disasters. A consensus thus has emerged that ‘something’ needs to be done, whilst questions as to what, how and when remain to a large extent unanswered.

Against this background, *Cities, disaster risk and adaptation* addresses the urgent need to re-evaluate current city planning for risk reduction and adaptation, which is required to achieve sustainable urban development. In order to do so, it brings together complex disaster risk and adaptation literatures, with a specific urban focus, in a coherent, thorough and holistic analysis. With disasters being a product of past developments, responding and

adapting effectively to disasters and associated risk is inherently complex. This book challenges the dominant solutions – physical planning and grand engineering projects – that provide security for some but exclude many more. It shows that the widely recognized need to incorporate better knowledge into urban planning for safer houses and infrastructure is just one of many issues that planners must address. In addition, it shows how sustainable urban development practices can flow from high- to low-income nations as well as from low- to high-income nations. In many poor countries, the need to compensate for inadequate urban risk governance structures and reimagine the city provides a rich context for new urban practice.¹²

1.2 Overall aim

The overall aim of this book is to enable students and planners working for city authorities and other urban actors¹³ to understand how urban communities can become more disaster resilient and able to counteract increasing disasters and climate change impacts – rather than inadvertently reinforcing them (Box 1.4). More specifically, it aims to:

- Analyse the complex interrelations between disasters, risk and urban development processes
- Provide an overview of current planning practice for risk reduction and adaptation
- Provide a conceptual and operational understanding of how to (better) integrate risk reduction and adaptation into urban planning practice
- Explore in this context the roles that citizens' local efforts, urban institutions¹⁴ and related governance systems (can) play in achieving sustainable urban transformation.

After reading this book, the reader will have obtained and be able to demonstrate:

- A holistic view and systems perspective of the main processes of urban disaster management, risk reduction, climate change adaptation, disaster response and recovery
- A critical understanding of different concepts and issues central to the understanding of risk reduction and adaptation in urban contexts
- Knowledge on concrete measures and operational tools for integrating risk reduction and adaptation into city planning,¹⁵ related urban governance structures and capacities.

BOX 1.4

Resilient cities

From a disaster risk perspective, resilience refers to '[t]he ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner . . .' (UNISDR 2009). Resilience is thus an attribute of a system's behaviour, indicating how well the system performs. On this basis, the ideal of urban resilience is here understood as cities that can easily withstand, cope with and overcome disasters, including climate- and non-climate-related, small- and large-scale disasters. The aim is to restore the historical function of cities as places where citizens can find safety and protection from disasters and environmental change. It is hoped that this book will help this vision become reality.

Imagine cities that effortlessly cope with hurricanes, fires or floods, that reinforce themselves and seal cracks of their own accord, and buildings that elevate themselves during flooding. Imagine cities that provide information systems that warn when a hurricane is approaching or when houses are overburdened and may be liable to imminent collapse. Such cities would secure the livelihood of all their inhabitants, empowering them to cope and deal with natural threats. As with a living organism, such cities would adjust their social, political and economic systems in such a rapid way that they can account for damage, effect repairs, learn from experience, transform and retire – urbanely – once they can no longer fulfil their protective and defensible function (adapted from Wamsler 2006a). (See Chapter 2, Boxes 2.2 and 2.3.)

Cities, disaster risk and adaptation thus supports and contributes to the priority areas of the Hyogo Framework for Action 2005–2015 and the goals of the 2010–2015 World Disaster Reduction Campaign 'Making Cities Resilient'. Whilst the book's focus is on cities and urban planning, its content has much wider applications. It is a useful source for both undergraduate and postgraduate students across the disciplines of environmental studies, geography, international development, sociology, sustainability studies, urban studies and planning. Its institutional target group includes, amongst others, government officials and practitioners, urban planners, and staff from non-governmental and community-based organizations and environmental consultancies from both developed and developing contexts.

1.3 Outline

Chapter 1 sets the scene by defining the scope and aim of the book. On this basis, the book is structured into three parts:

1. Theory
2. Practice
3. Moving forward.

Part 1 comprises two chapters. Chapter 2 provides an overview of key concepts and terms central to the understanding of urban disaster risk management, risk reduction and adaptation (such as risk, hazard, vulnerability, adaptive capacity, mitigation, preparedness, mainstreaming, resilience and sustainable transformation) and the recent evolution of thinking on these concepts. Chapter 3 explores the reciprocal linkages between disasters and cities, analysing in detail how the urban fabric with its characteristic urban features influences both climate- and non-climate-related risk.

Part 2 deals with the current practice of urban planning for risk reduction and adaptation in high-, middle- and low-income nations. Chapter 4 presents an overview of the prevalent measures and strategies implemented by city authorities. Chapter 5 focuses on city dwellers' local initiatives to reduce and adapt to increasing disasters and climate change.

Part 3 compares the theoretical and practical approaches presented in Parts 1 and 2 and, on this basis, elaborates on the notion of resilient cities and sustainable urban transformation and how it could be (better) achieved in the future (see Box 1.4). In Chapter 6 existing differences, gaps and related challenges are discussed, together with ways in which these could be bridged. Concrete strategies are provided whereby city authorities and planners could better fulfil their responsibility for creating resilient cities. Chapter 7 briefly revisits some of the main themes of the book. It provides succinct conclusions about the arguments and findings presented in the previous chapters. The consequences for how we conceive of urban planning and the city in an era of increasing disasters and climate change are discussed.

