

# Urban disaster risk governance

## A systematic review



by Nicola Murray

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# Urban disaster risk governance: a systematic review

*“After five years working on this in Nepal, I have come to recognise that addressing Nepal's vulnerability to natural hazards is first a governance problem, and only second, about funding and expertise.” (Robert Piper, UN Resident Coordinator Nepal 2013).*

**By Nicola Murray**

**February 2017**

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## Abstract

Every year natural hazards, be they floods, earthquakes, or landslides, cause loss of life and injury, as well as damage to property and livelihoods. Climate change is increasing the frequency and severity of weather-related natural hazards, and demographic change in the form of urbanization is increasing exposure and vulnerability to disasters. Cities and towns in low- and middle- income countries are particularly vulnerable to natural disasters due to their dense populations, and rapid, often unplanned and haphazard growth. Good governance is considered by many researchers to be an important factor in safer, more resilient urban development. This paper deploys a configurative systematic review methodology to: i) map the literature on urban disaster risk governance in low- and middle- income countries; and ii) more deeply explore and synthesize the literature on the governance of risk-sensitive land-use planning in urban areas. The paper will also reflect on the configurative systematic review methodology, and on the opportunities and challenges of policy-makers and practitioners acting as researchers (the author of this study works for a policy and practice organization).

## Introduction

Natural hazards are amongst the most significant threats to long-term development. Over the last 20 years it has been estimated that natural disasters have affected 4.4 billion people, claimed the lives of 1.3 million, and caused 2 trillion USD in economic losses (UNISDR 2012). The scale, frequency and severity of natural disasters is likely to grow in coming years at an accelerated pace. Research indicates that there are two important drivers of future disaster risk: global environment change and demographic change (Foresight 2012).

Changes in climate due to global warming are widely expected in coming decades. The increase in the frequency of climate extremes are likely to increase the prevalence of droughts, flooding and storm surges affecting countries in different ways (Foresight 2012). Such disasters, especially those linked to drought, are likely to be an important cause of impoverishment, counteracting progress on poverty reduction (Shepherd et al. 2013). In terms of demographic change, more than half of the world's population live in urban centres. The majority of the world's urban population and the largest cities are in developing countries, and the greatest future urban growth is projected to be in low- and middle- income countries (Dodman et al. 2013). Cities are amongst the world's most prosperous, but also most risky locations to work and live. Many urban centres in Asia and Africa are categorised as the highest risk from both large- and small-scale disasters, particularly with regard to mortality (ibid 2013). The largest urban disasters are caused by hurricanes or earthquakes, resulting in significant damage to infrastructure and loss of life due to one event. Eight of the ten most populated cities in the world are at risk of a severe earthquake, and six of the ten are vulnerable to storm surges and tsunami waves (Chafe 2007). But, smaller more frequent events such as fires, floods, disease epidemics, and traffic accidents also cause sizable economic losses and fatalities in urban areas (ibid 2013).

The poor disproportionately bear the brunt of natural hazards, particularly in developing countries. Whilst vulnerability to natural hazards is not the same as poverty, they are intermediately linked and overlapping (Dodman et al. 2013). The population of least developed countries is projected to increase to around 1.5 billion by 2040. In many of these countries a high proportion of their populations are at risk of one or more natural hazard (Foresight 2012). There are, for example, 30 million people currently living in urban floodplains in Asia. This is set to increase to between 83 and 91 million by 2030 (Foresight 2011). Furthermore, around one third of the population of urban centres in low- and middle- income countries live in informal settlements with poor planning, low quality building structures and limited services (Dodman et al. 2013). There is also evidence to suggest that within an urban centre some groups (i.e. low income, women, elderly, and unwell) are more vulnerable to hazards than others (ibid et al. 2013).

It is widely recognised that more needs to be done to address the risk of future natural disasters, particularly in highly vulnerable developing countries, and that effective risk governance is important to this. Some evidence suggests there is a strong relationship between wider indicators of good governance and the effectiveness of regulation to reduce disaster risk, including in urban areas (e.g. UNISDR 2009, 2011; William 2011; Jones et al. 2013; Tanner et al. 2009). Consequently, a number of researchers propose that limited progress for some countries in relation to disaster risk management is a consequence of weak governance, including the lack of leadership and political incentives for change; overlapping institutional mandates and limited decentralisation; deficits in accountability particularly to vulnerable and often excluded groups; and a tendency to focus on crises as opposed to longer-term more difficult challenges (Lassa 2010; Jones et

al. 2013; Bongo 2015; Berquist et al. 2015). Some authors contend that there has been little attention on disaster risk governance, but there appears to be an emerging literature (e.g. Ahrens et al. 2006; Bang 2013; Bongo 2015; Jones et al. 2013, Jones et al. 2016; Wilkinson et al. 2014).

This paper explores the literature on disaster risk governance, with a focus on urban governance in low- and middle- income countries. The author of this paper works in Nepal with the UK Department for International Development (DFID) on disaster risk management. Kathmandu, with a population of over one million, is highly vulnerable to earthquakes (Oven et al. 2016). Despite being one of the least urban countries in the world, Nepal is one of the fastest urbanising (Bakrania 2015). This is both within the Kathmandu Valley, but also in the secondary towns and cities that have well positioned infrastructure connections to India (Bakrania 2015). The nature and form of this urban expansion will be important in shaping Nepal's risk profile to natural hazards, particularly earthquakes, floods and landslides, in the coming decades. This dynamic is also true for other emerging urban areas in Asia and sub-Saharan Africa, with a number of cross-country research and practitioner networks emerging to try and grapple with these issues, (e.g. Asian Cities Climate Change Resilience Network, Urban Africa Risk Knowledge). Global conferences such as the World Humanitarian Summit (2016) and UN World Conference on Disaster Risk Reduction (2015) have also attempted to bring profile and national action to address urban disaster risk issues.

One of the main objectives of this paper is to map the emerging literature on urban disaster risk governance in order to gain insight into how governance, both "good" and "bad", informs disaster risk. The ambition, although beyond what was possible in this paper, was to draw out learning across-contexts on what promotes and drives improvements in disaster risk governance, particularly in urban areas where there are often established institutions and networks, both public and private, which can influence both negatively and positively.

Due to time constraints, this review has focused on two levels. Firstly, the review identifies and broadly maps the literature on urban disaster risk governance in low- and middle- income countries. Whilst this is a nascent literature, with most articles published in the last five years, it is also relatively significant with 76 articles identified as relevant through the searching and screening process. It was not possible in the timeframe to fully interrogate this literature, both from a content and quality perspective. Therefore, the second level of this review focused on a sub-sector within the wider literature for deeper analysis and synthesis (the governance of risk-sensitive land-use planning). The allocation and use of land in urbanising areas is often contested, shaped by the informal or formal decision-making of different actors. As urbanisation puts pressure on available space, either in terms of expansion on to new land or increased density, there is a risk of greater exposure and vulnerability of people and assets to natural hazards. For example, urban expansion in a number of developing country cities has led to the growth of informal settlements on areas prone to seasonal flooding (Dodman et al. 2013). A frequent policy response to this is risk-sensitive land-use planning. The second level of this review will draw out the wider urban risk governance literature insights on land-use planning and local policy responses.

This review will also reflect throughout on the application of configurative systematic review methods to the disaster risk management sector. Systematic review methods are relatively nascent in this area, but with an increasing body of practice starting to emerge (Gough et al. 2012). It will also reflect on the role of the author as an employee of a policy and practice organisation (i.e. DFID), and how policy expertise can help shape research and support the interpretation of findings. The research questions for this systematic review are:

- Who are the actors, and what are the dynamics and approaches in governing urban disaster risk in low- and middle- income countries?
- Who are the actors, and what are the dynamics and approaches for governing land-use planning that is sensitive (or not) to disasters in urban areas in low- and middle-income countries?
- What are the implications of being both a researcher and policy-maker when conducting a systematic review? How does this help shape the research and interpretation of findings? What are the risks and challenges?

The **first section** of this paper will give an overview of the literature on risk, governance, disaster risk governance and urban disaster risk governance. This review of the literature will help build the initial theoretical framework for the systematic map. This in turn will inform the searching and screening strategy, as well as approaches to mapping and synthesising identified literature. This theoretical model was adapted during the process of the review as the understanding of terminology and concepts matured.

The **second section** of this paper sets out the research methodology. It describes the overarching systematic review approach, as well as the specific tools for searching, screening, mapping and synthesising literature. It also notes the potential limitations of the review approach.

**Section three** summarises the research findings. The research findings are presented at two levels: i) a broad mapping of the literature on disaster risk governance; and ii) a deeper framework synthesis of a specific dimension of disaster risk governance (governance dimensions of risk-sensitive land-use planning). There is also a discussion on the application of the particular systematic review research method (i.e. configurative synthesis) to the research questions, as well as the role of the author of this paper as both a practitioner and researcher.

**Section four** in the paper discusses the research findings summarises the overall conclusions from the research. It also reflects on application of the research methodology, and how findings can be positioned within the wider literature, and policy and practice environment.

# 1: Literature Review

## 1.1 Approaches to risk

There is an extensive body of literature, dating back decades, which explores the social and political dimensions of risk. In general terms, risk can be defined as a situation or an event when something of human value is at stake and where the outcome is uncertain (Renn 1992; Fischhoff et al. 2011; Rosa et al. 2014). Academics such as Ulrich Beck, Anthony Giddens and Niklas Luhmann are frequently cited as key theoretical contributors to debates on risk (Rosa et al. 2014). Broadly, these academics premise their work on the basis that the twentieth century was not only a period of great invention, but also one of increased awareness of risks associated with technological innovation, unprecedented human invention and economic growth. A number of structural shifts associated with twentieth century modernity, they argue, have led to the changing scale and nature of risk. These include science and engineering, industrialization, economic growth, urbanization, demographic shifts, emergence of markets and their globalization, new transport infrastructures, and the expansion of global communications (Rosa et al. 2014). In parallel, a multitude of approaches and techniques have evolved to identify, evaluate and manage risks across a range of different sectors - business and private sector, policy-making and regulatory arenas, military operations and financial markets. The initial focus of these approaches have been technical - how can risk be objectively estimated, what is the probability of outcomes, and what are the consequences if risks materialize (cited Kaplan and Garrick 1981; Rowe 1977; Wilson and Crouch 2001).

Less attention has been given historically by researchers to risk governance. (Rosa et al. 2014). Who is responsible for identifying, assessing and managing risk? Who are the losers and who are the winners when risk materializes? What are the institutional processes that recognize and embed risk? How do considerations of risk enter policy-making processes, and what are the effective means of risk governance? Even less is known about how these questions relate to developing countries which have not had the same twentieth century 'transformation' as the developed world, but are subject to some of the same structural changes, such as urbanization, demographic shifts, and global communications.

## 1.2 From government to governance

In order to address some of these questions in relation to risk governance, it is first important to explore debates around the shift from government to governance. The word government normally refers to a civil body defined as a sovereign state, most commonly it is used to refer to the modern nation-state. However, the public sphere is clearly broader than government and incorporates a range of actors, institutions and processes. It is, therefore, important to consider power dynamic both within and outside of the state (Rhodes 1997).

There are well-established academic debates that we increasingly live in a "centreless" society, where the mono-centric or unitary government no longer dominates. This not only refers to the diffusion of traditional state responsibilities across government and non-governmental actors, but also the multiple layers of government which are increasingly becoming influential at a local, regional and supra-national level (Rhodes 1997). Much of this academic debate broadly falls out of the neoliberal school of thought, which in basic terms explores the renegotiation of the interface between state, market and civil society. Proponents of neoliberalism on the whole argue for a laissez-faire approach to economics and politics, which pertains that government and the state should have limited influence in markets (Gane 2012). Some of the frequently cited manifestations of this are deregulation and the transferring of responsibilities to the private sector and/or civil society (Castree 2008). Those skeptical of neoliberal arguments see this as 'hollowing out'

or ‘rolling back’ the state both horizontally, but also vertically to international institutions and local bodies (Rhodes 1997). In short, ‘state boundaries have become more politically and economically permeable to decisions and flows emanating from diverse, overlapping and integrated networks of power which operate beyond effective control by formal structures of government’ (Jones et al. 2014:79).

These shifts in the way that government operates, and the way in which decisions and policies get negotiated and implemented is often captured by the shift from “government to governance”. At its core governance refers to the actors, structures and processes by which societies share power and make collectively binding decisions (van Asselt and Renn 2011; Lebel et al. 2006). More specifically it “refers to the complex of public and/or private coordinating, steering, and regulatory processes established and conducted for social (or collective) purposes where powers are distributed amongst multiple agents, according to formal and informal rules” (Burns et al. 2011).

This messiness and complexity of the shift from government to governance has important implications for disaster risk governance, particularly as it raises questions about responsibility and accountability for identifying, evaluating, managing and reducing risks that could materialise into events which cause significant damage and loss to human life and property.

### **1.3 Disaster risk governance**

Rosa et al. (2014) from an academic perspective attempt to bring together concepts of risk and governance. They propose that risk governance is a, ‘broad rubric referring to a complex of coordinating, steering and regulatory processes conducted for collective decision-making involving uncertainty’ (2014: 150). They argue that there are five main stages of risk governance, including: pre-assessment, appraisal or estimation, characterization and evaluation; management, and communication and participation. There are three core factors they propose, which make risk more or less easier to govern. They are complexity, uncertainty and ambiguity.

In the context of governance, which is multi-stakeholder and multi-layered, different actors will have different perceptions and evaluations of risk; they will have different types of knowledge and evidence; and they will have different incentives and political interests. This, they go on to argue, creates both challenges and opportunities for collective management of risk (Rosa et al. 2014). However, beyond conceptual frameworks Rosa et al. do not offer any insight in terms of how risk governance manifests in practice at an international, national or sub-national level, and what evidence there is of strong or weak practices of risk governance from which policy-makers and practitioners could learn.

The global practitioner community on disaster risk management has started to absorb some of these concepts of risk governance. The Hyogo Framework for Action (2005-2015) for disaster risk reductions is considered by many to be a milestone global agreement between nations and other stakeholders. It established for the first time a widely endorsed framework for working at a national and subnational level on disaster risk management (UNISDR 2005). As a framework, it started to articulate risk governance as an important perspective. Embedded in the general priorities for action is, ‘appropriate support in order to enhance governance for disaster risk reduction... in order to improve the disaster resilience of developing countries.’ (2005: 5). There is also recognition of the need to strengthen policy, legislative and institutional frameworks for disaster risk reduction; and to work at a local and national level with multiple stakeholders from the private sector, as well as civil society. However, there is no specific reference to ‘risk governance’ as a core lens, and the focus is very much on the primary responsibility of member states to lead and drive risk reduction and management.

Ten years after Hyogo, governments, civil society and the private sector, reconvened, this time in Sendai to review progress against the Plan of Action and considered a further looking forward strategy. The objective of the Sendai conference (2015) was very similar, to prevent new and reduce existing risks in order to prevent and reduce losses to lives and livelihoods as a result of disasters. However, the language in the final agreement on the importance of effective risk governance is much more prominent.

The guiding principles of the Sendai framework emphasize the importance of disaster risk reduction being a responsibility shared by “central Governments and relevant national authorities, sectors and stakeholders”, and that successful disaster risk management “depends on coordination mechanisms within and across sectors with relevant stakeholders at all levels, and requires... clear articulation of responsibilities across public and private stakeholders” (UNISDR 2015). Strengthening disaster risk governance to manage disaster risk is one of the top four priorities of the framework and is considered to span disaster prevention, mitigation, preparedness, and response pre-disaster and during, as well as recovery and rehabilitation in post-disaster contexts. In terms of specific priorities this establishing strategies, plans, and policies on risk reduction, mainstreaming disaster risk in to other sectors, establishing and maintaining coordination forums, clarifying roles and responsibilities, and so on (UNISDR 2015). From more of an urban perspective, the Sendai framework also made specific recommendations for action on risk governance in relation to the built environment; for example, the need to address the mechanisms and incentives for compliance with regulatory regimes which address land-use, urban planning, building codes, resource management and the environment (UNISDR 2015).

In parallel, there have also been global debates and conferences on the impacts of climate change. For many developing countries, climate change will bring more frequent and severe weather-related disaster events. The UN Framework Convention on Climate Change (UNFCCC) has long had a focus on climate change adaptation and financing - catalyzing national and local plans and programmes (NAPAs and LAPAs) which respond to climate (UNFCCC 2016). This in turn for a number of countries, at a national and sub-national level, has had important implications in terms of how different actors conceptualize and respond to climate risk, which has subsequently informed risk governance.

There are potential implications at a national and local level in terms of risk governance, as a result of what is effectively two relatively siloed, but in theory overlapping, global processes on climate change adaptation (UNFCCC) and disaster risk reduction (Sendai). The former is arguably more influential at a national and local level due to its intergovernmental and legalistic nature, as well as the stronger connection to global financing for action in developing countries. This it could be argued leads to a focus on addressing climatic, weather-related risks as opposed to a broader multi-hazard approach which includes geological and biological risks.

From a more grounded perspective, a number of researchers over the last five years or so have started to explore what disaster risk governance looks like in practice at both national and sub-national levels. A preliminary search of the literature identifies a number of studies. For example; Jones et al. (2013) explores the governance of risk and resilience in Nepal at a local-level, comparing and contrasting the experience of two case studies of projects that aimed to strengthen community-based disaster risk management. In a subsequent study Jones et al. (2014) explore in Nepal how non-state actors in the context of weak state apparatus have influenced and shaped national disaster risk management policy, often in competition with other international actors. Bankoff et al. (2010) investigates the divergence of disaster risk perceptions and response across state actors and NGOs in the Philippines. Bang (2014) maps out the disaster management framework in Cameroon across legislative, institutional and administrative dimensions. Cho (2014) researches governance issues and implications for post-tsunami recovery and

reconstruction in Eastern Japan. Bongo (2015) explores the importance of leadership and disaster risk governance in Zimbabwe.

#### 1.4 Urban risk governance

Urban centres are often lauded as engines for economic growth. However, urban expansion in low- and middle- income countries is generally badly planned and poorly managed. Consequently cities and towns are linked to social, political, economic and environmental problems, particularly in rapidly developing contexts where increased population density can increase vulnerability to natural disasters (Dodman et al. 2013).

The distinction between urban and rural is sometimes ambiguous. In rapidly urbanizing countries, towns and cities have suburban or peri-urban zones surrounding the urban centre. Satterthwaite (2006) highlights, ‘that a significant proportion of the [global] population lives in settlements that could be termed either small urban centres (and thus urban) or large villages (and thus rural).’ Satterwaite points to different country definitions on urban centres, mostly framed in terms of number of inhabitants, but with significant ranges in minimum population size required for an urban area. Population density and land use are also commonly used defining characteristics. Global statistics on urban centres, such as those produced by the World Bank, aggregate data from national statistics offices that use a range of different definitions and methodologies. There is also a literature that points to the importance of seeing urban-rural areas as more of a continuum with interaction and linkages between urban and rural areas (see figure 1) (Dodman et al. 2013).

Figure 1: Urban, rural linkages



That said urban areas do have certain common characteristics both in terms of physical space, but also the different ways in which human activities - social, economic and political - are shaped. In a paper about post-disaster needs assessments, ACAPs (2015) a specialist humanitarian organisation, identifies thirteen characteristics that make urban centres different for rural. These differences, they argue, make urban areas more complex in terms of risk profiles and from a disaster response perspective. These characteristics are echoed in other literature on urban disaster risk management (e.g. Dodman et al. 2013; Brown et al. 2015) and have important implications in terms of risk governance. Some of these characteristics include:

- **Density.** Urban areas are both dense in terms of their populations, but also buildings, roads and services. The density of the built environment creates hazards not seen in rural areas, such as large amounts of rubble post earthquake. Population density can also increase risk; for example, to communicable diseases.

- **Authority.** Urban centres tend to have multiple, diverse authorities – elected representatives, religious leaders, business elites, market governors and so on. This tends to disrupt traditional social hierarchies, especially vertical lines of authority.
- **Diversity and Complexity.** Compared with rural areas, urban areas tend to have more socially and economically diverse populations, as well as a wider variety of livelihoods and classes. Networks are also important in cities, not just physical but social, economic and political. Residents will be members of multiple, overlapping networks.
- **Legality.** Given the density of urban areas, land tenure and property rights are more likely to be complex. This is particularly important in rapidly growing areas, where informal settlements are likely to be significant.

There is evidence that suggests that well-governed cities have reduced the incidence of disasters, as well as the scale of impacts. Therefore, there are a number of researchers who advocate the key role of city authorities in engaging with wider stakeholders on the local governance of risk (Satterthwaite 2011; Fox et al. 2012). Dodman et al. (2013) explore the role of local government in low- and middle- income countries in shaping the scale and form of urban risk. Firstly, they argue that urban authorities have a number of responsibilities that can contribute to disaster risk reduction, preparedness and post-disaster response and recovery. These can be grouped into three categories - built environment (planning, building codes, land use regulations); physical infrastructure (roads, drainage, sanitation) and services (fire-protection, solid waste, transport, health care). See figure 2 for full mapping.

**Figure 2: The role of city/municipal government in disaster risk management**

Role for city/municipal government*	Long-term protection	Pre-disaster damage limitation	Immediate post-disaster response	Rebuilding
<b>Built environment</b>				
Responsive, appropriate and enforced building codes	High		High**	High
Land use regulations and property registration	High	Some		High
Public building construction and maintenance	High	Some		High
Urban planning (including zoning and development controls)	High		High**	High
<b>Infrastructure</b>				
Piped water including treatment	High	Some	High	High
Sanitation	High	Some	High	High
Drainage	High	High***	High	High
Roads, bridges, pavements	High		High	High
Electricity	High	Some?	High	High
Solid waste disposal facilities	High	Some?		High
Waste water treatment	High			High
<b>Services</b>				
Fire-protection	High	Some	High	Some
Public order/police/early warning	Medium	High	High	Some
Solid waste collection	High	High***	High	High
Schools	Medium	Medium		
Healthcare/public health/environmental health/ambulances	Medium	Medium	High	High
Public transport and transport management	Medium	High	High	High
Social welfare (includes provision for child care and old-age care)	Medium	High	High	High
Disaster response (over and above those listed above)			High	High

Secondly, Dodman et al. (2013) argue that urban authorities have significant influence in terms of the planning and regulatory frameworks, and that public infrastructure investments, be they relatively small, can profoundly influence the scope and location of other investors. These could be large commercial property developers or low-income households looking for land to build homes. In short, planning and land use decisions can shape the overall exposure of an urban centre to particular hazards both positively and negatively.

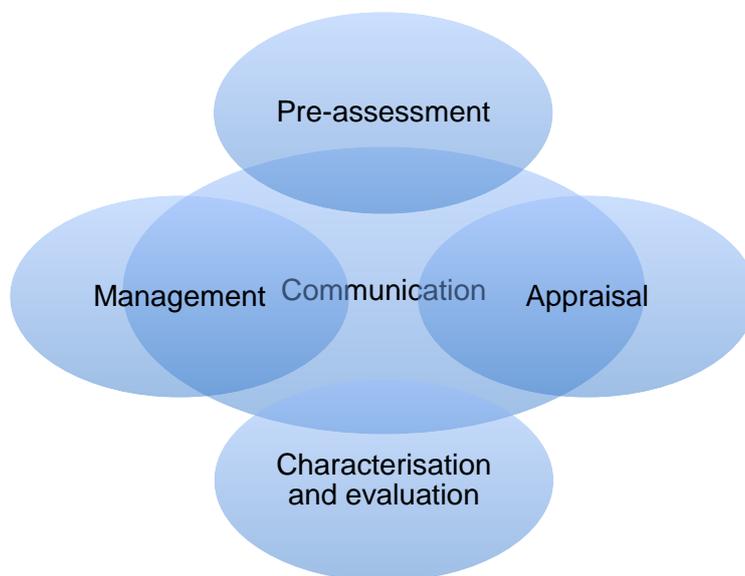
Beyond urban local government, other researchers point to wider partnerships, incentives and structures that affect the design and implementation of plans, codes and regulations in informal settlements. Satterthwaite (2011) argues the role of low-income communities; Johnson (2011) the importance of civil society knowledge and insight on risk and

vulnerability; Pelling et al. (2015) notes the role of the private sector in shaping cities and risks; and Hardoy et al. (2014) reflects on how global processes on climate change adaptation materialize into planning at a local level, particularly in urban areas.

### 1.5 Risk governance frameworks and models

The International Risk Governance Council (IRGC), a generalist organization looking at risk across a number of sectors, developed in 2005 a basic model for risk governance (figure 3). This model has been widely adopted across a number of different sectors (e.g. air quality, bioenergy, critical infrastructure, nanotechnology, food safety) as a foundation for analyzing and framing risk governance. This model is structured around four phases pre-assessment; appraisal; characterization and evaluation; and risk management. Communication is seen as a constant, overlapping dimension of all phases

Figure 3: IRGC basic model for risk governance

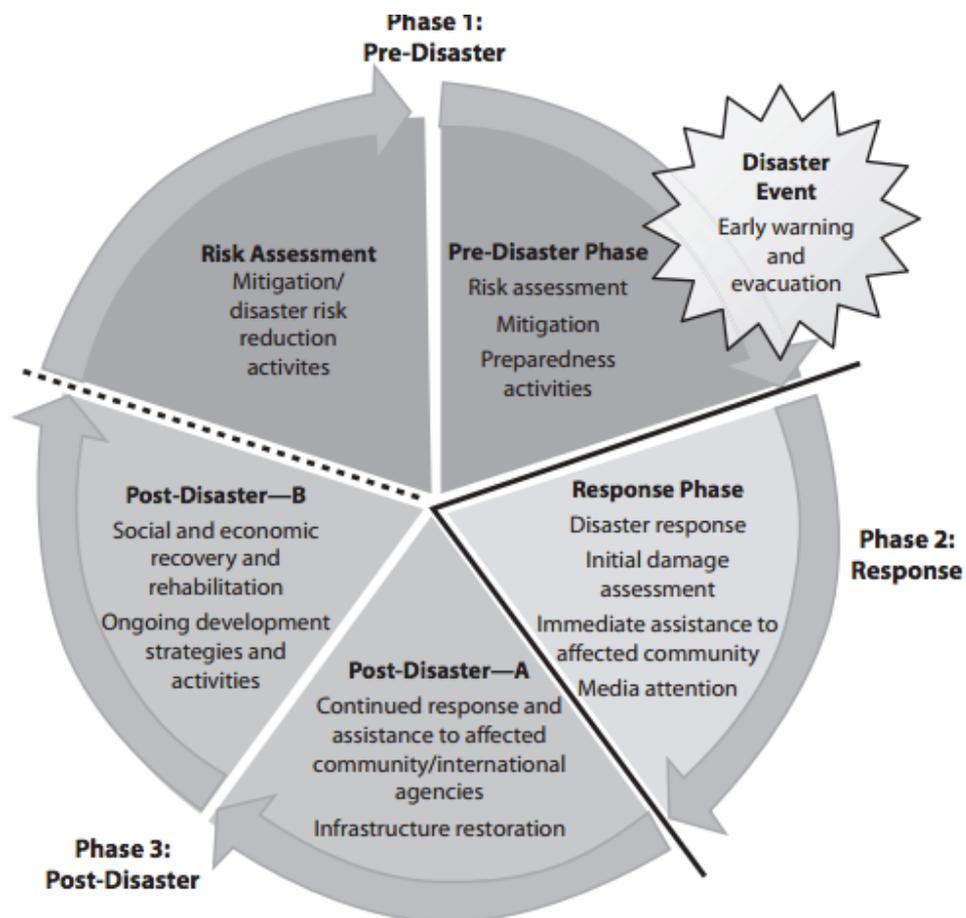


This model has been critiqued as being too linear and focused on technological hazards. It presents risk governance as a clear sequential process, with clearly delineated stages. Instead proponents argue that risk governance is messy, with the stages of risk assessment and management leaking into each other with multiple actors participating and influencing what is not a fully scientific process (Rosa et al. 2014). In response to these challenges the IRGC has adapted its framework, reformulating stages into pre-estimation; interdisciplinary estimation; risk characterization; risk evaluation and risk management. Risk communication is still at the heart of all stages, but the IRGC has extended this to include deliberation and involvement indicating a two-way process between key stakeholders. The revised model also brings in importance of the capacity and resources of risk governance institutions - institutional means, financial, social capital, technological and human resources.

This is a useful general starting point for a theoretical framework for this systematic review. However, the disaster management community has evolved similar, but different,

frameworks for response to risks from natural hazards. These are relatively coherent with the disaster risk governance, and risk governance literature already described in this chapter, which in different ways describe the stages of the disaster management cycle into pre-disaster, response and post-disaster. Figure 4 is a well-recognized framework, adapted by Todd et al. (2011) as part of a major review of lessons from evaluations commissioned by the World Bank and other large donors on response to national disasters.

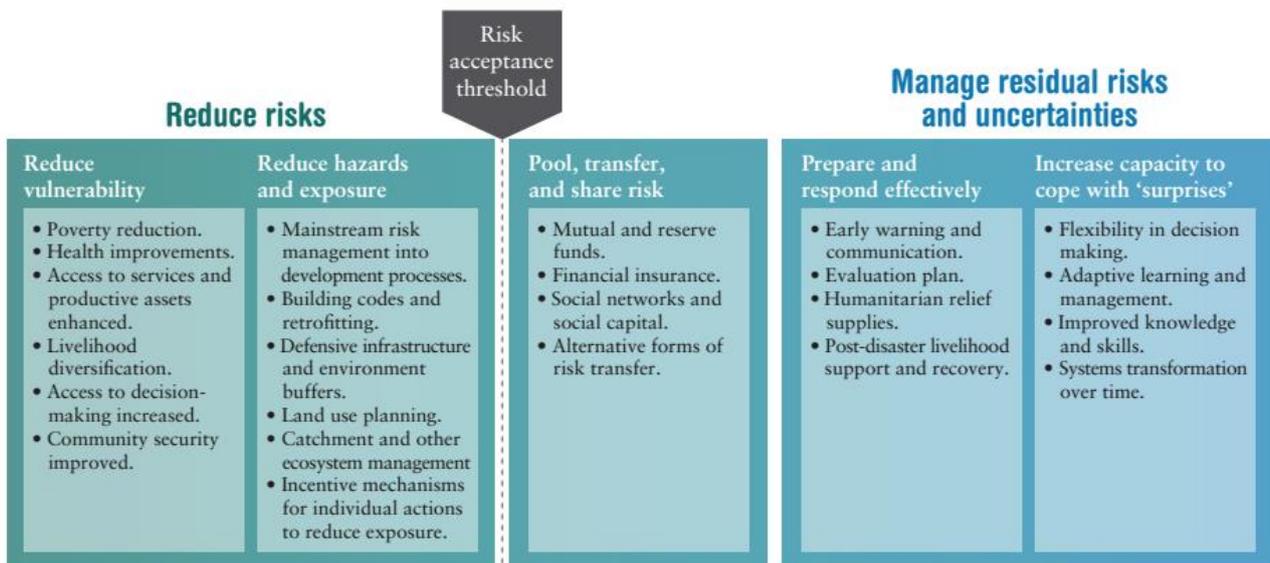
Figure 4: Phases of the disaster management cycle Todd et al. (2011)



Source: Based on work of Ian Davis, Cranfield University, Bedford, United Kingdom.

These stages can be further broken down. The below figure 5 based on the work of the Intergovernmental Panel on Climate Change (2012) further digs into the different approaches to managing risk (reducing vulnerability, reducing hazards and exposure, and pooling, transferring or sharing risk). It also sets out approaches for monitoring and adapting to residual risk and uncertainties, which in the context of natural hazards results in the activation of humanitarian resources as a responder of last resort.

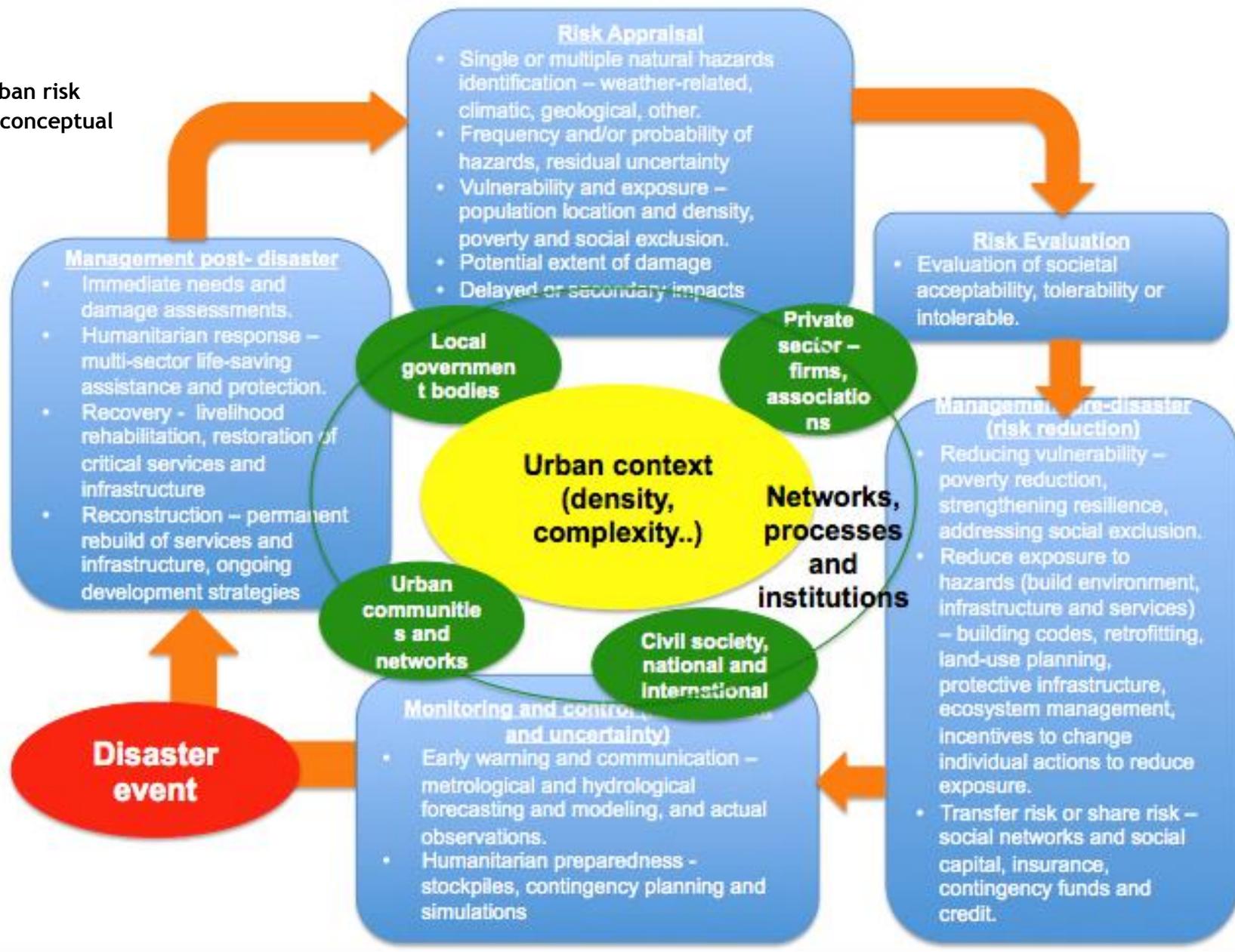
**Figure 5: Intergovernmental Panel on Climate change model on risk management (IPCC 2012)**



SOURCE: IPCC, 2012

Figure 6 brings this together into an initial theoretical framework for this systematic review. It uses the IRCG model as a starting point, but integrates the stages and language from the disaster management community (i.e. figures 4 and 5). It also draws on insights from the literature review; for example, it includes the multiple actors that are involved in governing disaster risk in urban centres (i.e. local government, civil society, private sector, and residents/communities); and the different ways in which risk is generated or regulated (e.g. infrastructure, services, planning, laws). As is common in configurative systematic reviews, this initial framework evolved over the course of the systematic review, as the author develops a more detailed understanding of the concepts and language. These adaptations to the framework are discussed in more detail in Sections 4 and 5.

Figure 6: Urban risk governance conceptual framework



## 2: Methodology

### 2.1 Systematic reviews as a research methodology

At its core a systemic review is “a review of the research literature using systematic and explicit accountable methods” (Gough et al. 2013: 261). The method has evolved out of a number of challenges to traditional literature review approaches. Traditional literature reviews attempt to summarise what is “known” about a topic, but without explaining how studies included have been identified, and why other studies have not been reviewed and discussed. Studies that could have been relevant may not have been known by the researcher or they may have been excluded for some unspecified reason. If the approach of identifying and including studies is not clear, readers are not able to assess the appropriateness of such decisions and whether they have been applied in a systematic way. There is, therefore, a higher risk of bias in the literature review findings or that important findings may not have been included (Gough et al. 2013).

Systematic reviews aim to address this by deploying an explicit, rigorous and transparent approach to reviewing literature in order to answer specific research questions. This is as opposed to addressing a general topic area. Systematic reviews have three key phases: i) identifying and describing relevant research (“mapping”); ii) critically appraising research reports in a systematic manner; and iii) drawing together findings into a coherence statement, or synthesis (Gough et al. 2013). In a similar way to primary research, methods are explicit.

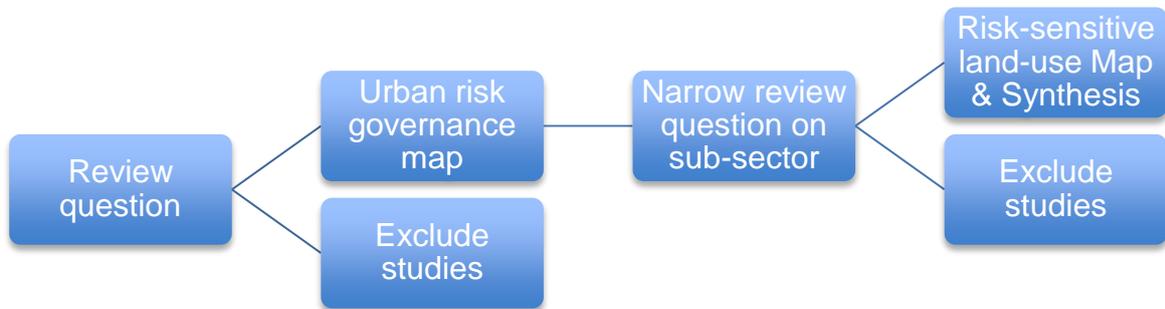
Broadly, there are two approaches to conducting a systematic review, with the chosen approach depending on the objectives of the study and research questions (although some reviews draw on both approaches). These two approaches are configurative and aggregative reviews. This paper deploys a configurative approach. A configurative systematic review is where the synthesis is predominantly organising, or arranging, data from studies to answer a research question. They are commonly used for qualitative data, but quantitative data can also be configured. This is in contrast to an aggregative systematic review that aims to add up (aggregate) the findings from primary studies to establish an overall effect sizes in order to answer a research question. Aggregative syntheses are normally associated with testing hypothesis or theories (Gough et al. 2013).

Systematic reviews that configure findings tend to address research questions that are aimed at generating new theories or exploring the relevance of an existing theory. The studies included in a configurative synthesis tend to be heterogeneous (Gough et al. 2013). Characteristics of configurative synthesis include (Gough et al. 2013: 52-64):

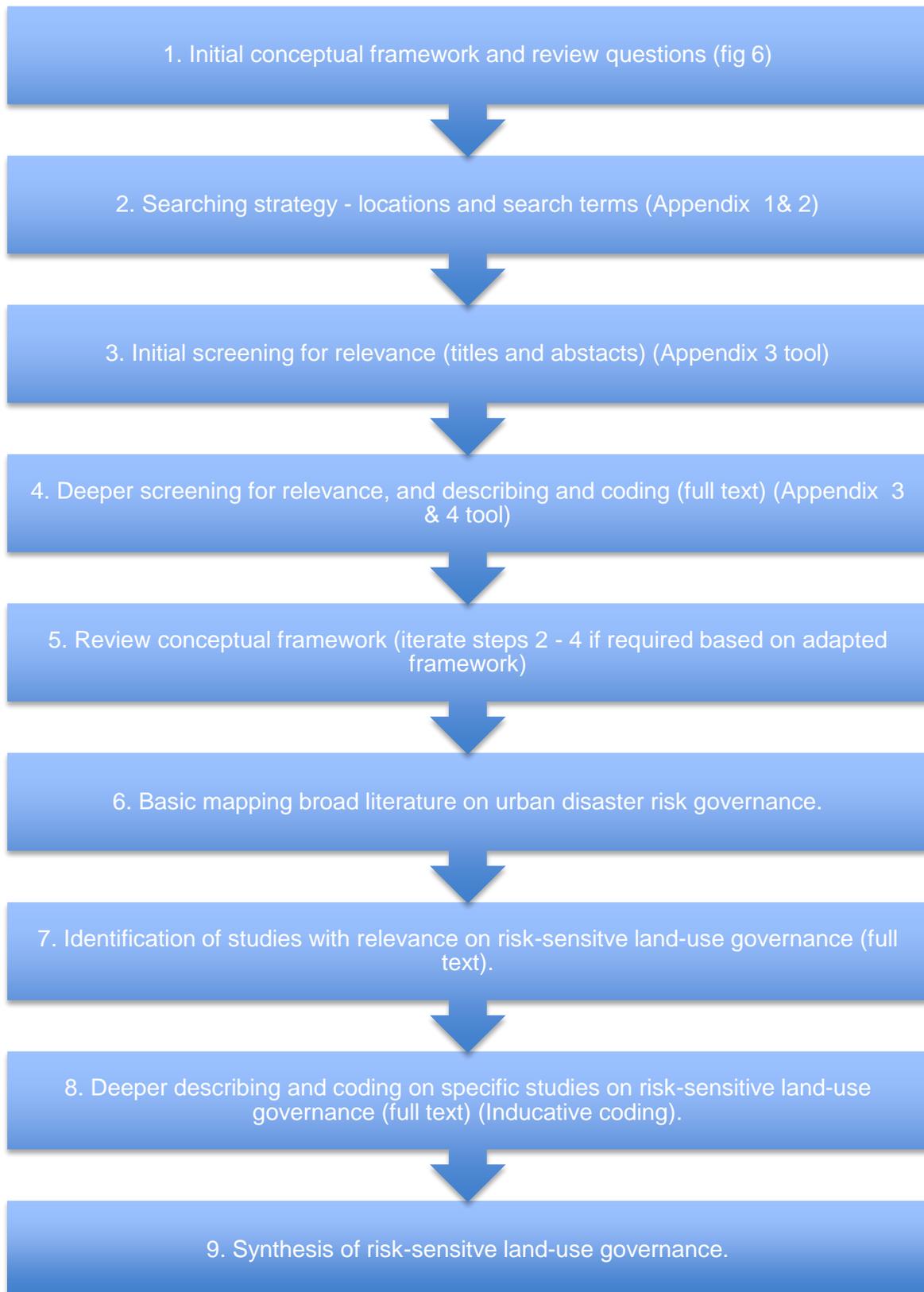
- Concepts are the data for analysis;
- Conceptual analysis is within, rather than before and after the review;
- Review is aiming to generate and explore theories, taking an inductive approach;
- Review is an iterative exploration rather than using pre-defined, pre-specified method;
- Review does not have to be exhaustive in searching, the focus is instead on the range and nature of findings for sufficient and coherent configuration; and
- Greater focus is on the richness of data as opposed to bias, quality appraisal focuses on relevance with a basis assessment of quality.