1.4 Format and style

The book is written in a textbook or lecture style to provide the reader with a comprehensive understanding of urban disaster risk reduction and climate change adaptation, without getting 'lost' in theoretical discourses with little

practical relevance. Each chapter has a similar format, starting with an outline of the key learning objectives addressed in each chapter. The following text is structured with the help of ‘guiding questions’ and is accompanied by various figures, tables and boxes to provide additional input and effective illustrative examples to support, or highlight, some of the key issues. Several internationally recognized experts contributed to this, including (in alphabetical order): David Alexander, University College London, UK; Per Becker, Training Regions Research Centre and Lund University, Sweden; Terry Cannon, Institute of Development Studies (IDS), UK; Annika Carlsson-Kanyama, Swedish Defence Research Agency; Ian Davis, Lund University, Sweden, Oxford Brookes University, UK and Kyoto University, Japan; Willemien Faling, Council for Scientific and Industrial Research (CSIR), South Africa; Maureen Fordham, Northumbria University, UK; Mohamed Hamza, Copenhagen University, Denmark and the Global Climate Adaptation Partnership; Esteban Leon, United Nations Human Settlements Programme (UNHABITAT), Geneva; Ingrid Molander, Botkyrka Municipality, Sweden; Helena Molin Valdes, United Nations Office for Disaster Risk Reduction (UNISDR), Geneva; Mark Pelling, King’s College, London, UK; Dan Smith, International Alert, UK; Dewald Van Niekerk, African Centre for Disaster Studies, South Africa; Janani Vivekananda, International Alert, UK; and Ben Wisner, University College London, UK.

With the aim of stimulating wider interest, engagement and critical thinking, every chapter includes a summary for action taking to highlight some key aspects and ends with (a) suggested learning activities (questions and ‘test yourself’ scenarios that the reader should be able to discuss, answer or solve after having studied each chapter); (b) a list of key references for further reading; and (c) a list of relevant websites. The suggested learning activities can be used for self-study or by academics/teachers in the context of training courses. A complete bibliography and index appear at the end of the book.

In sum, this book provides an objective-oriented and well-guided learning base that encourages the reader to take an active role by answering questions, working on case studies, deepening certain areas of knowledge and exploring real-life examples and challenges of urban risk reduction and climate change adaptation when following suggested references and online resources.

Part 1

Theoretical framework

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2 **Sorting out the conceptual ‘jungle’ associated with urban risk reduction and adaptation**

Learning objectives

- To gain an overview of key concepts and terms central to the understanding of urban disaster risk management, risk reduction and climate change adaptation
 - To identify what constitutes urban risk in conceptual terms
 - To identify the conceptual characteristics of disaster-resilient cities
- To become acquainted with a conceptual and operational framework for mainstreaming risk reduction and adaptation into urban planning practice

The worldwide increase in urban disasters makes the constant struggle and failure of city authorities and other urban actors all too visible. Improved knowledge and capacity on conceptual and operational frameworks to better address this situation are crucial. But what are the concepts and terms city authorities and planners need to be familiar with when dealing with disasters and planning for risk reduction and adaptation? Unfortunately, there is no short answer to this question. Even the most simplistic and popular documentaries and publications on these issues confront the audience with an overwhelmingly large number of different concepts. This conceptual ‘jungle’ includes terms such as risk, vulnerability, hazard, prevention, mitigation, preparedness, reconstruction, resilience, sustainable transformation and many more (Figure 2.1). Too often these concepts are used without further explanation. Whilst there are no universally accepted definitions of these terms, being able to interrelate them in a coherent way is crucial in order, ultimately, to ‘construct’ a framework that can guide the comprehensive management of increasing urban disasters and changing risk patterns in



Figure 2.1 Word cloud presenting the conceptual ‘jungle’ associated with urban risk reduction and adaptation. Source: graphic created in Wordle.net.

practice. So how can we find our way through the existing conceptual jungle and make sense of its many different terms?

Different answers are possible and depend on the definition of each concept. The answer presented in the following sections is considered the most suitable for city authorities and other urban actors because it provides a coherent conceptual framework for reducing and adapting to risk in urban areas, which furthermore can be easily operationalized.¹

In simple terms, the key concepts and their interrelation can be summarized as follows. There are three main **processes** of disaster risk management, namely (1) disaster response, (2) disaster recovery and (3) disaster risk reduction (see Table 2.1, last column, bold terms). The third process, disaster risk reduction, is closely related to climate change adaptation. Both processes share the aim of increasing disaster resilience by reducing the number and impacts of climate-related disasters and associated risk, which includes climatic extremes and variability (see Boxes 1.2–1.3). The concepts of disaster, disaster risk and resilience can thus be seen as the **conceptual basis** that underlies urban risk reduction and adaptation (see Boxes 1.1 and 1.4 and Table 2.1, first column, bold terms). Risk reduction and adaptation include five main **activities**, namely (1) hazard reduction and avoidance, (2) vulnerability reduction, (3) preparedness for response, (4) preparedness for recovery and (5) risk assessment (see Table 2.1, second column, bold terms). If people at risk take measures on their own to reduce or adapt to