There are a number of defined stages to a systematic review, although for a configurative synthesis the approach tends to be more iterative as new concepts emerge and develop. Broadly the methodology for this paper followed a number of review stages (see figures 7 and 8). There was some iteration between stages one and four, as concepts emerged and the codes refined and developed over review.

Figure 7: Overview review stages



**Figure 8: Review stages and screening, coding tools**



## 2.2 Searching Strategy

### 2.2.1 Search terms, definitions and exclusion criteria

The broad searching strategy for this review was comprised of four dimensions (see figure 9). In order to be considered relevant for this systematic review, identified literature needed to meet all of these different dimensions. If a source included only three or less (e.g. the focus of the research is a high- income country) it was excluded.

**Figure 9: Review searching strategy**

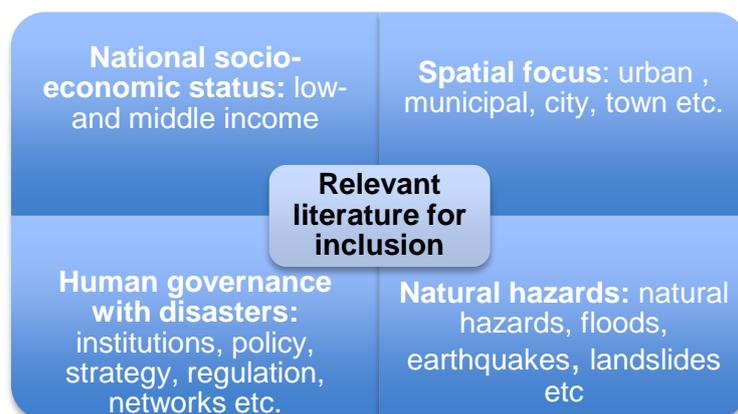


Figure 10 sets out definitions for these four dimensions. These informed the specific search terms set out in Appendix 2. The definitions also supported the deeper assessment of relevance as article titles and abstracts, as well as full text were screened. This was relatively straightforward in terms of national socio-economic status and natural hazard dimension, as there were pretty clear definitions. It is worth noting that the systematic review did not focus on technological or man-made disasters (e.g. conflicts, industrial and transport accidents) that are largely caused by humans. In urban areas there may not always be a clear definition on what is a “natural” or “man-made” hazard; for example, a poorly constructed building that collapses in an earthquake could be attributed to human factors as much as natural. There is also a wide literature on how poverty and social exclusion are often key drivers of vulnerability to disasters, and that in term there is no such thing as a “natural disaster” as there is often good reason why some people live in poor quality housing in the most dangerous areas.

Day-to-day, or extensive, risks were also not included in order to keep the scope manageable. Extensive risk refers to low-severity, high-frequency events which are generally associated with localised hazards. This is in contrast to intensive risks associated with high-severity, and lower-frequency events, mainly associate with major hazards (UNISDR 2015). This differential is important in the context of urban areas, where issues such as poor sanitation and other pollutants contaminate water, causing ill-health; and limited solid waste management and drainage systems cause localised flooding and damage to property and assets. A number of studies that only explored extensive risks were not included in the review; however, a number of studies addressed both intensive and extensive risks and their interactions. These latter studies were included in the review if they met other inclusion criteria. This is reflected in the chosen definitions for “natural hazards” and “disaster risk” in figure 10.

The search and screening category that was most challenging to apply was “governance”. In order to address this, a relatively broad set of search terms were deployed initially so as to not exclude potentially relevant literature. It was important in the “deeper screening” stage, which looked at the full text of articles, to review closely the decisions and make judgements about whether literature was in the scope of the systematic review. This challenge is discussed further in the limitations section of this chapter.

**Figure 10: Search term definitions**

Term	Definition	References
Governance	“refers to the complex of public and/or private coordinating, steering, and regulatory processes established and conducted for social (or collective) purposes where powers are distributed amongst multiple agents, according to formal and informal rules”	(Burns and Stohr 2011: 173)
Disaster risk (intensive risk)	“can be defined as the potential damage caused by a single event or series of events. It is a combination of two factors. The first is the probability of a hazard: a potentially harmful event which might itself be influenced by various factors. The second factor, vulnerability, reflects the potential damage inflicted by occurrence of a hazard in terms of both direct and indirect consequences”	(OECD 2014: 21)
	“Intensive risk is used to describe the risk associated to high-severity, mid to low-frequency events, mainly associated with major hazards”.	(UNISDR 2015)
	“The combination of the probability of an event and its negative consequences.”	(cited Foresight 2013: 17)
Natural hazard	Threatening event, or probability of occurrence of a potentially damaging phenomenon within a given time period and area.	(EM-DAT n.b)
	Natural hazards are naturally occurring physical phenomena caused either by rapid or slow onset events which can be <b>geophysical</b> (earthquakes, landslides tsunamis and volcanic activity), <b>hydrological</b> (avalanches and floods), <b>climatological</b> (extreme temperatures, drought and wildfires), <b>meteorological</b> (cyclones and storms and wave surges) or <b>biological</b> (disease epidemics and insect/animal plagues).	(IFRC n.b)

Risk Governance	“has been used to describe the translation of the substance and core principles of governance to the context of risk and risk-related decision-making, where governance is understood to describe the multitude of actors and process that lead to collective binding decisions”	(Rao 2013: 3)
Disaster risk governance	“refers to the way in which the public authorities, civil servants, media, private sector, and civil society coordinate at a community, national and regional levels in order to manage and reduce disaster and climate related risks”	(UNDP 2013:1)
Low- and middle-income country	Countries with a Gross National Income (GNI) per capita of \$1,045 or less in 2013 (low income) or between \$1,046 and \$4,125 in 2013.	(World Bank n.b)
Urban	“There is no single definition of an urban area as there are many different approaches to classifying what is urban. These include approaches based on population, population density and land use, all of which have different advantages and disadvantages depending on the purpose of the classification. However, the 2011 rural-urban area classification is now available as a [UK] National Statistics standard. This classifies output areas and wards as either urban or rural depending on whether the bulk of their population falls in a settlement of greater than 10,000 residents.”	(ONS n.b)

In addition to the above guiding definitions, the searching strategy deployed the additional inclusion criteria:

- English language sources only;
- Articles after 2004;
- Studies should focus on events in the last 30 years (i.e. no historical studies);
- Studies should be accessible either available open-source or through institutional access online (e.g. not books or book chapters); and
- Study has conducted some form of primary or secondary research (i.e. excluding advocacy and theoretical/conceptual papers).

The first four criteria have been identified for practical reasons. It is recognised that relevant literature could be published in other languages, but the researcher did not have access to translation services. In terms of date cut-off, this is relatively arbitrary. It allows for the searching of over a decade of publications and coincides with the start of the Hyogo Framework for Action on disaster risk reduction that in some ways was the catalyst for debates on risk management and governance. The review also only included studies that had conducted some form of primary or secondary research. The selection criteria did not specify any particular type of research approach or method, although this information

was collected using the screening and coding tools. What was excluded from the review were papers that were purely conceptual or “think pieces”, with no applied research methodology.

### *2.2.2 Search locations*

A full list of search locations is included at Appendix 1. However, the following broad locations and sources were used to identify research studies. This list of sources was developed using the author’s knowledge, search strategies of systematic reviews working in similar areas, and advice from experts in the sector:

- Hand searches in key journals;
- Hand searches and structured searches (where possible) on websites of key international agencies; and
- Structured searching in electronic bibliographic databases (academic and practitioner).

From the outset it was considered important to invest significant time in searching in non-academic locations for relevant studies. Whilst there was a relatively substantial body of literature within formally categorised locations, such as academic databases, studies were also identified within practitioner websites that publicised evaluations and operational research. As identified by others, practitioner focused literature is much less likely to be part of formally structured databases that formally bring together and categorise knowledge (Grayson et al 2003). Searching for this type of “grey” literature took more time, and in some cases involved manually scrolling through website links (e.g. Evidence Aid). This also introduced the risk that the search strategy was less transparent and replicable (important characteristics of a systemic review).

In terms of the sequencing of search locations, the review started with hand searching key journals, before more structured searching in websites and databases. The rationale for this was that more detailed hand searching, could inform the search terms and strings for the more mechanised searches as well as potentially supporting the development of the conceptual framework.

### **2.3 Screening studies**

Once potentially relevant literature was identified in databases and websites, it was screened for inclusion. EPPI-Reviewer 4 was used to screen and code potentially relevant articles. Outputs from structured searches in databases were loaded into EPPI-Reviewer, and studies identified through hand searches (key journals and websites) were manually entered.

As described in figures 7 and 8, screening for the overarching systematic map on urban risk governance was conducted in two stages - titles and abstracts, and full texts. The objective of the first stage was to identify the relevance of the study at a relatively superficial level. The screening tool used in EPPI-Reviewer is summarised at Appendix 2. Studies that were considered potentially relevant were then subject to a second level of screening. This involved the author uploading the article into EPPI-Reviewer and reviewing the whole text against the same screening tool. If an article met all the criteria based on a full article screen it was considered included in the review.

This systematic review was largely conducted by one reviewer. It is normal practice for systematic reviews to have more than one researcher conducting the screening and coding stages of a review. This is often structured in such a way, so as to provide quality assurance and peer review to screening and coding decisions. This is particularly important in configurative systematic reviews, where researchers may be making difficult, sometimes subjective judgements about whether particular definitions are being met. In

order to establish greater rigor in this regard in this review, a sample of six studies was submitted to a second reviewer for quality assurance in terms of how inclusion and exclusion criteria were being consistently applied, and that definitions were applicable. This process did not uncover any significant inconsistencies or issues.

## 2.4 Coding and mapping

The objective of this stage was in broad terms to describe and categorise the identified research studies. This should help expose patterns in the literature, as well as key themes and concepts that would inform the narrower focus of a more detailed review on risk sensitive land-use planning.

Articles were coded using the relatively basic tool included at Appendix 4. This tool did not include any inductive coding, but focused on closed codes, against a number of categories including:

- Purpose of study
- Research method
- Geographical location
- National hazard type
- Dimension of risk governance (appraisal, evaluation, management pre-disaster, post-disaster response, and post-disaster recovery and reconstruction)
- Governance institutions and actors
- Governance approaches and interventions.

Initially the coding tool was much longer and elaborate, drawing out more detail on the content of studies, as well as the quality of the studies (often referred to as the “weight of the evidence”). However, 76 articles were identified as included in the review, and time did not allow for more detailed coding and analysis of quality. Studies were excluded, nonetheless, at full article stage if they did not include any explicit reference to research methods. This was considered to be a proxy prerequisite, be it a very basic one, for research quality. This was considered to be a reasonable approach, as configurative systematic reviews place greater emphasis on themes and content, as opposed to quality and impact.

It should also be noted that the coding categories adapted over the review. For example, after reading a number of articles new codes were added in terms of governance “institutions/actors” - security forces (army and police), religious groups, scientists and academics. Additional governance “approaches/interventions” were also added during the review, including ecosystems services, temporary relocation of people and assets, and services such as solid waste management. This resulted in amendments to the conceptual framework, although not fundamental, and requirement re-reviewing and re-coding of previously categorised articles. A peer review of the application of codes was not conducted due to time constraints. However, this would have increased the rigor of the review.

During this coding stage, articles were also coded as either having a major, minor or no focus on spatial risk governance. Articles considered to have a major focus were subject to more detailed (inductive) coding to support deeper mapping and analysis.

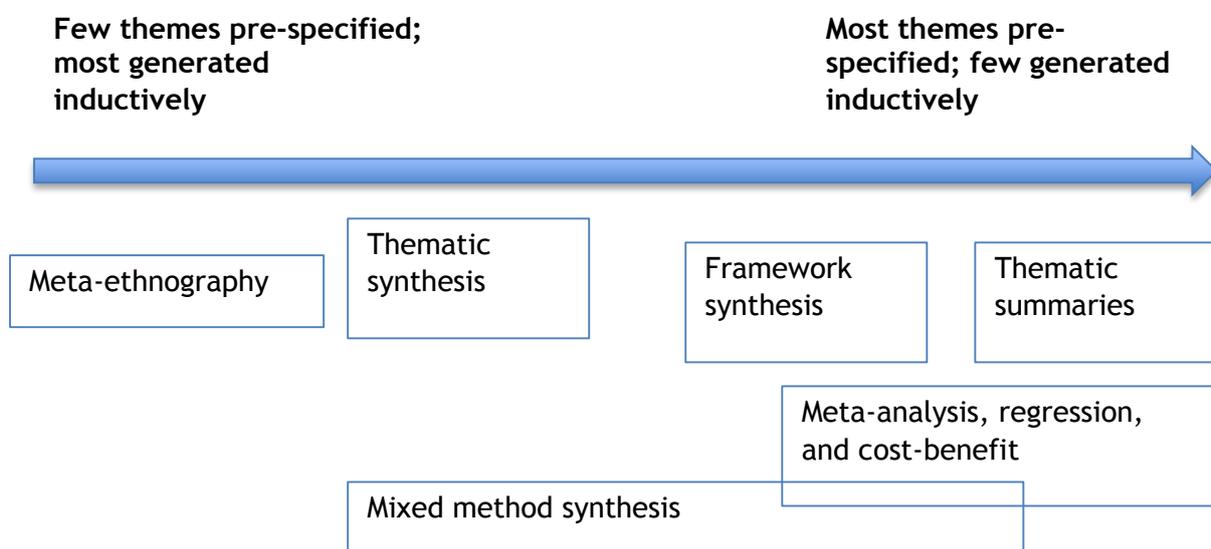
## 2.5 Synthesis

Finally, the outputs from the coding and describing of the risk-sensitive land-use planning were brought together into a framework synthesis. The main activity of the synthesis stage of a systematic review is appropriately and systematically combining research results from the identified studies. The ultimate objective of this is to create a new, collective body of knowledge (Thomas et al. 2012). There is a range of different synthesis methods, with the

selection of method largely dependent on the initial review question and/or type of research studies identified and/or data generated through the screening, describing and analysing phase of the review.

The fact that this is a configurative systematic review precludes certain synthesis methods that are more appropriate for aggregating quantitative data. However, one key dimension that shapes the synthesis approach in a more mixed methods or qualitative review, is the degree to which categories for grouping findings are inductive or deductive. In short, the main difference in synthesis approaches is, “principally in terms of when in the process the distinguishing categories originate; whether they are determined at the outset of the review as part of its conceptual framework (‘deductive’), derived from the studies themselves (‘inductive’), or a combination of the two” (Thomas et al. 2012: 183). Figure 11 maps out this spectrum and the various synthesis approaches (adapted Thomas et al. 2012).

**Figure 11: Spectrum of synthesis approaches (Thomas et al. 2012)**



As discussed earlier, this systematic review identified an initial theoretical framework, but that this has evolved over the review. Therefore, this review has been both deductive and inductive. Sections 4 and 5 describe in more detail the outcomes from the synthesis, but broadly a framework synthesis approach was used to reflect the findings on the risk-sensitive land-use planning governance sub-sector.

## 2.6 User involvement

A number of systematic review researchers emphasise the importance of engaging users in the research process. Research evidence from the health and social sectors suggests that active engagement of users in research is a ‘good thing’ (Davis et al. 2000; Nutley et al. 2008; Smith 2009). Perhaps most importantly user engagement can improve the relevance and quality of research.

Smith et al. (2009) presents, in the context of a systematic review, that research can benefit from user engagement at a number of stages in the research cycle. At the start of a research project, users can be instrumental in defining scope and setting questions in order to increase relevance (Oliver et al. 2015). Sheppard et al. (2013) note that different types of stakeholders will have diverging interests, and who sets the research questions

will determine who the research is useful for. For example, in a health context, patients and patient organisations often want to see social and emotional outcomes considered in research, as well as outcomes tracked over time in order to capture adverse reactions. In contrast, policy-makers tend to want to know whether one intervention works better than another and which is the most cost-effective, whereas practitioners tend to focus on delivery and what is needed to establish and manage interventions (Sheppard et al. 2013). Carr et al. (2007) illustrate this well with their work on Electro-Convulsive Therapy (ECT). Here engagement with patients in setting the focus of a systematic review identified long-term memory impairment as a reported side effect in approximately a third of all patients. This challenged conventional professional opinion and led to revisions in the UK's national medical guidelines. Smith et al. (2009) also propose that the engagement of users in research can support the identification, retrieval and analysis of data, particularly material that is not published. In the Carr et al. (2007) ECT systematic review, for example, engagement with patients influenced the type of evidence considered within scope and identified (i.e. the inclusion of testimonies and first-hand accounts).

Lastly, research users can play a role in the formulation of recommendations and dissemination of findings. As summarised by Nutley et al. (2008), in a UK public services context, evidence indicates that the extent to which research is relevant, credible and meets user needs, as well as the presence of positive linkages between research and policy/practitioner communities, will determine the likelihood that research findings are considered and applied by decision-makers. This is echoed in recent research by Napier et al. (2016) on humanitarian evidence systems in East Africa, where they report particular gaps and challenges in connecting national government stakeholders and research, which they conclude in turn impacts on the relevance and robustness of findings.

There is a whole literature on how users can be engaged in research, and systematic reviews more specifically. Arnstein (1969) 'ladder of participation' is a commonly referenced framework. It characterises different depths of user engagement in decision-making - citizen power (citizen control, delegated power, partnership), tokenism (informing, consultation, placation), and non-participation (therapy and manipulation). This, he argues, characterises the different degrees of power sharing between decision-makers (or researchers) and users. However, in the context of research seeking deeper user/citizen engagement is not only an issue of power, but also of resources and time. Stewart et al. (2007) illustrate this well in the documenting of the participatory, evidence-based development of a health information leaflet, and the learning that deep user engagement requires budget and sufficient time to engage effectively.

The author of this review works for UK DFID in Kathmandu with a focus on disaster resilience, and therefore could be seen as a potential user of the review. The research also sought advice from other policy-makers and practitioners in the sector at key moments during the review (e.g. protocol, draft mapping findings, synthesis report). Establishing a reference group was considered, but not taken forward due to resource and time constraints (a potential limitation of the review). The author did discuss the review question with a number of expert colleagues (i.e. potential users), with general positive feedback, but no substantive consultation for systematic review questions was undertaken - again due to time and resource constraints.

The author also kept a research diary to try and capture how as the research evolved personal and professional insights informed the research process and conclusions. Whilst conducting this review the author was also professionally working on the UK response to the 2015 Nepal earthquake, as well as the development of a new DFID disaster resilience programme, with a particular focus on seismically resilient buildings and risk-sensitive land-use planning. This work brought the author in to contact with policy-makers and professionals, as well as literature in Nepal on issues relevant to this systematic review. This has the potential to both positively and negatively influence the review. From a

positive perspective it enables access to people and insights that a researcher many not readily have, but negatively it could undermine the transparent and systematic nature of the review. A research diary is one tool often used by researchers to objectively reflect on how the research process is informed by external factors, and to transparently document and understand this external influence.

## 3: Research Findings

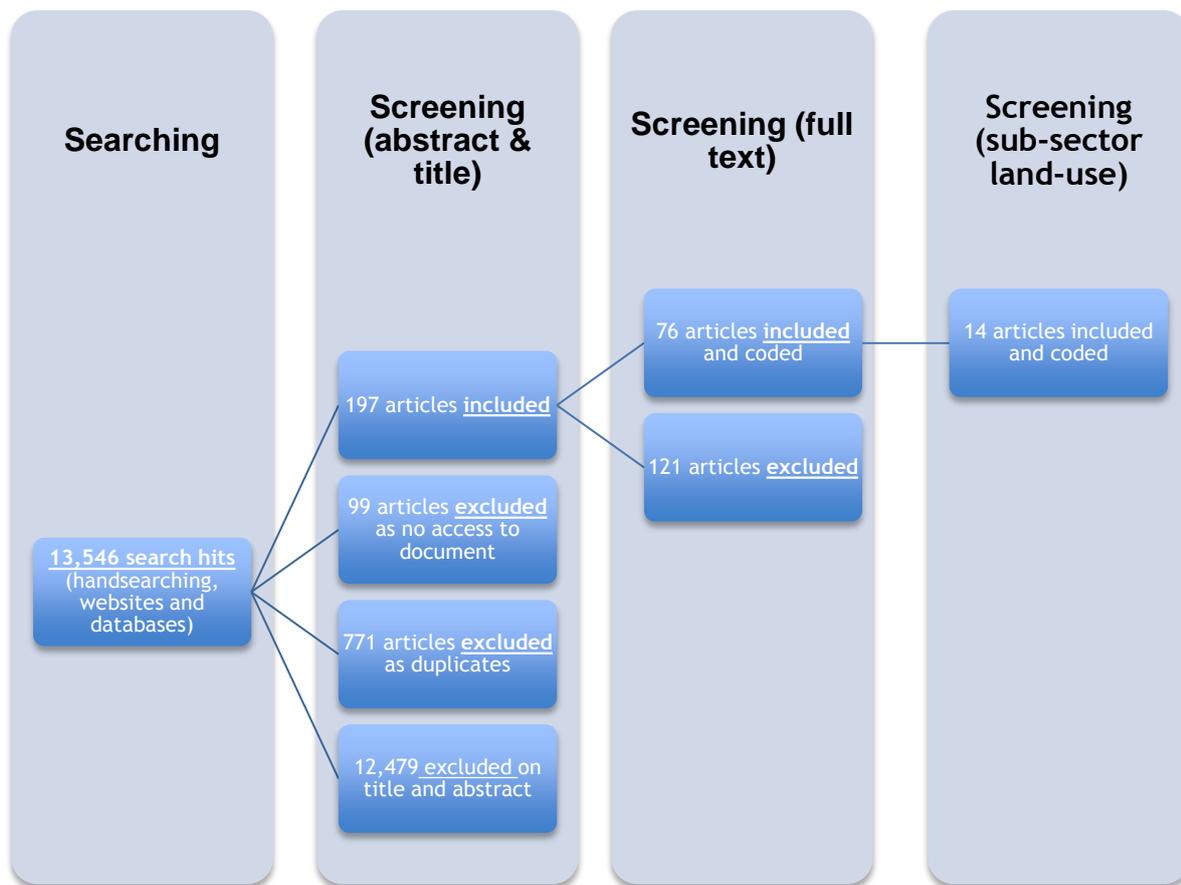
### 3.1 Mapping of the urban risk governance literature

#### 3.1.1 *Searching, screening and coding*

Figure 12 summarises the searching and screening parts of the review processes. In short, 13,546 articles were found using various searching approaches. Through a process of screening this was reduced to 76 articles that met all the inclusion criteria for the urban disaster risk governance literature map. Full citations of these included studies are noted at Appendix 5. As discussed earlier because of the number of studies, and the time constraints of this review, only a very basic coding exercise was undertaken of the 76 articles.

Within the 76 studies that met the inclusion criteria for the review 37 included some reference to risk-sensitive land-use planning. These studies were further coded into those that had a minor and major focus on risk-sensitive land-use planning. Fourteen of the 37 studies were coded as having a major focus on risk sensitive land-use planning and were subjected to deeper coding and analysis as a sub-sector within the review literature (see Appendix 5 for included studies). Those which were considered to only have a minor reference to risk-sensitive land-use planning were not included, as the judgement was made that they would only offer limited insights for the deeper sub-sector synthesis, and given time and resource constraints in this review a deeper, more limited synthesis was considered to offer more relevant and useful insight into the literature.

Figure 12: Summary of screened, included and coded studies.

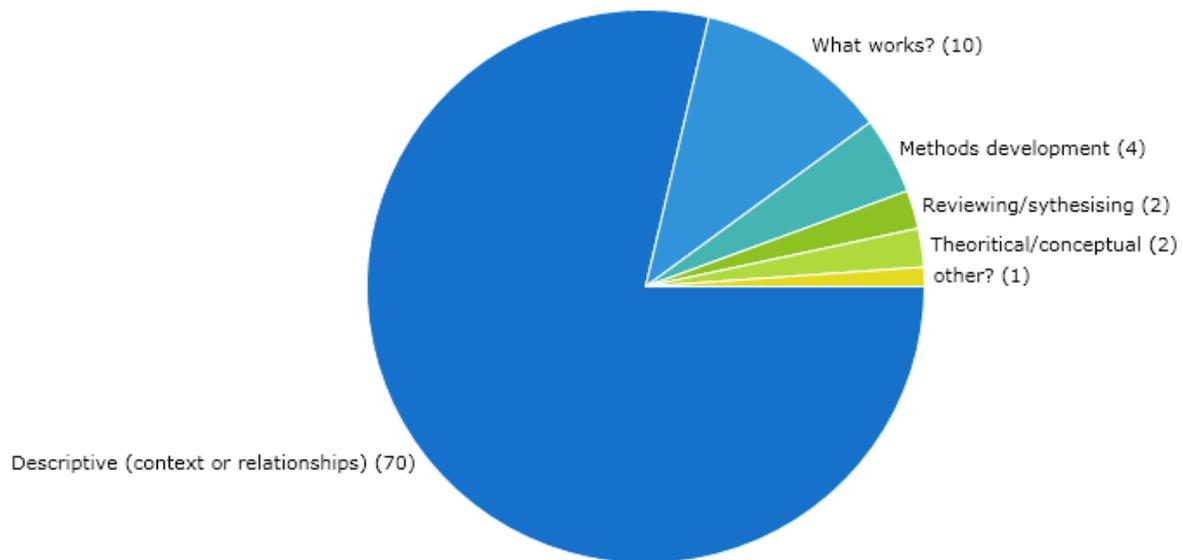


### 3.1.2 Findings, characteristics of the literature

An overview of how all of the 76 included studies were coded is included at Appendix 6. Looking at the coding of individual criteria offers some insight into the broad characteristics and composition of the literature on urban disaster risk governance. General observations on the content of the literature can also be drawn out, but with more time deeper concepts and ideas could be explored through further inductive exploration.

Firstly, the literature is mainly comprised of studies that aim to provide contextual understanding, largely based on single country case studies. There were a handful of studies which focused on addressing “what works” questions; developing methodologies for assessing vulnerability to disasters and multi-dimensional coping strategies; and developing theories for disaster resilience (see figure 13).

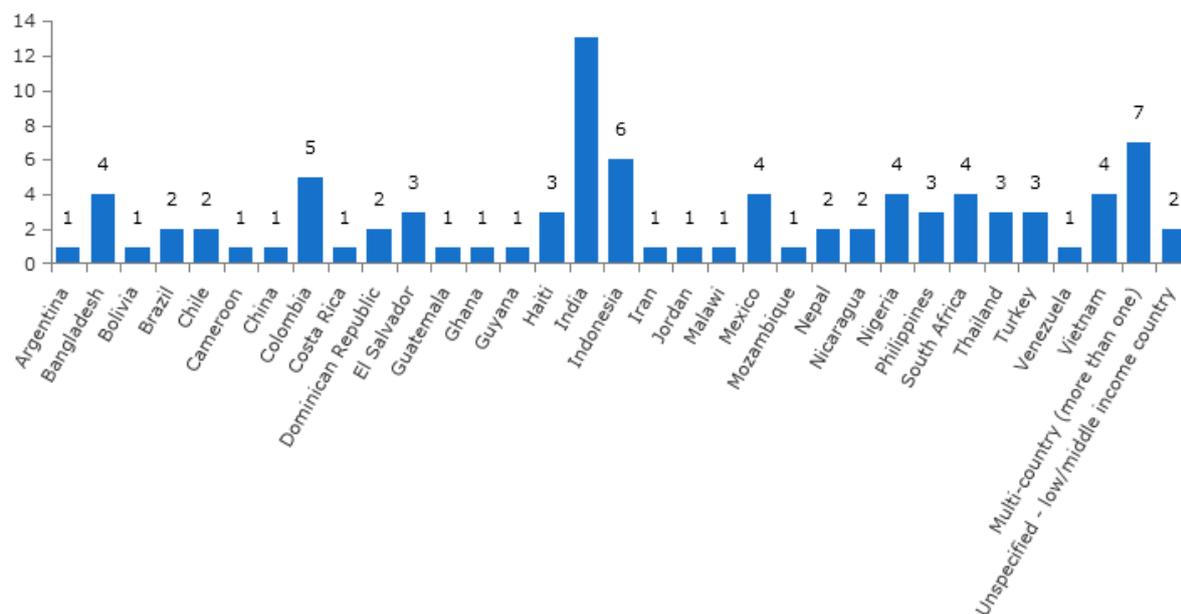
Figure 13: Frequency of research purpose for included studies



There were also a handful of multi-country studies (7), which to different degrees were comparative. There were a number of countries that featured very strongly in the literature - India (13), Indonesia (6), Colombia (5), Bangladesh (4), Mexico (4), Vietnam (4), South Africa (4) and Nigeria (4). In terms of regional emphasis Asian and Latin American countries had more of a focus, with less from Africa, the Middle East and Europe. The latter two are likely to do more with the lesser number of low- and middle-income countries in these regions (see figure 14).

In hindsight, it would have also been good to code the different cities, to see whether some cities have been researched more than others, and particularly the differences between capital cities, and smaller cities and towns. A general observation from the literature included in this review is that the latter (smaller cities and towns) are much less researched and thus understood. This is important as smaller cities and towns are likely to have very different characteristics and challenges in terms of risk governance compared to larger, primary cities. For example, smaller cities and towns are likely to have less decentralised authority and resources than capital cities, which may in turn have an impact on local action in responding to disaster risk (e.g. Brown 2013).

**Figure 14: Frequency of countries in included studies.**



Secondly, in terms of research methodology, the majority of studies deployed more than one data collection approach. Case studies, as well as perception data (interviews, focus groups, and surveys) approaches were dominant. Approaches were largely qualitative, using some kind of purposive sampling approach (although this was often implied and not specified). A systematic approach to assessing the quality of the evidence was not undertaken for this systematic review (e.g. weight of the evidence), but it was observed that the sample of a number of included studies were relatively small. Documentary review of primary data (e.g. policy documents, newspapers, legislation) was also used by a number of studies, as well as non-systematic literature reviews and observation. A number of studies were structure in terms of presenting a country risk profile, overlaying this with vulnerability, and then exploring and analysing community and/or institutional capacity and coping mechanisms for response and recovery. It was in the exploration of copying mechanism and responses that relevant themes on “urban risk governance” were identified. The emergence of a relatively standardised methodological approach for exploring risk, vulnerability and capacity could in time create a body of literature which more readily lends itself to research synthesis.

A general observation, not necessarily captured in the coding, was the predominance of studies utilising qualitative approaches in the form of relatively limited purposively sampled interviews. Also a significant number of studies that were screened out at “full text” stage as there was not even a very basic description of research methods. Very few articles, even those included, described data collection techniques at length, and even less described data analysis approaches. The majority of studies were from academic peer-reviewed journals, so the lack of description of methods is surprising. There were even some journals where studies were frequently excluded for not describing the main methods applied.

A final observation in terms of the nature of the literature is in relation to the year of publication. Figure 15 sets out the frequency of included studies against the year of publication. In short, the majority of included studies were published in the last five to six years. This indicated that this is an area of research that is growing in interest with more

work being published. The implications of this from the perspective of a systematic review is that it is very likely that in the next few years there will be more relevant literature, and that this systematic map will quickly be out-dated and need revision. It also implies that this research area could benefit from a strengthening of the evidence base, due to greater volume of studies in coming years. However, this will only be the case if the quality of studies is sufficient, and there is also some convergence of methodological and theoretical approaches that enables more coherence synthesis, whether it is inductive or deductive.

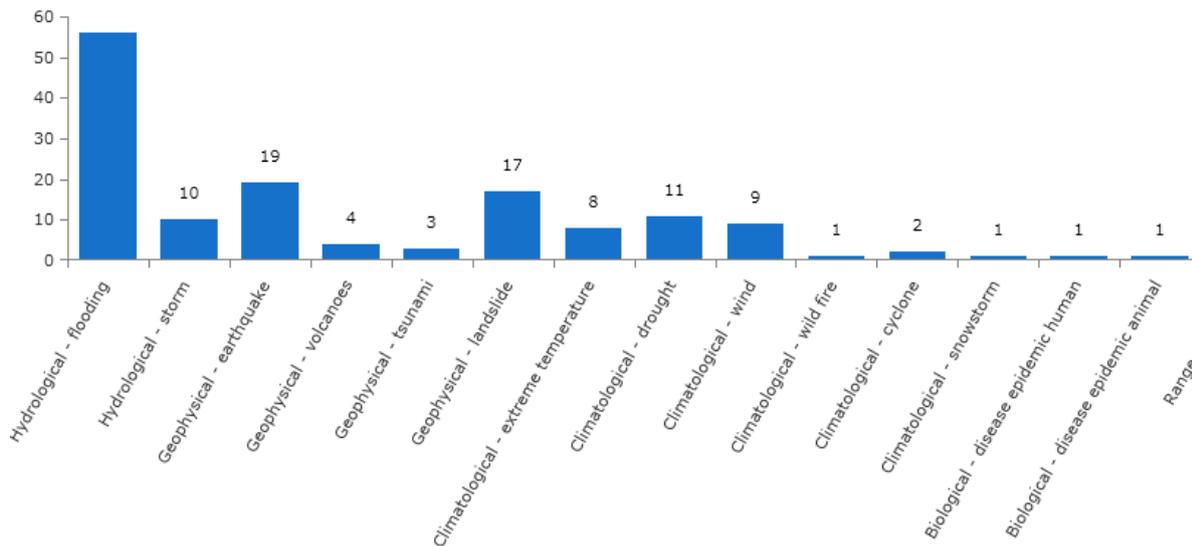
**Figure 15: Frequency of included studies by year of publication**

<b>Year</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>
<b># studies</b>	3	17	17	15	7	7
<b>Year</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>
<b># studies</b>	3	2	1	1	2	1

### 3.1.3 Urban risk governance

Addressing now more on the content of the literature identified through this review, there is an overwhelming focus in the literature on flooding with over 50 studies either completely or partially investigating urban centres prone to flood risk. This was followed by earthquake (19), landslide (17), and drought (11) hazards. Figure 16 sets out the frequencies of studies included in this systematic review focusing on different urban hazards. This resonates with Dodman et al. (2013) who also note in their literature review that many of the studies on urban risk more broadly focus on cities within low-lying coastal areas. Many of these cities are known to be at high risk of flooding from sea-level rise and storm surges, particularly for those cities prone to cyclones. Interestingly, the body of literature on inland cities also tends to focus on flooding, despite the range of hazards these cities experience - extreme heat, desertification, food insecurity, and disease (Dodman et al. 2013). It is worth noting that a number of studies identified in this review were multi-hazard, focusing on more than one hazard and often the interactions between hazards. For example, landslides are often a significant secondary hazard in an earthquake scenario where there is hilly terrain (e.g. Turkey, Nepal). Similarly rain-induced flooding is also likely to cause landslides where urban settlements spread in an unplanned way onto hill slopes (e.g. La Paz, Chittagong). It is striking that there is very little urban risk governance literature on biological hazards (animal or human), particularly in the context of the recent, high profile West Africa Ebola outbreak, as well as Severe Acute Respiratory Syndrome (SARS) and Avian Influenza in Asia. Given the density of humans and domesticated animals in developing country towns and cities, and the vulnerability that this brings in terms of biological hazards, it would be reasonable to expect there to be research attention on the governance of these issues.

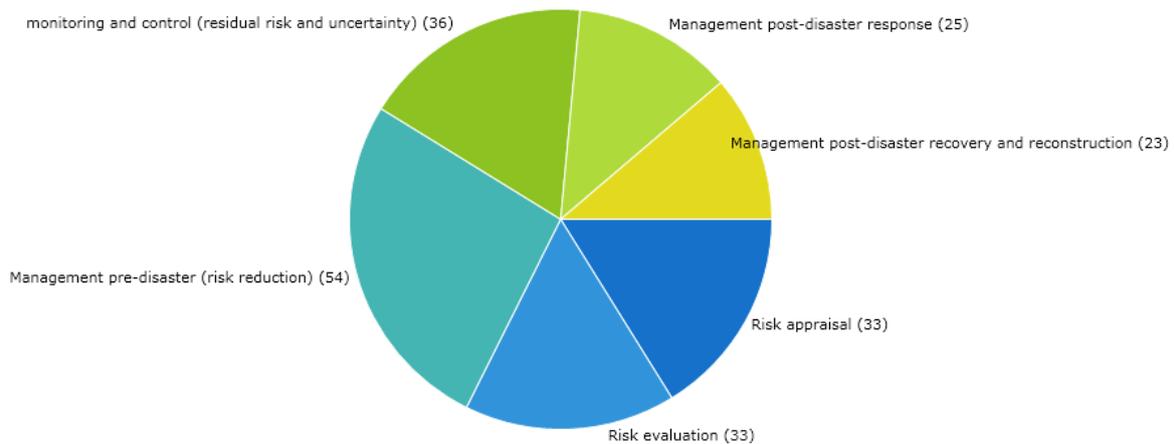
**Figure 16: Frequency of natural hazards in included studies**



In relation to risk governance, included studies were coded against the broad categories of the review conceptual framework - risk appraisal, risk evaluation, management pre-disaster (risk reduction), monitoring and control (residual risk and uncertainty), management post-disaster response, management of post-disaster recovery and reconstruction. Studies often covered more than one of these stages of the disaster risk management cycle and in some cases all. Figure 17 in very headline terms sets out the frequency of different aspects of risk governance being addressed in the literature.

In terms of what was coded in relation to the components of risk governance, the literature is relatively evenly spread between the codes identified to categorise risk governance for this review. However, it is interesting to note there are more studies that focus on pre-disaster event assessment, risk reduction and monitoring risk, compared with post-disaster event response, and recovery and reconstruction. This could be for a number of reasons. Although not specifically coded, it can be observed that there were a high number of studies included in this review that focus on climate change adaptation as opposed to disaster risk management more broadly (and intensive risks). The climate change adaptation literature tends to focus more on developmental responses to reducing the risk to climate related hazards over longer-term timeframes. This is in contrast to more of the disaster risk management literature that addresses non-climate hazards (landslides, earthquakes) and captures more of the immediate impact of these hazards on urban areas. This is again also highlighted in Dodman et al. (2013: 50) literature review of urban risk; “a strong body of evidence has been developed in relation to climate change risks and responses in urban areas... and this is slowly beginning to influence policy... However, the coverage of intensive risk in urban areas is lagging behind.” As argued earlier in this paper, this could be partially to do with the success and dominance of inter-governmental processes and financing of climate change, in contrast to disaster risk reduction, which filters down to greater research interest and focus on climate change adaptation.

**Figure 17: Frequency of risk governance stage in included studies.**



Studies explored urban risk governance in both negative and positive terms. In other words, how the relationships and processes between different actors results in more deliberate and effective collective actions at reducing, monitoring or responding to disaster risks. Or more negatively, how power dynamics and incentives across and between actors, prevent or restrict action that effectively manages risk. Whether studies found or explored positive or negative dynamics in relation to urban risk governance was not coded, although this would have been an interesting thing to capture. However, it is the general observation of the author that the majority of studies described negative dynamics, with very few positive examples of “best practice” or conclusions of what factors might constructively promote good governance in this area. Some of the negative dynamics cited in different studies included:

- Limited decentralisation of responsibilities and resource, that constrains local actors, particularly government, from making decisions and taking action;
- Unclear, overlapping or fragmented bureaucracies at both a local level, and between local and national government actors responsible for different tasks in relation to urban risk governance;
- Institutional incentives across organisations - government, private sector, civil society, and communities - to focus on crises and short-term emergency response, as opposed to longer-term risk reduction and control;
- Limited local capacity and resources, as well as in some cases empowerment, of actors to focus on and address urban risk governance issues;
- Political (dis)incentives to address the vulnerability of socially excluded groups (e.g. informal settlements) who are at most risk of natural hazards; and
- Elite capture and corruption which prevents change from the status quo of haphazard, organically growing urban centres which compound disaster risk.

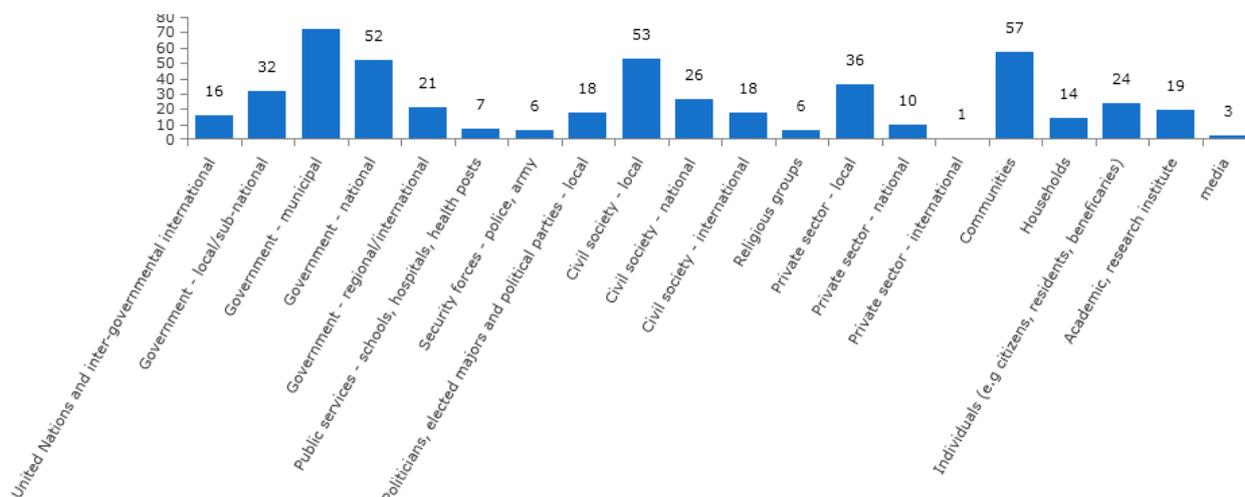
In some studies more than one of these factors were in play, and in some cases they interacted. Again, with more time, exploring deeper inductive coding against some of these factors would help build a more detailed model on what factors drive negative (or positive) governance dynamics.

Figure 18 sets out the frequencies of different “risk governance” actors identified and discussed in the studies included in this review. All studies included more than one actor,

and in some cases many. As described earlier in this paper (section 1), “risk governance” is at its core about the interaction of different types of actors, both public and private, in responding to disaster risk. Twenty different groups of actors were identified in the included studies. This probably could have been broken down into more detailed sub-categories if time had allowed (e.g. communities into formal and informal settlements, public services separated into health, schools and emergency). Also greater richness could have been drawn out particularly in terms of local urban governments. This review treats local urban government as one institution, whereas a number of studies went into greater depth exploring the relationships between different professional functions and units within local urban government (e.g. town planning, engineering, emergency services). This becomes important in different contexts where to greater or lesser degrees functions of the state are decentralised in relation to risk governance.

However, that said, this was one of the code sets which evolved the most over the course of the review. For example, media, religious groups, political parties and locally elected representatives, were not captured in the initial conceptual model and were subsequently added. A number of factors were more frequently discussed than others in studies, local government in the form of municipal authorities were the most discussed (72), followed by urban communities (57), local civil society (53), and national level government (52). Private sector, commercial actors - local, national, and international - were discussed in a number of studies but to a lower frequency.

**Figure 18: Frequency of risk governance actors in included studies**



Although not coded specifically within the review, a number of dominant interactions between different groups were observed within studies. These includes between:

- Communities and local municipal governments;
- Local municipal governments and national governments, and in some cases sub-national, regional governments (depending on institutional structure of the state);
- Local municipal government and other connected local municipal governments;
- Communities and civil society, both local, national and international;
- Communities, civil society and local municipal governments; and
- Local municipal governments, and residents/citizens.

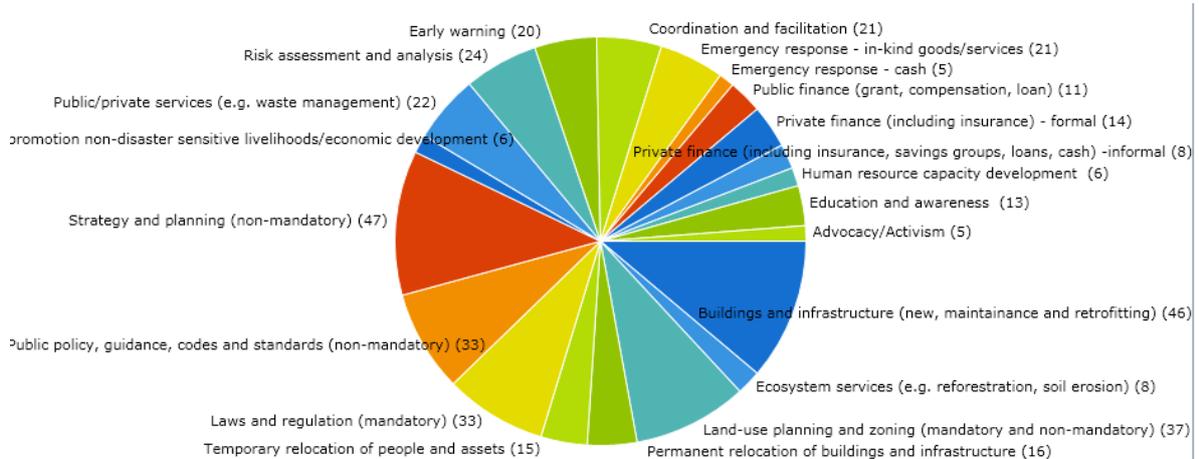
These observed interactions between different groups in review studies, echoes some of the different dimensions of governance that were brought out in the earlier literature review chapter of this paper. In short, that governance, and urban risk governance more specifically, is about multi-levelled interactions and linkages between international, national and local; and that governance is multi-actor particularly between government, commercial private sector and civil society.

A number of studies also explicitly explored the nature of the relationships between different actors, characterising them in different ways. For example, Leck et al. (2012) focuses on collaboration and cooperation for effective governance of climate change adaptation in urban areas. Their study analyses the opportunities and barriers for collaboration for better risk governance between different actors in two urban centres in South Africa. Boyd et al. (2013) also advocates for collaborative approaches between the government, private sector and public in order to reframe engagement with marginalised groups in urban areas (e.g. slum dwellers) that are vulnerable to natural hazards. Other studies describe relationships between different groups as competitive or authoritative, with some making judgements about whether that produces positive or negative dynamics for effective risk governance. These different actor interactions and relationships would be a good avenue of further exploration, using inductive coding approaches.

Finally, studies included in the review were also deductively coded by type of interventions. This was in terms of activities or interventions that studies observed to be happening in urban centres under investigation. Again, whether these were having a positive or negative influence on urban risk governance was not reflected on. Figure 19 sets out the frequencies at which different interventions were cited in studies included in the review. These interventions can be grouped into a number of areas: overarching strategy and enabling policy environment (municipal-wide strategies, multi-stakeholder coordination and facilitation, risk assessment and analysis); the built environment and infrastructure (building construction and maintenance, flood defences, land use planning, and building code enforcement); and services (social protection, emergency response, waste management). The most frequently referred to interventions or activities related to overarching city- or town-wide disaster resilience strategy setting or planning. A number of studies took a city-wide strategy or plan as their starting point for investigating on paper, and in practice, relationships across actors and governance of risk. The built environment and infrastructure were also frequently referred to in included studies. This ranged from establishing new and maintaining existing public infrastructure that control risk (e.g. flood defences, drainage systems, land stabilisation), to physical risk reduction to private property (e.g. seismically retrofitting houses). Laws and regulation, as well as codes, guidance and standards, were also frequently referred to in included studies as more indirect approaches for reducing risk in the built environment. Land-use planning and zoning as part of this, was also frequently cited.

Beyond these areas two areas - strategy setting and the built environment - included studies referred to a whole range of different activities and interventions. These activities and interventions were instigated by different actors in different contexts, with some aimed at reducing disaster risk, others monitoring and managing risk, and some responding to the consequences of risk materialising. Whilst the coding conducted in this review gives a sense of the range of activities, it would probably be more fruitful for deeper analysis and synthesis to drill into sub-sectors. For example, it is difficult to explore the governance dimensions of community coping strategies, supported by civil society and other actors, to a flood event at the same time as investigating the dynamics of city-wide disaster resilience strategizing and planning.

**Figure 19: Frequency of interventions in included studies**



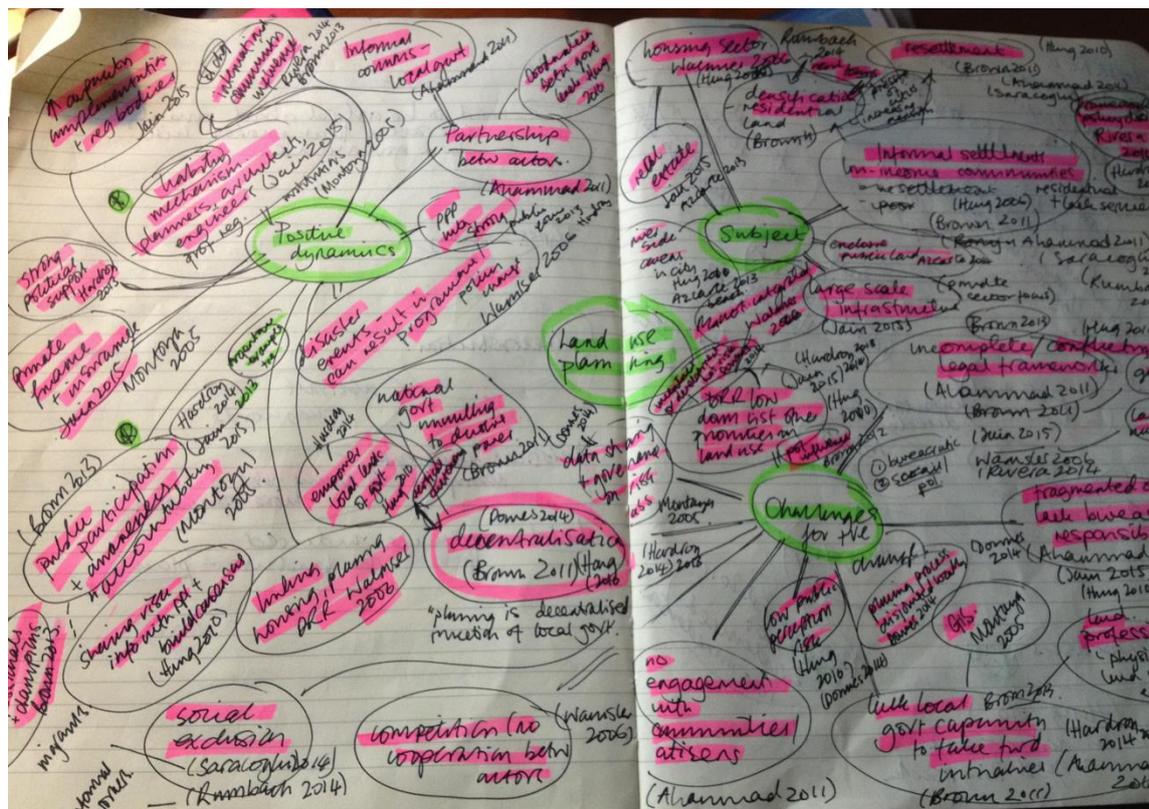
### 3.2 Governance dynamics of risk-sensitive spatial planning

The fourteen studies that were identified through the systematic mapping as having a major focus on the governance dimensions of risk-sensitive land-use planning were subject to further coding. For this stage a more inductive approach to coding was used, without a specific conceptual framework. Content and themes that were drawn out against the below areas, with themes allowed to emerge organically from the literature:

- Subject and stakeholder focus (e.g. informal settlements, land-scale infrastructure development, housing development);
- Factors or dynamics that led to either negative or positive change in terms of the governance of risk-sensitive land-use planning; and
- How the relationships between actors are characterized, and whether this is positive or negative in supporting risk-sensitive land-use planning.

The inductive coding function of EPPI-Reviewer 4 was attempted, but due to poor internet connection it was not a feasible approach (see discussion in Section 4). Instead hand drawn maps were used to pull out themes from the included studies to support the framework synthesis and analysis. An example of one of these maps is included at figure 20.

Figure 20: Example of inductive coding by hand



### 3.2.1 Subject and stakeholder focus

Studies took different entry points, some focused on a sector such as housing (Walmser 2006; Hung 2010), whereas others focused on a specific geography within an urban centre which is either risk-prone or contested, such as a river bank (Hung 2010), beach (Azcarte 2013), or informal settlement. In fact, a large number of the included studies focused in some way on informal settlements as a particularly risk-prone and spatially contested part of urban areas (Ahammad 2011; Brown 2011; Hung 2010; Rumbach 2014; Saracoglu). Within this resettlement of residents in informal settlements was also an area of focus (Ahammad 2011; Brown 2011; Hung 2010; Saracoglu 2014).

A number of studies addressed urban centres in the entirety, either in terms of planning and policy (Rivera 2014; Hardoy 2013; Hardoy 2013), or in terms of overall physical risk landscape (Rumbach 2014; Brown 2011). Only one study focused explicitly on the private sector, particularly in the context of large-scale infrastructure projects and real estate (Jain 2015).

### 3.2.2 Determinates of risk-sensitive land-use change

Figure 21 maps out some of the challenges identified in the literature for effective governance of land-use that is risk sensitive in urban areas. These themes were broadly categorised as being political, bureaucratic and social.

**Figure 21: Framework synthesis of challenges of risk governance**

Theme	Sub- theme	Studies
Political economy	Political and commercial interests aligned to short-term development of land, not longer-term risk-sensitive planning. Disaster risk reduction is subsequently a low priority.	Downes 2014 Brown 2012 Hardoy 2014 Hardoy 2013 Hung 2010
	Limited political leadership due to low prioritisation of risk-sensitive land-use planning, compared to other drivers of land-use, and changes in political leaders.	Brown 2012
Bureaucratic	Incomplete and/or conflicting legal and policy frameworks on risk-sensitive land use planning. This includes gaps in terms of responsibilities, processes, and multiple hazards.	Brown 2013 Brown 2011 Jain 2015 Ahammad 2011 Wamsler 2006 Montoya 2005 Rivera 2014
	Fragmented bureaucracies and/or lack of clear responsibility for risk-sensitive land-use planning activities, resulting in inertia and a reluctance to address difficult issues.	Ahammad 2011 Jain 2015 Hung 2010 Downes 2012 Saracoglu 2014
	Lack of decentralised government planning functions. The state is either highly centralised or planned decentralisation has not materialised (due to central governments reluctance to release power).	Brown 2011 Hung 2010 Hardoy 2013 Hardoy 2014

	Lack of government capacity to develop policy, plan and enforce risk-sensitive land use planning.	Brown 2011 Brown 2013 Hardoy 2013 Hardoy 2014 Ahammad 2011 Downes 2014
	Skills or capacity gap in relation to land-use professionals (e.g. planners, surveyors, and estate managers).	Brown 2011 Hung 2010
	Limited data sharing on hazards, vulnerability and exposure, and poor data governance which prevents a collective view of land-use risk.	Montoya 2005 Downes 2014
Social	Low awareness of disaster risk within communities and/or citizens. Limits demand or acceptance of risk-sensitive land use.	Hung 2010 Downes 2014
	No engagement with communities and/or citizens. Limits demand or acceptance or risk-sensitive land use.	Ahammad 2011
	Socially excluded groups are further marginalised through risk-sensitive land-use planning, both explicitly and implicitly.	Saracoglu 2014 Rumbach 2014

Figure 22 summarises some of the themes emerging from the literature, which more positively facilitate or enable governance of risk-sensitive land-use planning. A number of these are the flipside of the themes identified in figure 21, but some indicate new issues. Similarly these themes were categorised in terms of political economy, bureaucratic, and social. An additional theme, environmental was also added.

**Figure 22: Framework synthesis of drivers of positive risk governance**

Theme	Sub-theme	References
Political economy	Legal incentives and accountability, particularly civil and criminal liability for professional groups and other decision-makers.	Jain 2015 Montoya 2005
	Financial incentives, including commercial loans and insurance, as well as public subsidies and public-private-partnerships.	Montoya 2005 Hardoy 2013
	Strong political leadership and support for risk-sensitive land-use planning.	Hardoy 2013
	Empowered local government with sufficient vertical autonomy to make decisions. Clear coordination between government at different levels (e.g. national, sub-national and municipal)	Hardoy 2013 Hung 2010
	International influence and resources through global processes and commitments, particularly evident in relation to climate change.	Rivera 2014 Brown 2013
Bureaucratic	Institutional support to develop and strengthen technical leadership in land-use planning	Brown 2013
	Increase the implementation capacity of local government implementing and regulatory bodies for land-use planning.	Jain 2015
Social	Public participation in risk-sensitive land-use planning in order to strengthen accountability for decision-making.	Hardoy 2013 Hardoy 2014 Jain 2015 Montoya 2005 Brown 2013
	Sharing risk information with people (e.g. citizens, residents) to raise awareness and build consensus on action/interventions.	Hung 2010
Environment	Disaster events can increase awareness of risk and willingness of actors to engage in risk sensitive land-use planning	Wamlser 2006

### 3.2.2 Nature of relationships between actors

Almost all of the studies described in some way the current, or most desirable, relationship dynamics between different actors involved in risk governance. These were broadly categorized into four relationship types - i.e. competitive, authoritarian, cooperative and partnership - with study authors presenting them as either being negative or positive. These relationship types were not necessarily explicitly referenced in studies, but more that certain descriptions of characteristics of relationship indicated their

underlying nature. Examples of these characteristics, drawn from the included studies against the relationship types are illustrated in figure 23. Not all of these characteristics were drawn from the empirical research in the studies, but more researcher conclusions of what relationship dynamics can positively or negatively drive coherent risk governance of land. It would be worth exploring these themes within the wider urban risk governance literature to see if more evidenced conclusions, based on the empirical data from a larger set of case studies can be drawn out. The findings from figure 23 could be used as a starting point for a refined conceptual model to explore this.

**Figure 23: Framework synthesis of risk governance relationship dynamics**

<b>Relationship</b>	<b>Examples of characteristics of relationships</b>	<b>References</b>
<b>Competitive (negative relationship dynamic)</b>	Diverging policy objectives and goals  Duplication of small-scale activities that are not strategic or connected.  Temporary alliances between actors for specific ends.  Non-compatible or duplicative plans.	Walmser 2006  Hung 2010  Downes 2014  Brown 2012
<b>Authoritarian (negative relationship dynamic)</b>	Necessary and unquestionable action to prevent risk.  Risks (e.g. landslides) used in an instrumental way to justify policy decisions without consultation.  Paternalistic approach to risk management.	Saracoglu 2014  Azcarte 2014
<b>Cooperative (positive relationship dynamic)</b>	Coordination and facilitation amongst different actors.  Promotion of participation of different stakeholders  Ensuring transparency and information sharing between actors	Jain 2015  Hardoy 204
<b>Partnership (positive relationship dynamic)</b>	Active participation of different actors in decision-making processes, particularly those who tend to be socially excluded (informal settlements).  Consensus seeking across actors.  Integrated working across sectors and agendas on risk management	Hardoy 2013  Montoya 2004

## 4: Discussion and Conclusions

To recap, this review aimed to address core three questions:

- Who are the actors, and what are the dynamics and approaches in governing urban disaster risk in low- and middle- income countries?
- Who are the actors, and what are the dynamics and approaches for governing land-use planning that is sensitive (or not) to disasters in urban areas in low- and middle- income countries?
- What are the implications of being both a researcher and policy-maker when conducting a systematic review? How does this help shape the research and interpretation of findings? What are the risks or challenges?

This section will reflect on the research findings in the previous section and will discuss the implications of these against the research questions. It will also reflect on the research process, and some research challenges and limitations of the review.

### Question 1: Mapping the literature urban risk governance

To summarise, the literature on urban disaster risk governance in low- and middle- income countries is relatively substantive and looks to be growing. There is, however, a general bias towards certain countries and regions with no studies in some countries, particularly in Africa, where there are high levels of urbanisation and disaster risk (e.g. South Sudan, Ethiopia, Somalia). This is echoed in the Dodman et al. (2013) literature review on the natural and scale of urban risk in low- and middle-income countries, which also points to research gaps in African cities. This could reflect the fact that Asia is the most rapidly urbanising region in the world (followed by Africa). It could be to do with the higher levels of conflict and insecurity in Africa and the Middle East, which results in a less permissive environment for researchers, or it may be as a result of institutional bias in relation to the focus of dominant research organisations in this area and/or research funding organisations.

In terms of the research approach and methodology, there is convergence within the literature towards contextual studies, using largely qualitative methods. From a general policy-maker or practitioner perspective, it is perhaps not immediately clear what the relevance of this kind of evidence is. This type of research, which is narrow but deep, can sometimes be seen as only useful if a policy-maker or practitioner is working in the particular context. It is often also difficult for policy-makers and practitioners to make the mental jump from contextual findings to implications for policy and practice, particularly in different contexts. “What works” and synthesis studies are much easier to translate into policy and practice relevant findings and recommendations. There is evidence in the literature of an emergent model for researching urban risk, which focuses on hazards, vulnerability and capacity. This could in time increase the potential for more integrated synthesis of the literature in future systematic reviews.

In terms of the quality of the literature, there are indications that the literature is relatively limited. A systematic assessment of the quality of the overall literature was not conducted (e.g. weight of the evidence assessment) and, therefore, it is difficult to have conclusive findings. However, through this mapping there are some warning signs that point to the literature being limited or low quality. These include very limited descriptions within articles on the research methods used; limited information presented on sampling strategies and data analysis approaches; and no detail on potential biases and study limitations.

In terms of the content of the literature, and who are the key actors engaged in urban disaster risk governance, municipal governments came through as very important players.

Only four of the included studies did not include municipal governments as an actor, in even a minor way. That said, in terms of the dynamics of governing risk, decentralisation and unempowered local authorities or decision-makers, was referred to in a number of studies as being an important factor in constraining good governance.

This is not surprising, as many city authorities in low- and middle- income countries lack sufficient mandate, financial resources, capacity, and political influence to coordinate and implement decisions that would strengthen disaster resilience. So, even though municipal authorities are clearly present in urban risk governance dynamics the literature indicates that they are not necessarily positively influential.

Similarly urban communities, in different forms, were seen to be an important actor within the urban risk governance dynamic. This is frequently cited in relation to communities in informal settlements and the strategies and coping mechanisms they deploy, in either conflict or concert with other actors, in response to the very real, routine materialisation of risk. Again, the impression from the literature is that communities are not on the whole influential in terms of risk governance. There are a number of examples in the literature where productive, cooperation and even partnerships between communities and other more influential actors has resulted in productive risk governance. However, a more common theme seems to be one of social exclusion. As referred to earlier in this paper poverty, social exclusion and vulnerability to urban risk are intimately linked. There is often good reason why the poorest and most socially excluded groups live in poor quality housing in unsafe areas within towns and cities. Worst still, a number of studies explored dynamics where disasters are seen as a mechanism to advance other policy agendas with negative impacts for the urban poor and vulnerable. For example, rather than investing in disaster risk reduction mechanisms, there are a number of cases where communities have been encouraged, or forced, to relocate to alternative “less risky” land. This often has implications in terms of livelihoods and community ties. Strengthening accountability mechanisms for communities was referred to a number of times in the literature as a mechanism for stronger public dialogue that is more informed by communities affected by disasters.

Local civil society groups are also identified as an important actor in risk governance. This was mainly in terms of projects that supported communities to be more resilient to disasters, as well as strengthening community voice and advocating on behalf of communities for better risk governance. In a number of studies local civil society organisations also partnered vertically with international civil society, or non-governmental organisations, to deliver projects for communities. The nature of these relationships was not captured in great depth, but there is a wider literature on the politics and dynamics between local and international civil society organisations in the delivery of development assistance. Again, civil society organisations whilst able to support and influence to a degree, did not come through in the literature as being one of the most influential actors within risk governance. Civil society organisations, in contrast to government, however are less influenced by political cycles and therefore can act as more constant champions of good risk governance. In some cases, civil society actors can emerge as centres of excellence, and/or owners of institutional knowledge.

National government, particularly in relation to city or municipal government, was another key risk governance actor identified. In some cities, especially capital cities, national level government departments and agencies play an important role in disaster response and wider risk management. As discussed earlier, the degree to which countries are decentralised in terms of governance can determine the extent to which national-level government is engaged in urban risk management. There is a tendency in developing countries for states to remain relatively centralised, with close control of resources held centrally. In this context, national governments only reluctantly devolve responsibilities to local levels. Where there is devolution of responsibilities, capacities and resources to

implement government tasks and functions do not always follow. In short, the national level government seems to be an important actor in urban risk governance, particularly in terms of establishing a permissive environment in which lower levels of government can function and make decisions.

A few studies described the engagement of other actors in risk governance, such as the private sector (local, national and international), political parties and locally elected persons. Intuitively these groups are also likely to have a strong influence over the governance of risk in urban areas, as they are likely to drive particular decisions around urban development. As discussed earlier, urban areas due to their spatial concentration of wealth can intensify competition for resources, such as land, and bring powerful interests into conflict. A myriad of commercial and private considerations interacting can have wider public implications in terms of good urban risk governance. In other words, short-term fiscal and commercial interests may undermine and conflict with decision-making and action that makes urban centres more disaster resilient. Given the limited literature identified it is difficult to draw out even some overarching themes. This would be a recommended area of further research in the area of urban disaster risk governance.

Overall the literature was more negatively focused, exploring contexts and dynamics where risk is poorly managed in urban areas. There were only a handful of positive examples (e.g. Argentina, Mexico). To a degree this is not surprising. There are clear trade-offs between investments that address longer-term, infrequent impacts of natural hazards, and those that bring immediate benefits, particularly in resource constrained environments.

## **Question 2: Urban governance of risk-sensitive land use**

As discussed in Section 3, the sub-set of included studies which majored on the governance of risk-sensitive land use planning address very different areas and took different research entry points in order to explore this topic. Some focused on particular actors, dynamics and processes; some focused on sectors; and some focused on particular disaster events. That said there are a number of emergent themes, which build on the preliminary themes identified out of the broader systematic mapping of the urban risk governance literature. In terms of the framework synthesis in Section 3, this was separated into factors that challenge effective land-use planning governance, and those which enable. Both of these will be discussed in turn.

In terms of challenges to effective governance of risk-sensitive land-use, a number of studies referenced the importance of understanding the political economy of cities, and particularly the underlying dynamics around land scarcity and value, which often have implications for risk-sensitive land-use planning. As described by Brown et al. (2012: 551), the ‘spatial concentration of wealth makes land values a driver for most choices related to use of urban space. For this reason, cities are magnets for an array of competing, powerful interests’. Within the studies identified in this review, political and commercial interests were highlighted as important determinates of whether short-term interests determined the use and development of land, over risk informed decision-making.

Often linked to political economy, a number of bureaucratic constraints were frequently cited as preventing risk-sensitive land use planning. Brown (2013) argues that physical land-use planning from a technocratic perspective should be a decentralized function of the state due to its localized nature. However, the lack of decentralization, or lack of clarity on decentralized, in a number of studies is reported to disempower and constrain pro-active action on behalf of local decision-makers. Fragmented legislation and plans, as well as institutions are also identified as factors that create inertia and prevent government actors in particular in making decisions that perhaps come into conflict with other local interests. Lack of capacity, particularly within certain land-use professions, is

considered a constraint. This is not unusual in low- and middle- income country contexts where bureaucracies tend to be resource constrained.

Lastly, a number of social constraints were identified in the literature as having negative implications for risk-sensitive land-use planning. Awareness raising and engagement with communities was argued with evidence in a number of studies as being important factors that increase demand for risk-sensitive land-use and/or acceptance of decisions which are risk-based and perhaps come into conflict with shorter term interests. Linked to the earlier theme on the political economy of land in cities, a number of studies explored the dynamics around the further marginalization of informal communities through risk-sensitive land-use planning. This is particularly in terms of the resettlement (sometimes involuntary) of communities to safer land outside of the city, which in turn frees up value land for other means.

In terms of the enablers of effective governance of risk-sensitive land use planning, similar broad themes were identified - political economy, bureaucracy and social exclusion. An additional theme - environmental - was also identified. In terms of political economy, a number of studies identified instruments, legal and financial, which could counter the prevailing commercial and political incentives in urban areas in relation to land-use. Similarly strong political leadership and local government empowerment were argued in studies as important. The interaction with international influence and resources was also seen as a potentially positive factor and incentive for more risk-sensitive approaches to land-use. This was particularly raised within the context of global climate change negotiations and international climate finance, which for many developing countries has started to become an incentive for national and local level investment in climate change adaptation.

Bureaucratic and social factors that could support positive change, were largely the mirror image of the negative factors identified in the literature - e.g. strengthened institutional and technical capacity (particularly for land planning experts), increase participation of communities and/or citizens; and stronger information sharing and joint risk analysis. The additional thematic category environmental, highlighted from one study the potential of disaster events to increase the awareness and willingness of actors to consider and address land-use risk. This in effect, catalyses actors to think beyond short-term interests.

### **Question 3: the experience of a policy-maker turned researcher**

As described earlier the author of this review is also a policy-maker working for the UK DFID in Kathmandu with a focus on disaster resilience issues. There are clear parallels between the findings with this review, particularly in relation to the governance of risk-sensitive land use planning, and the professional experience of the author in Nepal.

The author started working in Nepal in May 2015, one-month after the devastating earthquake that killed nearly 9,000 people and caused over \$6.6bn worth of damage and loss to the country (GON 2015). The author worked for just over one-year on the UK's contribution to the earthquake response, which included funding partnerships to deliver humanitarian relief with over twenty international NGOs, national NGOs, the Red Cross, and UN agencies. The author also engaged with different parts of the Government of Nepal, including the Ministry of Home Affairs (MOHA) who led the overall emergency response and with other Nepal ministries with sector responsibilities - e.g. the Ministry of Urban Development who led on the emergency shelter response and the Ministry of Agriculture who led on food security issues. Before the earthquake, the UK had a long-term programme in Nepal working with a number of national and international partners to

strengthen preparedness for emergencies and also reduce disaster risk<sup>1</sup>. Historically the UK has focused its work in urban areas, particularly in the Kathmandu Valley, which is the largest and most dense urban centre in Nepal. Thus, DFID UK is very much part of the (urban) risk governance landscape in Nepal, and is therefore exposed and party to some of the dynamics described earlier. With overseas development assistance approximately a quarter of Nepal's annual budget (MOF 2015), international donors such as DFID (which is one of the largest bilateral donors) are also likely to exercise some influence on risk governance dynamics in Nepal. The remaining part of this section reflects of some on the themes identified in this review, and how they materialise in Nepal based on the author's experience as a policy-maker and practitioner engaged in the sector.

The first striking parallel between the findings of this review and experience in Nepal is around fragmented, unclear and sometimes overlapping bureaucracy. In Nepal there is no comprehensive legislation on disaster risk management. The current National Calamity (Relief) Act 1982 focuses on rescue and response (IFRC 2011). There has been debate over the last five or so years on updating this legislation with a more comprehensive and broadly based Disaster Management Act. However, progress has been slow with significant debate over the shape and form of a national disaster management authority that such legislation would evoke. The absence of up to date legislation and clear institutional form, creates uncertainty and inefficiency in the way that risk is governed. The MOHA in their most recent national Disaster Report (2015) note: "Ministry of Home Affairs is coordinating the overall disaster management activities, although different ministries are presuming their duties of disaster preparedness. In the absence of a dedicated authority, it has become increasingly more challenging for the timely, efficient and effective management of disasters". Furthermore, reflecting on lessons from the 2015 earthquake the report goes on to note that, 'it has been found that preparedness at all levels ranging from household to national levels was inadequate. Insufficient and poor implementation of legal instruments e.g. Building Code have also been identified as a factor for losses and damages. In a nutshell risk governance has been found weak." In the absence of an update legal framework, Nepal does have a National Strategy for Disaster Risk Management (2008). This has 5 priority actions, with 29 "strategic activities" which span a range of different issues, and governmental line ministry responsibilities. One area that is not strongly explored in the literature known to the author on national-level disaster risk management in Nepal is around the role of the Army. The Nepal Army clearly played an important role in the 2015 earthquake response, and has strong views on how civilian and military resources could be better combined in future large-scale emergencies (NA 2015).

There is some evidence from the wider Asia region that disasters can offer a window of opportunity to promote institutional or legislative change on disaster risk governance. A combination of political will, international support, and public opinion can provide sufficient impetus for change (Carter et al. 2016). However, almost a year and a half after the earthquake this seems unlikely in Nepal. With the passing of a new Constitution just after the earthquake, and three changes in Government and Prime Minister, political attention has moved on. The 2016 monsoon, which at the time of writing had killed over 100 people and affected almost 50 districts is largely being responded to in terms of immediate<sup>2</sup>, emergency support with little discussion on why vulnerable communities are living on flood plains and what the long-term strategy is to prevent urban inundation in growing towns and cities. This echoes the finding in the review around the importance of political leadership to enable effective risk governance.

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<sup>1</sup> UK Support to increase resilience to natural disasters in Nepal (2012-2016), <https://devtracker.dfid.gov.uk/projects/GB-1-202433/documents/>

<sup>2</sup> Reported in Nepal Red Cross Society situation reporting (August 2016)

In terms of the decentralisation in Nepal and the benefits this could bring for disaster risk governance, the picture is unclear. Not long after the earthquake, Nepal passed a new constitution. This was arguably a long awaited, historic moment that would start the process of decentralisation through the establishment of provincial structures and devolution of powers and responsibilities to local bodies. The lack of decentralisation in Nepal, and corresponding local elections, is often cited in Nepal as one of the main constraints for greater local level accountability and more responsive local government. However, progress has stalled as there remains significant debate over the boundaries of new provinces; electoral representation; and constituency delineation (ICG 2016). In the absence of the implementation of the new constitution, Nepal's structure of local governance is complex with 75 districts and 217 municipalities (159 of which have been created in the last two years), and thousands of lower levels of administration in the form of villages and wards. Districts, municipalities and villages have responsibilities, determined by the 1999 Local Self-Governance Act, in terms of disaster risk management, including disaster preparedness planning and emergency; building code compliance; and establishment of building bye-laws and land-use plans. However, without funds and guidance to support local authorities to undertake disaster resilience activities there has been limited impact locally (Pradhan 2007). This is starting to change with the MOHA developing district-level guidance for Disaster Preparedness and Response Plans, and the MOFALD producing Local Disaster Risk Management Plan guidelines (Oven et al. 2016). The Government of Nepal has also directed local authorities to allocated 2-5% of total revenue for disaster risk reduction activities (MOHA 2015). However, this is a relatively new directive, with limited evidence to date that local authorities are aware and/or acting upon it (Oven et al. 2016). With limited resources and capacity, in the experience of the author, local authorities tend to focus on the immediate impacts of seasonal disasters (floods and landslides) in terms of emergency response, as opposed to longer-term risk reduction and more resilient development planning.

Beyond the government, the risk governance landscape in Nepal is made more complex by the significant number of local, national and international non-governmental organisations, as well as the UN and bilateral/multilateral donors. A regionally focused research organisation, based in Kathmandu, ICIMOD (2007) highlights, 'effective implementation of preparedness activities has often been hampered by lack of coordination between and within the government and non-government organisations... Lack of effective coordination has, in many case, led to gaps and duplication of response works of various aid organisations.' This is echoed by Jones et al (2013) who writing in the context of disaster risk governance describes the proliferation of local, national and international NGOs in Nepal and competing agendas: "The number of local, national, international NGOs in Nepal stood at 221 in 1990 and has risen to over 30,000 by 2011." This is likely to have significantly increased after the earthquake, as a number of new organisations have since established themselves in Nepal. The proliferation of actors, results in a tendency towards a range of small, uncoordinated projects that have limited impact in terms of scale. Jones et al. suggest that engagement of non-state actors in disaster risk governance may also have the perverse effect of reducing government ownership, as opposed to supporting it. Jones et al. (2013) give the example of how international organisations UN and INGOs have supported two parallel processes in Nepal to institutionally strengthen disaster risk management (i.e. development of the National Strategy for Disaster Resilience (UNDP) and the draft Disaster Management Bill (Oxfam)). These seemingly linked processes have been worked on separately, with organisations acting competitively to support the Government. The degree to which the Government of Nepal has ownership of the products of these two processes is open to discussion. Conversely, the Government of Nepal's annual Development Cooperation report, which analyses support from international development partners frequently comments upon the fragmentation of donor assistance across sectors, and the impact this has in terms of coherence not just in the disaster resilience sector (MOF 2016).

The private sector has played a relatively invisible role in disaster risk governance in Nepal. There has been some work by the UN Development Programme with financial institutions on lending conditions for seismically resilient structures and some wider discussion about the domestic insurance sector. Business continuity in the context of natural disasters has also been a point of discussion in various partnership forums on disaster risk.<sup>3</sup> However, the private sector in Nepal is relatively new. It was only in the 1990s that many aspects of the economy were opened up to private investment (domestic and international) from state control. Whilst the private sector has grown, the Government of Nepal's ability to regulate has not developed as quickly. Urban development in Nepal is largely driven by private sector and individual decisions, and not necessarily government planning and regulation (UN-Habitat 2010). After the earthquake there has been some debate amongst stakeholders on the role of the private sector in post-earthquake reconstruction and in wider disaster resilience (e.g. WEF 2016). In summary, the incentives for the private sector to positively or negatively engage in disaster risk governance in Nepal, particularly in urban centres, is not well understood and the private sector is not currently deeply involved in multi-stakeholder policy and practice forums on disaster risk in Nepal.

To conclude, there is clear resonance between the findings of this review and the experiences of the author working on disaster resilience in Nepal. It has been helpful to reflect on the themes emerging from the review, and the practice of working in Nepal. The review process has certainly influenced the author to explore more the political economy of risk governance in Nepal, and to not take institutional blockers at face-value as "technical" problems. There is, for example, strong political and institutional reasons why Nepal despite having experienced a very large earthquake does not have more progressive disaster risk management legislation. As the previous UN resident coordinator to Nepal has been quoted to say: "After five years working on [disaster resilience] in Nepal, I have come to recognise that addressing Nepal's vulnerability to natural hazards is first a governance problem, and only second, about funding and expertise." (Robert Piper, UN Resident Coordinator Nepal 2013).

There is a risk that, particularly when conducting more open, inductive coding, that perceptions of the author in terms of what is important in relation to disaster risk governance may have influenced what has been considered important. In such a case, quality assurance and peer review of the research process can help reduce any potential for bias. As this was not done at the coding and describing phase of the review this is a potential limitation of this study (and is discussed further later in this section).

#### **4.1 Reflections on the research process**

Systematic reviews have only recently become a significant area of research methodological development. The evolution of configurative systematic review approaches is even more nascent, with more effort to date placed on aggregative methods given the dominance of health sciences in promoting the approaches. There are a number of general challenges and/or limitations with configurative systematic reviews.

Firstly, getting the scope right. Defining a review question and search strategy, particularly the inclusion criteria, in such a way that the review is not overwhelmed with studies (or only finds a very limited number) is a key challenge. This was the experience of the Zwi et al. (2015) review on community-based disaster risk management that initially identified over 31,000 studies in databases alone. Within this review 13,546 studies were identified in academic databases, professional online databases and organisational

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<sup>3</sup> This is based on the author's own perceptions and engagement in various stakeholder forums on disaster risk governance and interactions bilaterally with organisations working in Nepal.

websites. It was, therefore, decided not to conduct wider searches using platforms such as Google Scholar (initially planned). The screening tool was also refined to be more restrictive (i.e. only including studies reporting on events in the last 30 years) and the coding tool for describing included studies was simplified to focus on only key information.

A second challenge was identifying relevant literature. Like other social science disciplines, the literature in this area is dispersed and not carefully catalogued in a number of core databases and journals (as is the case with the health sector). This is why the search strategy included a number of professional databases and organisational websites. Searching these locations was time consuming, so the initial list of search locations, particularly organisational websites, had to be prioritised and reduced. Search strategies also had to be adapted for different websites and databases, where their functionality did not allow complex search term strings.

Another challenge identified in the Zwi et al. (2015) review, linked to identifying relevant literature, was the diverse use of terminology for similar concepts. This makes identification of relevant studies through database searching difficult, and requires a greater level of expert interrogation of papers. These challenges are echoed by Kar Purkayasta (2011) in relation to 'disaster databases', where he argues that limited comparability and standardisation of disaster databases make it challenging to conduct systematic reviews. These issues are deeper than just literature database architecture, but stem from factors such as the disaster community being very pluralistic, with a range of different disciplines, which come with their own approaches and languages, and different types of 'evidence', such as observational, epidemiological, field data, evaluations and research. This was certainly experience within the context of this review, where careful refining and clarification of definitions evolved over the review, and relatively extensive search terms produced a significant number of potentially relevant studies which had to be screened individually. Non-academic search engines were also not well laid-out, with limited functionality.

This review was conducted desk based from Kathmandu, and thus experienced some of the logistical challenges faced by researchers in developing countries. Slow internet speeds made it difficult to access large files and upload documents to EPPI-Reviewer. Some academic journals focused on development studies, offered the option to download lower quality documents, but with smaller file size. However, the practitioner focus literature tended to have large photos and files that in some cases made uploads to EPPI-Reviewer prohibitive. It was also not possible to use the inductive coding function in EPPI-Reviewer due to the internet speed and the delays it took to open and scroll through articles. On a number of occasions it was also difficult to even load onto the EPPI-Reviewer page. The unreliable power supply in Kathmandu also made working online with EPPI-Reviewer difficult. In Nepal there are scheduled power outages for at least seven hours per day, and power generators are the norm. Every time the mains power went out and the generator turned on the internet switched off, logging off EPPI-Reviewer automatically! Offline EPPI-Reviewer functionality would be useful in such a context.

## **4.2 Limitations and recommendations for further analysis**

There are a number of limitations to this review that are worth highlighting and reflecting on. Firstly, one person largely conducted this review. In developing the screening tools for the inclusion or exclusion of studies there was some peer review of screening decisions from a small sample of studies. This peer review did not raise any concerns in terms of the application of inclusion decision-making. To make the review more robust, it would have been helpful to have conducted this peer review on a wider set of studies, and perhaps at more than one moment during the screening (so as to ensure that the changes to the inclusion/exclusion criteria were also being uniformly and transparently applied). It would have also been helpful to conduct a similar peer review process in relation to the coding

of included studies, to ensure that these different definitions and terms were also being consistently applied.

Secondly, the review has attempted to strike a balance between breadth and depth but with time being a significant constraining factor. As indicated in the above sections, there is a lot more work that could be done in terms of further analysing and synthesising the findings from the 76 studies identified as addressing issues of urban disaster risk governance. The coding of the broader urban risk governance literature was relatively limited and relatively prescriptive in terms of code (although they did adapt over the review process). With more time it would have been useful to conduct some deeper, more inductive coding taking some of the insights from the coding and synthesis in the risk-sensitive land use sub-sector. A more comprehensive synthesis of these findings would also be interesting.

Thirdly, this review only took a very limited look at quality of research studies. Originally a “weight of the evidence” assessment was planned at the coding and describing studies stage. This was not included due to time, and only a very high level assessment of quality was undertaken (i.e. whether studies referred to research methods) and general observations on research quality. Having a rigorous assessment of research quality is less important for configurative review, compared to aggregative reviews, as their focus is identifying concepts and themes. However, if this review wanted to take the next step in making more tangible recommendations to policy-makers and practitioners on the factors that are more (or less) likely to result in good urban risk governance a more rigorous look at the quality would be important. This would help build confidence in synthesised findings.

Fourthly, a potential limitation of the review is the transparency of conceptual framework formulation. Configurative reviews have been challenged for not taking a systematic and transparent approach to establishing the foundational theoretical framework. Foundational frameworks are often based on the researchers own understanding of the conceptual literature and risk being shaped according to their own view of the world. A number of researchers have been attempting to address this by adopting a two stage systematic review processes. The first stage is similar to that of a normal systematic review, it establishes inclusion criteria, search strategies and selects relevant studies. However, the focus is on identifying models and theories related to a topic, that are then brought together to create a meta-framework that is then used for the second stage of the systematic review that identifies primary qualitative studies into a thematic synthesis. Researchers have dubbed this as “Best fit” framework synthesis (Carroll et al. 2013). The advantage of this approach is that theory-based qualitative evidence synthesis can employ more than one identified theory or model, thus drawing together something that is more inclusive. This, the developers of this approach argue, avoids forcing data into prescribed categories as opposed to asking informed questions and challenging the relevance of established theories (Carroll et al. 2013). This approach has obvious drawbacks, it requires two stages of systematic searching, and is therefore more resource and time intensive. It is most appropriate for research areas where theories and conceptual frameworks exist, and the development of the meta-theory still is subject to researcher judgement (Carroll et al. 2013).

In terms of the review methods used in this paper, no systematic searching for theories was conducted. The review deployed a basic, but established “disaster risk management” framework which is relatively well recognised within the practitioner literature (see figure 6). This was largely to do with time and resource constraints and the author’s view that there is sufficient agreement in the policy-maker and practitioner community around the value of this framework. This is essentially a professional judgement and could be open to challenge.

Finally, it is also clear from the mapping that the literature in this area is fast evolving. For this review to remain relevant it will be important to update with new, relevant studies. However, in order to strengthen the findings of this review it will probably be as important to increase the depth and quality of individual studies, as well as to increase the volume. Individual studies that conduct more extensive data-collection (e.g. larger samples, comparative case studies), attempt to broaden data collection beyond just perception, and more rigorously apply data analysis methods will help strengthen the evidence base in this area.

### 4.3 Conclusions

To conclude, this paper has attempted to map the literature on urban risk governance in low- and middle- income countries. This is a relatively new, but growing body of literature, which is still to mature in terms of methodological rigor and depth. A systematic mapping of the literature illustrates some emerging themes in terms of which actors are engaged in risk governance, and how they are interacting. In short, there are a range of different actors across the public, private and civil society sectors that engage both vertically and horizontally in urban risk governance. The literature covers a range of different levels (e.g. city-wide, communities within cities, cities within a wider nation-states); focuses at different parts of the disaster risk governance cycle (e.g. assessment, evaluation, risk reduction, monitoring and control, and response and recovery); and explores different interventions or actions to address disaster risk. Nonetheless, from this broad map there are some emerging themes on the institutional challenges to effective urban risk governance. These include overlapping bureaucracies, limited decentralisation, fragmented roles and responsibilities, and competing and unconstructive incentives. With more time, there is an opportunity to dig further and more rigorously into this literature. A deeper dive into risk-sensitive land-use planning literature starts to substantiate some of these wider themes, with clear characteristics of good (and bad) governance of urban risk emerging across political economy, bureaucratic and social dimensions. Noting that these dimensions tend to overlap in practice (e.g. bureaucratic impediments are often a symptom of more deep rooted political economy; and that people are normally socially excluded for historic and political reasons). These findings resonate with the author as a policy-maker working on urban risk governance in Nepal. This paper argues that this professional insight has supported the review to be both relevant in terms of content, but also achieve a deeper insight in to some of the issues. Finally, the review reflects on research processes and some of the limitations of the work. Some of these reflections are generic to configurative systematic reviews (e.g. complexity of terminology, fragmentation of literature) and some of these are more specific to this review (e.g. slow internet access). The author concludes by reflecting on ways in which this review could be strengthened or built upon. This includes strengthening the peer review and quality assurance, conducting further analysis and synthesis of identified studies beyond the mapping, being more explicit about how the conceptual framework is established, and overtime keeping the review updated with new studies.

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## Appendices

### Appendix 1: Search locations

Category	Location
Journals (hand searching)	<p>Disasters</p> <p>Disaster Preparedness and Management Journal</p> <p>Journals of Contingencies and Crisis Management</p> <p>Journal of Disaster Risk Studies</p> <p>International Journal of Disaster Risk Reduction</p>
Databases (using structures and search engines as far as possible)	<p>Disaster/development</p> <p>DFID Research for Development (R4D) database</p> <p>ALNAP evaluation database</p> <p>ALNAP Urban Humanitarian response database</p> <p>Politics/social science</p> <p>IBSS: International Bibliography of the Social Sciences</p> <p>Scopus</p> <p>ASSIA</p> <p>Sociological abstracts</p> <p>SAGE</p> <p>Economics</p> <p>Econlit</p> <p>Environment</p> <p>GEOBASE</p> <p>Science Direct</p> <p>Other</p> <p>JSTOR (urban journals)</p> <p>Systematic review/impact evaluation databases</p> <p>3ie Impact Evaluation database</p> <p>3ie Systematic Review database</p> <p>Evidence Aid</p> <p>Campbell Collaboration</p> <p>EPPI-Centre systematic reviews database</p>

<p>Organisation websites (hand searching and structured searches (where possible) in website document repositories)</p>	<p>Networks</p> <p>InterAction</p> <p>Enhanced Learning and Research For Humanitarian Assistance (ELRHA)</p> <p>International Council of Voluntary Agencies (ICVA)</p> <p>Multilateral actors</p> <p>UN Development programme</p> <p>UN Habitat</p> <p>International Federation of the Red Cross and Red Crescent</p> <p>Relief Web (OCHA)</p> <p>Prevention Web (UN Office for Disaster Risk Reduction)</p> <p>International donors</p> <p>USAid</p> <p>JICA</p> <p>IDRC International Development Research Centre</p> <p>European Commission’s Humanitarian Aid and Civil Protection department (ECHO) - not relevant</p> <p>European Commission International Cooperation and Development</p> <p>World Bank, including Global Fund for Disaster Risk and Recovery.</p> <p>OECD</p> <p>Research/communication organisations</p> <p>Earthquakes without Frontiers</p> <p>Overseas Development Institute - Humanitarian Practitioners network</p> <p>Centre for Global Development</p> <p>International Institute for Environment and Development (including environment and urban journal)</p> <p>Institute for Development Studies</p> <p>Asia Disaster Preparedness Centre</p>
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## Appendix 2: Search terms

Search terms had to be adapted for different databases and websites depending on the functionality. This included the length of search strings permitted, as well as the different configurations of terms (e.g. AND, OR etc), and the number of search parameters allowed (e.g. geography, natural hazard, urban and governance terms).

The below table sets out the most expansive set of research terms used, but for the majority of search locations this was too expansive. In most cases search strings had to be shortened, and sometimes only two or three parameters included (e.g. natural hazard, urban governance). This resulted in more work in terms of the screening for inclusion/exclusion. Search terms for each search location were recorded, but included here due to the level of detail.

Category	Search terms
Geography (low, lower-middle- and upper-middle income countries)	<p>“Low income country” OR “middle income country” OR “developing country” OR “underdevelopment” OR “least developed country”</p> <p>[low-income countries] OR “Afghanistan” OR “Benin” OR “Burkina Faso” OR “Burundi OR “Cambodia” OR “Central African Republic” OR “Chad’ OR ”Comoros” OR “Democratic Republic of Congo” OR “Eritrea’ OR Ethiopia” OR Gambia” OR “Guinea” OR “Guinea-Bissau” OR “Democratic Republic of Korea” OR “Liberia” OR “Madagascar” OR “Malawi” OR “Mali” OR “Mozambique” OR “Nepal” OR “Niger” OR “Rwanda” OR “Sierra Leone” OR “Somalia” OR “South Sudan” OR “Tanzania” OR “Togo” OR “Uganda” OR “Zimbabwe”</p> <p>[low-middle income countries] OR “Armenia” OR “Bangladesh” OR Bhutan” OR “Bolivia” OR “Cabo Verde” OR “Cameroon” OR “Republic of Congo” OR Cote d’Ivoire” OR Djibouti” OR “Egypt” OR El Salvador” OR “Georgia” OR “Ghana” or “Guatemala” OR “Guyana” OR “Honduras” OR “India” OR “Indonesia” OR “Kenya” OR “Kiribati” OR “Kosovo” OR “Kyrgyz Republic” OR “Lao” OR “Lesotho” OR “Mauritania” OR “Micronesia” OR “Moldova” OR “Morocco” OR “Myanmar” OR “Nicaragua” OR “Nigeria” OR “Pakistan” OR “Papua New Guinea” OR “Philippines” OR “Samoa” OR “ Sao Tome and Principe” OR “Senegal” OR “Solomon Islands” OR “Sri Lanka” OR “Sudan” OR “Swaziland” OR “Syria” OR “Tajikistan” OR “Timor-Leste” OR “Ukraine” OR “Uzbekistan” OR “Vanuatu” OR “Vietnam” OR “West Bank and Gaza” OR “Yemen” OR “Zambia”</p> <p>[Upper-middle-income countries] OR “Albania” OR “Algeria” OR “American Samoa” OR “Angola” OR “Azerbaijan” OR “Belarus” OR “Bosnia and Herzegovina” AND “Botswana” OR “ Brazil” OR “Bulgaria” OR “China” OR “Colombia” OR “Costa Rica” OR “Cuba” OR “Dominica” OR Dominican Republic” OR “Ecuador” OR “Fiji” OR “Gabon” OR “Grenada” OR Iran” OR “Iraq” OR “Jamaica” OR “Jordon” OR “Kazakhstan” OR “Lebanon” OR “Libya” OR “Macedonia” OR “Malaysia” OR “Maldives” OR “Marshall Islands” OR Mauritius” OR “Mexico” OR “Mongolia” OR “ Montenegro” OR “Namibia” OR “Palau” OR “Panama” OR “Paraguay” OR “Peru” OR “Romania” OR “Serbia” OR “South Africa” OR “St Lucia” OR “St Vincent and the Grenadines” OR “Suriname” OR “Thailand” OR “Tonga” OR “Tunisia” OR “Turkey” OR “Turkmenistan” OR “Tuvalu”</p>

	[Regional terms] “Africa” OR “Sub-Saharan Africa” OR “Latin America” OR “Asia” OR “Pacific” OR “Middle East”
<b>AND</b>	
Urban	“Urban” OR “town” OR “city” OR “megacity” OR “metropolitan” OR “municipality” OR “Mayor”
<b>AND</b>	
Human governance with disasters <i>Adapted from Anthony et al. (2013)</i>	“government” OR “governance” OR “institutions” OR “policy” OR “policies” OR “regulation” OR “network” OR “legislation” OR “law” OR “strategy” OR “framework” OR “planning” OR “management” OR “government” OR “disaster risk reduction” OR “disaster risk management” OR “risk reduction” OR “residual risk” OR “risk management” OR “disaster preparedness” OR “humanitarian preparedness” OR “disaster management” OR “disaster prevention” OR “disaster planning” OR “disaster response” OR “climate change adaption” OR “Hyogo Framework for Action” OR “Sendai” OR “disaster resilience” OR “resilience” OR “risk management” OR “risk planning” OR “risk analysis” OR “risk assessment” OR “risk evaluation” OR “risk appraisal” OR “humanitarian” OR “humanitarian response” OR “emergency response” OR “emergency” OR “recovery” OR “reconstruction” OR “rehabilitation” OR “vulnerability” OR “exposure” OR “risk retention” OR “risk acceptance” OR “risk transfer” OR “risk monitoring” OR “early warning” OR “contingency planning” OR “emergency planning”
<b>AND</b>	
Disaster (natural) <i>Adapted from Anthony et al. (2013)</i>	“Risk” OR “disaster” OR “disaster risk” OR “natural disaster” OR “crises” OR “crisis” OR “environmental emergency” OR “natural hazard” OR “hazard” OR “catastrophe”  OR “hydrological” OR “flooding” OR “avalanche” OR “flood”  OR “geophysical” OR “landslide” OR “earthquake” OR “volcano” OR “tsunami” OR “tidal wave”  OR “metrological” OR “cyclone” OR “storm” OR “storm surge” OR “coastal flooding” OR “wave surge” OR “blizzard” OR “hailstorm” OR “hail” OR “typhoon”  OR “climatological” OR “extreme weather” OR “extreme temperature” OR “fire” OR “heat wave” OR “cold wave” OR “wildfire” OR “wild fire” OR “bush fire” OR “bushfire” OR “drought” OR “extreme rainfall” OR “extreme wind” OR “wind”  OR “biological” OR “disease” OR “epidemic” OR “disease epidemic” OR “plague” OR “insect plague” OR “animal plague” OR “animal disease”

### Appendix 3: Screening tool for inclusion, title and abstract, and full text

This table is a summary of the code set established in EPPI-Reviewer that was used to screen at both the title and abstract, as well as a full text stage.

The way this was applied in practice, as that if any article screened negatively against the inclusion criteria it was not screen against any further question, but was deemed to be excluded.

<b>Section A: Basic inclusion criteria</b>	
1. Is the paper in English?	Yes (meets systematic review inclusion criteria)  No (does not meet systematic review inclusion criteria).
2. When was the article published?	After 2004 (meets systematic review inclusion criteria)  2004 and before (does not meet systematic review inclusion criteria).
3. Does the article describe events over 30 years ago?	Yes (does not meet systematic review inclusion criteria).  No (meets systematic review inclusion criteria)  <b>If not clear from title or abstract screening do not excluded, include for full text review.</b>
<b>Section B - Study focus</b>	
4. Is the focus a low- or middle-income country?	Yes (meets systematic review inclusion criteria)  No (does not meet systematic review inclusion criteria).  <b>Note: studies that were global in focus or were not explicitly low- or middle-income country focused were excluded. If not clear from title or abstract screening do not excluded, include for full text review.</b>
5. Is the spatial focus urban?	Yes (meets systematic review inclusion criteria)  No (does not meet systematic review inclusion criteria).  <b>Note: studies that were not explicitly urban in focus were excluded. If not clear from title or abstract screening do not excluded, include for full text review.</b>

<p>6. Does the study have a focus on disaster risk governance? <i>e.g. any of the stages identified in the conceptual framework</i></p>	<p>Yes (meets systematic review inclusion criteria)</p> <p>No (does not meet systematic review inclusion criteria).</p> <p><b>Exclude studies that do not appear to have a focus on disaster risk governance. If not clear from title or abstract screening do not excluded, include for full text review.</b></p>
<p>7. Does the study describe its research approach and methods? <i>e.g. primary data collection, or secondary data analysis.</i></p>	<p>Yes (meets systematic review inclusion criteria)</p> <p>No (does not meet systematic review inclusion criteria).</p> <p><b>Exclude studies that do not have explicit research methods. If not clear from title or abstract screening do not excluded, include for full text review.</b></p>
<p>8. Can an electronic, online copy of the document or article be obtained?</p>	<p><b>At full text screening stage.</b></p> <p>Yes (meets systematic review inclusion criteria)</p> <p>No (does not meet systematic review inclusion criteria).</p>
<p><b>Section C - Conclusion based on information from title abstract review</b></p>	
<p>9. Does the paper meet the systematic review section criteria based on answers from section A-B?</p>	<p>Yes (full text screening and coding)</p> <p>No (exclude from the review at this stage)</p> <p><b>If not clear from title or abstract screening do not excluded, include for full text review.</b></p>

## Appendix 4: Coding tool for included studies for the Urban Disaster Risk Governance literature map

This is a summary of the coding tool loaded into EPPI-Reviewer for this systematic review.

Criteria	Coding options (select one or more items unless stated otherwise)
1. Purpose of study	Descriptive (context or relationship) What works? Methods development Reviewing/synthesising Theoretical/conceptual Other?
2. Geography	Africa South Asia East Asia & Pacific Middle East Europe Unspecified low/middle-income country Multi-country (more than one) <b>Note: individual countries also coded.</b>
3. Research methods noted	Experimental (including quasi-experimental) Views and perceptions (surveys, focus groups and interviews) Ethnography (observation) Systematic review Literature review (non-systematic review) Case study (including comparative case studies) Document review (primary data) Secondary data analysis Action research Methodological analysis Other?
4. Natural hazards references	Hydrological - flooding Hydrological - storm Geophysical - earthquake Geophysical - volcanoes Geophysical - tsunami Geophysical - landslide

	<p>Climatological - extreme temperature</p> <p>Climatological - drought</p> <p>Climatological - wind</p> <p>Climatological - wild fire</p> <p>Climatological - cyclone</p> <p>Climatological - snowstorm</p> <p>Biological - disease epidemic human</p> <p>Biological - disease epidemic animal</p> <p>Unclear/not stated</p> <p>Other?</p>
<b>5. Stages of the risk governance conceptual framework referenced</b>	<p>Risk appraisal</p> <p>Risk evaluation</p> <p>Management pre-disaster (risk reduction)</p> <p>Monitoring and control (residual risk and uncertainty)</p> <p>Management post-disaster response</p> <p>Management post-disaster recovery and reconstruction</p> <p>Unclear/not stated</p>
<b>6. Institutions and actors noted in the study</b>	<p>United National and other inter-governmental international</p> <p>Government - regional or international</p> <p>Government - national</p> <p>Government - sub-national</p> <p>Government - municipal or local</p> <p>Public services - schools, hospitals etc</p> <p>Security services - police, army etc</p> <p>Politicians, mayors, political parties - national</p> <p>Politicians, mayors, political parties - local</p> <p>Media</p> <p>Academic and research institutions</p> <p>Civil society - international</p> <p>Civil society - national</p> <p>Civil society - local</p> <p>Religious groups</p> <p>Private sector - international</p> <p>Private sector - national</p> <p>Private sector - local</p> <p>Communities</p>

	<p>Households</p> <p>Individuals (citizens, residents, beneficiaries)</p> <p>Unclear/not stated</p> <p>Other?</p>
<b>7. Approaches and interventions described or discussed</b>	<p>Buildings and infrastructure (new, maintenance, retrofit)</p> <p>Ecosystem services (e.g. reforestation, soil stabilisation)</p> <p>Land-use planning and zoning (mandatory and non-mandatory)</p> <p>Permanent relocation of buildings and infrastructure</p> <p>Temporary relocation of people and assets</p> <p>Law and regulation (mandatory)</p> <p>Public policy, guidance, codes and standards (mandatory and non-mandatory)</p> <p>Customary law (non-mandatory)</p> <p>Strategy and planning</p> <p>Coordination and facilitation</p> <p>Promotion of livelihoods/economic opportunities</p> <p>Public/private services such as waste management, clean water</p> <p>Risk assessment and analysis</p> <p>Early warning</p> <p>Emergency response - in-kind goods and services (e.g. rescue)</p> <p>Emergency response - cash</p> <p>Public finance longer-term (grant, compensation, loan)</p> <p>Private finance (insurance, savings, loans) - formal</p> <p>Private finance (insurance, savings, loans) - informal</p> <p>Human resource capacity building</p> <p>Education and awareness</p> <p>Advocacy and activism</p> <p>Unclear/not stated</p> <p>Other?</p>
<b>8. Spatial planning included in the study?</b>	<p><b>Only one code can be selected:</b></p> <p>Yes, spatial planning is a major theme</p> <p>Yes, spatial planning is a minor theme</p> <p>No, not included.</p>

## Appendix 5: Full list of included articles and references

References that are underlined are the subset of studies identified as relevant for the deeper review on risk-sensitive land-use planning.

### **Adegun (2015)**

Adegun O, and B . 2015. "State-led versus community-initiated: stormwater drainage and informal settlement intervention in Johannesburg, South Africa".

### **Adelekan (2010)**

Adelekan Ibidun O. 2010. "Vulnerability of poor urban coastal communities to flooding in Lagos, Nigeria". *Environment and urbanization* 22(2):433-450.

### **Adelekan (2012)**

Adelekan Ibidun O. 2012. "Vulnerability to wind hazards in the traditional city of Ibadan, Nigeria". *Environment and urbanization* 24(2):597-617.

### **Aggarwal (2013)**

Aggarwal Rimjhim M. 2013. "Strategic Bundling of Development Policies with Adaptation: An Examination of Delhi's Climate Change Action Plan". *International Journal of Urban and Regional Research* 37(6):1902-1915.

### **Ahammad (2011)**

Ahammad Ronju. 2011. "Constraints of pro-poor climate change adaptation in Chittagong city". *Environment and urbanization* 23(2):503-515.

### **Ajibade (2014)**

Ajibade I, and Mcbean G. 2014. "Climate extremes and housing rights: a political ecology of impacts, early warning and adaptation constraints in Lagos slum communities". *Geoforum* 55:76-86.

### **Al-Nammari, (2015)**

Al-Nammari Alzaghal M. 2015. "Toward local disaster risk reduction in developing countries: challenges from Jordan".

### **ARAUJO (2014)**

ARAUJO Raquel Otoni de, and ROSA Teresa C da Silva. 2014. "Socio-environmental vulnerability and disaster risk reduction: the role of Espirito Santo State (Brazil)". *Ambiente & Sociedade* 17(4):117-132.

### **AZCARATE (2014)**

AZCARATE MATILDE CoRDOBA, Baptista Idalina, and Rubio Fernando Dominguez. 2014. "Enclosures within Enclosures and Hurricane Reconstruction in Cancun, Mexico". *City & Society* 26(1):96-119.

### **Bahadur (2014)**

Bahadur Aditya, and Tanner Thomas. 2014. "Transformational resilience thinking: putting people, power and politics at the heart of urban climate resilience". *Environment & Urbanization* 26(1):200-214.

### **Bang, (2013)**

Bang H. 2013. "Governance of disaster risk reduction in Cameroon: the need to empower local governance".

**Berquist (2015)**

Berquist Michelle, Daniere Amrita, and Drummond Lisa. 2015. "Planning for global environmental change in Bangkok's informal settlements". *Journal of environmental planning and management* 58(10):1711-1730.

**Boyd (2013)**

Boyd Emily, and Ghosh Aditya. 2013. "Innovations for Enabling Urban Climate Governance: Evidence from Mumbai". *Environment and Planning C: Government and Policy* 31(5):926-945.

**Brown (2011)**

Brown D. 2011. "Making the linkages between climate change adaptation and spatial planning in Malawi". *Environmental science and policy* 14(8):940-949.

**Brown (2012)**

Brown Anna, Dayal Ashvin, Rumbaitis Del Rio, and Cristina . 2012. "From practice to theory: emerging lessons from Asia for building urban climate change resilience". *Environment and urbanization* 24(2):531-556.

**Brown, (2015)**

Brown D, Boano C Johnson, C, Vivekananda J, and Walker J. 2015. Urban crises and humanitarian response: literature review.

**Butsch (2016)**

Butsch C, Kraas F, Namperumal S, and Peters G. 2016. "Risk governance in the megacity Mumbai/India - A complex adaptive system perspective". *Habitat International*

**Button (2013)**

Button Cat, Mias-Mamonong Maria Adelaida Antonette, Barth Bernhard, and Rigg Jonathan. 2013. "Vulnerability and resilience to climate change in Sorsogon city, the philippines: Learning from an ordinary city?". *Local environment* 18(6):705-722.

**Campos (2012)**

Campos Perez, and Jorge Enrique. 2012. "Planning for Climate Change in Cartagena, Colombia: Institutionalizing Alternative Approaches". *Economia y Region* 6(2):53-95.

**Castan (2015)**

Castan Broto, Vanesa , Macucule Domingos Augusto, Boyd Emily, Ensor Jonathan, and Allen Charlotte. 2015. "Building Collaborative Partnerships for Climate Change Action in Maputo, Mozambique". *Environment and Planning A* 47(3):571-587.

**Castro, (2015)**

Castro C, P , Ibarra I m Lukas, M, Ortiz J, Sarminento J, and P . 2015. "Disaster risk construction in the progressive consolidation of informal settlements: Iquique and Puerto Montt (Chile) case studies". *International Journal of Disaster Risk Reduction* 13(Sept)

**Claudia, (2015)**

Claudia R, Tehler H, and Wamsler C. 2015. "Fragmentation in disaster risk management systems: a barrier for integrated planning".

**Doberstein, (2013)**

Doberstein B, and Stager H. 2013. "Towards guidelines for post-disaster vulnerability reduction in informal settlements".

**Dodman (2014)**

Dodman D, Brown D, Francis K, Hardoy J, Johnson C, and Satterwaite D. 2014. Understanding the nature and scale of urban risk in low- and middle- income countries and its implications for humanitarian preparedness and response.

**Downes (2014)**

Downes Nigel K, and Storch Harry. 2014. "Current constraints and future directions for risk adapted land-use planning practices in the high-density Asian setting of Ho Chi Minh City". Planning practice and research 29(3):220-237.

**Faling (2012)**

Faling Willemien, Tempelhoff Johann W. N, van Niekerk , and Dewald . 2012. "Rhetoric or Action: Are South African Municipalities Planning for Climate Change?". Development Southern Africa 29(2):241-257.

**Fatti (2013)**

Fatti C E, and Patel Z. 2013. "Perceptions and responses to urban flood risk: Implications for climate governance in the South". Elsevier Ltd, Langford Lane, Kidlington, Oxford, OX5 1GB, United Kingdom.

**Flower (2015)**

Flower B, and Fortnam M. 2015. Urbanising Disaster Risk: vulnerability of the urban poor in Cambodia to flooding and other hazards.

**Ganapati (2009)**

Ganapati N EmelNB. 2009. "Rising from the Rubble: Emergence of Placed-Based Social Capital in Golcuk, Turkey". International Journal of Mass Emergencies and Disasters 27(2):127-166.

**Grunewald (2014)**

Grunewald F, and Carpenter S. 2014. "Urban Preparedness: lessons from the Kathmandu Valley".

**Guiza, (2015)**

Guiza F, Simmons P, Burgess J, and McCall M. 2015. "Chronic institutional failure and enhanced vulnerability to flash-floods in the Cuenca Altadel Rio Lerma, Mexico"

**Haque (2014)**

Haque Anika Nasra, Dodman David, and Hossain Md Mohataz. 2014. "Individual, communal and institutional responses to climate change by low-income households in Khulna, Bangladesh". Environment and urbanization 26(1):112-129.

**Hardoy, (2014)**

Hardoy J, Barrero L, S , and V . 2014. "Re-thinking "Biomanizales": addressing climate change adaption in Manizales Colombia". .:

**Hardoy (2013)**

Hardoy J, and Ruete R. 2013. "Incorporating climate change adaptation into planning for a liveable city in Rosario, Argentina". Environment & Urbanization 25(2):339-360.

**Hardoy (2014)**

Hardoy Jorgelina, Hernandez Ivan, Pacheco Juan Alfredo, and Sierra Guadalupe. 2014. "Institutionalizing climate change adaptation at municipal and state level in Chetumal and Quintana Roo, Mexico". Environment & Urbanization 26(1):69-85.

**Hooper, (2014)**

Hooper M. 2014. "Priority setting amid the rubble: organisational approaches to post-disaster reconstruction in Haiti".

**Hung, (2010)**

Hung H, V, Shaw R, and Kobayashi M. 2010. "Flood risk management for the riverside urban areas of Hanoi: the need for synergy in urban development and risk management policies". *Disaster Prevention and Management Journal* .:

**IASC (2011)**

IASC . 2011. "Humanitarian response to the earthquake in Haiti".

**Jabeen (2010)**

Jabeen Huraera, Johnson Cassidy, and Allen Adriana. 2010. "Built-in resilience: learning from grassroots coping strategies for climate variability". *Environment and urbanization* 22(2):415-431.

**Jain, (2015)**

Jain G. 2015. "The role of private sector for reducing disaster risk in large scale infrastructure and real estate development: Case of Delhi". *Environment & Urbanisation*, Vol 23(2), pp503-515.

**Joerin (2014)**

Joerin Jonas, Shaw Rajib, Takeuchi Yukiko, and Krishnamurthy Ramasamy. 2014. "The adoption of a Climate Disaster Resilience Index in Chennai, India". *Disasters* 38(3):540-561.

**Johnson, (2011)**

Johnson C. 2011. "Kernels of change: civil society challenges to state-led strategies for recovery and risk reduction in Turkey". .:

**Jones (2013)**

Jones Samantha, Aryal Komal, and Collins Andrew. 2013. "Local-level governance of risk and resilience in Nepal". *Disasters* 37(3):442-467.

**KUMARAN (2006)**

KUMARAN T VASANTHA, and NEGI ELIZABETH. 2006. "Experiences of Rural and Urban Communities in Tamil Nadu in the Aftermath of the 2004 Tsunami". *Built Environment* (1978-) 32(4):375-386.

**Lampis (2013)**

Lampis Andrea. 2013. "Cities and Climate Change Challenges: Institutions, Policy Style and Adaptation Capacity in Bogota". *International Journal of Urban and Regional Research* 37(6):1879-1901.

**Lassa (2014)**

Lassa J, and Nugraha E. 2014. "Building urban resilience to climate change in the secondary cities in Indonesia".

**Lassa (2015)**

Lassa Jonatan, and Nugraha Erwin. 2015. "From shared learning to shared action in building resilience in the city of Bandar Lampung, Indonesia". *Environment and urbanization* 27(1):161-180.

**Leck (2013)**

Leck Hayley, and Simon David. 2013. "Fostering Multiscalar Collaboration and Co-operation for Effective Governance of Climate Change Adaptation". *Urban Studies* 50(6):1221-1238.

**Madan, (2015)**

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Appendix 6: Full list of included articles with coding.

Title	Country	Study details	Risk Governance	Activities/Interventions
Adelekan (2010)	<ul style="list-style-type: none"> <li>• Nigeria</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Religious groups</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Public/private services (e.g. waste management)</li> <li>• Emergency response - in-kind goods/services</li> </ul>
Adelekan (2012)	<ul style="list-style-type: none"> <li>• Nigeria</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Temporary relocation of people and assets</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Private finance (including insurance,</li> </ul>

			<ul style="list-style-type: none"> <li>• Communities</li> <li>• Households</li> </ul>	savings groups, loans, cash) -informal
Aggarwal (2013)	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Strategy and planning (non-mandatory)</li> </ul>
Ahammad (2011)	<ul style="list-style-type: none"> <li>• Bangladesh</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> </ul>

			<ul style="list-style-type: none"> <li>• Civil society - international</li> <li>• Communities</li> </ul>	
Ajibade (2014)	<ul style="list-style-type: none"> <li>• Nigeria</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Religious groups</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Early warning</li> <li>• Public finance (grant, compensation, loan)</li> </ul>
Al-Nammari, (2015)	<ul style="list-style-type: none"> <li>• Jordan</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> </ul>

		data)	<ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> </ul>	
<p>ARAUJO (2014)</p>	<ul style="list-style-type: none"> <li>• Brazil</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Laws and regulation (mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>
<p>AZCARATE (2014)</p>	<ul style="list-style-type: none"> <li>• Mexico</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Ethnography</li> <li>• Case study (including</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Private sector - local</li> <li>• Private sector - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Private finance (including insurance) - formal</li> </ul>

		comparative case study) • Document review (primary data)		
Bahadur (2014)	• India	<b>Purpose of study</b> • Theoretical/conceptual  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Document review (primary data)	<b>Risk governance</b> • Risk appraisal • Risk evaluation • Management pre-disaster (risk reduction)  <b>Actors/stakeholders</b> • Government - local/sub-national • Government - municipal • Government - national • Politicians, elected majors and political parties - local • Civil society - local • Private sector - local • Private sector - national • Communities	<b>Approaches/interventions</b> • Buildings and infrastructure (new, maintenance and retrofitting) • Strategy and planning (non-mandatory) • Risk assessment and analysis
Bang, (2013)	• Cameroon	<b>Purpose of study</b> • Descriptive (context or relationships)  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Case study (including comparative case study)	<b>Risk governance</b> • Risk appraisal • Risk evaluation • Management pre-disaster (risk reduction) • monitoring and control (residual risk and uncertainty) • Management post-disaster response	<b>Approaches/interventions</b> • Buildings and infrastructure (new, maintenance and retrofitting) • Land-use planning and zoning (mandatory and non-mandatory) • Laws and regulation (mandatory) • Public finance (grant, compensation, loan) • Human resource capacity development

		<ul style="list-style-type: none"> <li>• Document review (primary data)</li> </ul>	<ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - international</li> <li>• Communities</li> </ul>	
Berquist (2015)	<ul style="list-style-type: none"> <li>• Thailand</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Ethnography</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - international</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Private finance (including insurance) - formal</li> <li>• Private finance (including insurance, savings groups, loans, cash) -informal</li> </ul>
Boyd (2013)	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Private sector - local</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Public/private services (e.g. waste management)</li> </ul>

		<ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> </ul>	<ul style="list-style-type: none"> <li>• Communities</li> </ul>	
Brown, (2011)	<ul style="list-style-type: none"> <li>• Unspecified - low/middle income country</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Reviewing/synthesising</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Temporary relocation of people and assets</li> <li>• Public/private services (e.g. waste management)</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Emergency response - cash</li> </ul>
Brown (2011)	<ul style="list-style-type: none"> <li>• Malawi</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> <li>• Case study (including</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> </ul>

		comparative case study)	<ul style="list-style-type: none"> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<ul style="list-style-type: none"> <li>• Human resource capacity development</li> </ul>
Brown (2012)	<ul style="list-style-type: none"> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Human resource capacity development</li> <li>• Education and awareness</li> </ul>
Butsch (2016)	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> <li>• Public finance (grant, compensation,</li> </ul>

		<ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<ul style="list-style-type: none"> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> <li>• Academic, research institute</li> </ul>	loan)
Button (2013)	<ul style="list-style-type: none"> <li>• Philippines</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> <li>• Coordination and facilitation</li> </ul>
Campos (2012)	<ul style="list-style-type: none"> <li>• Colombia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning</li> </ul>

		relationships)  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Case study (including comparative case study) • Document review (primary data)	reduction) • monitoring and control (residual risk and uncertainty)  <b>Actors/stakeholders</b> • United Nations and inter-governmental international • Government - municipal. • Government - national • Civil society - local • Civil society - national • Private sector - local • Communities • Individuals (e.g. citizens, residents, beneficiaries)	(mandatory and non-mandatory) • Permanent relocation of buildings and infrastructure • Laws and regulation (mandatory) • Public policy, guidance, codes and standards (non-mandatory) • Strategy and planning (non-mandatory) • Coordination and facilitation • Public finance (grant, compensation, loan) • Education and awareness
Castan (2015)	•Mozambique	<b>Purpose of study</b> • Descriptive (context or relationships)  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Literature review (non-systematic) • Case study (including comparative case study)	<b>Risk governance</b> • Risk appraisal • Risk evaluation • Management pre-disaster (risk reduction)  <b>Actors/stakeholders</b> • United Nations and inter-governmental international • Government - municipal • Government - national • Government - regional/international • Civil society - local • Civil society - national	<b>Approaches/interventions</b> • Buildings and infrastructure (new, maintenance and retrofitting) • Land-use planning and zoning (mandatory and non-mandatory) • Public policy, guidance, codes and standards (non-mandatory) • Strategy and planning (non-mandatory) • Public finance (grant, compensation, loan) • Private finance (including insurance) - formal

			<ul style="list-style-type: none"> <li>• Civil society - international</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Academic, research institute</li> </ul>	
Castro, (2015)	<ul style="list-style-type: none"> <li>• Chile</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> </ul>
Claudia, (2015)	<ul style="list-style-type: none"> <li>• Nicaragua</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Theoretical/conceptual</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>

			<ul style="list-style-type: none"> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> </ul>	<ul style="list-style-type: none"> <li>• Public/private services (e.g. waste management)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Education and awareness</li> </ul>
Doberstein, (2013)	<ul style="list-style-type: none"> <li>• Dominican Republic</li> <li>• Venezuela</li> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• What works?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Risk assessment and analysis</li> </ul>
Dodman (2014)	<ul style="list-style-type: none"> <li>• Unspecified - low/middle income country</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Reviewing/synthesising</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>

			<b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<ul style="list-style-type: none"> <li>• Public/private services (e.g. waste management)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Human resource capacity development</li> <li>• Education and awareness</li> </ul>
Downes (2014)	<ul style="list-style-type: none"> <li>• Vietnam</li> </ul>	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Private sector - local</li> <li>• Private sector - national</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> </ul>
Faling (2012)	<ul style="list-style-type: none"> <li>• South Africa</li> </ul>	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-</li> </ul>

		<p>(surveys and interviews)</p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Private sector - local</li> </ul>	<p>mandatory)</p>
Fatti (2013)	<ul style="list-style-type: none"> <li>• South Africa</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>
Flower (2015)	<ul style="list-style-type: none"> <li>• South Africa</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Ethnography</li> <li>• Case study (including</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens,</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Laws and regulation (mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>

		comparative case study)	residents, beneficiaries) • Academic, research institute	
Ganapati (2009)	• Turkey	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Ethnography</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Communities</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• promotion non-disaster sensitive livelihoods/economic development</li> <li>• Coordination and facilitation</li> <li>• Education and awareness</li> </ul>
Grunewald (2014)	• Nepal	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Security forces - police, army</li> <li>• Civil society - local</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> </ul>

		comparative case study) • Document review (primary data)	<ul style="list-style-type: none"> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Communities</li> </ul>	
Guiza, (2015)	• Mexico	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Security forces - police, army</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Risk assessment and analysis</li> <li>• Emergency response - in-kind goods/services</li> <li>• Emergency response - cash</li> <li>• Private finance (including insurance) - formal</li> </ul>
Haque (2014)	• Bangladesh	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Public/private services (e.g. waste management)</li> <li>• Emergency response - in-kind goods/services</li> </ul>

		comparative case study) • Action research	• Management post-disaster recovery and reconstruction  <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	• Private finance (including insurance) - formal • Private finance (including insurance, savings groups, loans, cash) -informal
Hardory, (2014)	• Colombia	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)               <ul style="list-style-type: none"> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> </li> <li>• Management post-disaster response</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Private finance (including insurance) - formal</li> <li>• Education and awareness</li> </ul>

<p>Hardoy (2013)</p>	<ul style="list-style-type: none"> <li>• Argentina</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> <li>• Education and awareness</li> </ul>
<p>Hardoy (2014)</p>	<ul style="list-style-type: none"> <li>• Mexico</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> </ul>

		<ul style="list-style-type: none"> <li>• Document review (primary data)</li> </ul>	<ul style="list-style-type: none"> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Academic, research institute</li> </ul>	<ul style="list-style-type: none"> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Public finance (grant, compensation, loan)</li> </ul>
Hooper, (2014)	<ul style="list-style-type: none"> <li>• Haiti</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Private sector - local</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Strategy and planning (non-mandatory)</li> <li>• Coordination and facilitation</li> </ul>
Hung, (2010)	<ul style="list-style-type: none"> <li>• Vietnam</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-</li> </ul>

		<ul style="list-style-type: none"> <li>• Document review (primary data)</li> </ul>	<ul style="list-style-type: none"> <li>• Government - national</li> <li>• Communities</li> </ul>	mandatory)
IASC (2011)	<ul style="list-style-type: none"> <li>• Haiti</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• What works?</li> <li>• other?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Emergency response - cash</li> </ul>
Jabeen (2010)	<ul style="list-style-type: none"> <li>• Bangladesh</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Ethnography</li> <li>• Literature review (non-</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• Private finance (including insurance,</li> </ul>

		systematic) • Case study (including comparative case study)	<b>Actors/stakeholders</b> • Government - municipal • Civil society - local • Communities	savings groups, loans, cash) -informal
Jain, (2015)	• India	<b>Purpose of study</b> • Descriptive (context or relationships)  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Case study (including comparative case study) • Document review (primary data) • Secondary data analysis	<b>Risk governance</b> • Risk appraisal • Risk evaluation • Management pre-disaster (risk reduction)  <b>Actors/stakeholders</b> • Government - local/sub-national • Government - municipal • Government - national • Private sector - local • Private sector - national • Individuals (e.g. citizens, residents, beneficiaries)	<b>Approaches/interventions</b> • Buildings and infrastructure (new, maintenance and retrofitting) • Land-use planning and zoning (mandatory and non-mandatory) • Laws and regulation (mandatory) • Public policy, guidance, codes and standards (non-mandatory) • Strategy and planning (non-mandatory) • Public finance (grant, compensation, loan) • Private finance (including insurance) - formal
Joerin (2014)	• India	<b>Purpose of study</b> • Descriptive (context or relationships) • Methods development  <b>Research methods</b> • Views/perceptions (surveys and interviews) • Literature review (non-systematic) • Case study (including	<b>Risk governance</b> • Risk appraisal • Risk evaluation  <b>Actors/stakeholders</b> • Government - municipal • Communities	<b>Approaches/interventions</b> • Strategy and planning (non-mandatory) • Risk assessment and analysis

		comparative case study) • Methodological analysis		
Johnson, (2011)	• Turkey	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• promotion non-disaster sensitive livelihoods/economic development</li> </ul>
Jones (2013)	• Nepal	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Action research</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Civil society - local</li> <li>• Communities</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> <li>• Coordination and facilitation</li> </ul>

KUMARAN (2006)	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• promotion non-disaster sensitive livelihoods/economic development</li> <li>• Emergency response - in-kind goods/services</li> </ul>
Lampis (2013)	<ul style="list-style-type: none"> <li>• Colombia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Risk assessment and analysis</li> <li>• Coordination and facilitation</li> </ul>

Lassa (2014)	<ul style="list-style-type: none"> <li>Indonesia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>Views/perceptions (surveys and interviews)</li> <li>Literature review (non-systematic)</li> <li>Case study (including comparative case study)</li> <li>Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>Management pre-disaster (risk reduction)</li> <li>monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>Government - municipal</li> <li>Politicians, elected majors and political parties - local</li> <li>Civil society - local</li> <li>Private sector - local</li> <li>Communities</li> <li>Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>Laws and regulation (mandatory)</li> <li>Public policy, guidance, codes and standards (non-mandatory)</li> <li>Strategy and planning (non-mandatory)</li> <li>promotion non-disaster sensitive livelihoods/economic development</li> <li>Public/private services (e.g. waste management)</li> <li>Risk assessment and analysis</li> <li>Coordination and facilitation</li> </ul>
Lassa (2015)	<ul style="list-style-type: none"> <li>Indonesia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>Descriptive (context or relationships)</li> <li>What works?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>Ethnography</li> <li>Literature review (non-systematic)</li> <li>Case study (including comparative case study)</li> <li>Document review (primary data)</li> <li>Action research</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>Risk appraisal</li> <li>Risk evaluation</li> <li>Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>Government - municipal</li> <li>Government - national</li> <li>Politicians, elected majors and political parties - local</li> <li>Civil society - local</li> <li>Civil society - national</li> <li>Civil society - international</li> <li>Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>Public policy, guidance, codes and standards (non-mandatory)</li> <li>Strategy and planning (non-mandatory)</li> <li>promotion non-disaster sensitive livelihoods/economic development</li> <li>Public/private services (e.g. waste management)</li> <li>Risk assessment and analysis</li> <li>Coordination and facilitation</li> <li>Education and awareness</li> </ul>

<p>Leck (2013)</p>	<ul style="list-style-type: none"> <li>• South Africa</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Private sector - local</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>
<p>Madan, (2015)</p>	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Communities</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Emergency response - in-kind goods/services</li> <li>• Human resource capacity development</li> </ul>

Miles (2012)	<ul style="list-style-type: none"> <li>• Guatemala</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Advocacy/Activism</li> </ul>
Montoya (2005)	<ul style="list-style-type: none"> <li>• Costa Rica</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• Methods development</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Methodological analysis</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> </ul>

Nathan (2008)	<ul style="list-style-type: none"> <li>• Bolivia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Ethnography</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Communities</li> <li>• Households</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Risk assessment and analysis</li> </ul>
Neto, (2016)	<ul style="list-style-type: none"> <li>• Brazil</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> </ul>
Ng, (2015)	<ul style="list-style-type: none"> <li>• Thailand</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• Management post-disaster response</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Strategy and planning (non-</li> </ul>

		<b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Religious groups</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Private sector - international</li> <li>• Communities</li> </ul>	mandatory) <ul style="list-style-type: none"> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> <li>• Emergency response - cash</li> <li>• Education and awareness</li> </ul>
Odemerho (2015)	<ul style="list-style-type: none"> <li>• Nigeria</li> </ul>	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Secondary data analysis</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens,</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Emergency response - in-kind</li> </ul>

			residents, beneficiaries)	goods/services • Human resource capacity development
Oteng-Ababio (2012)	• Ghana	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Secondary data analysis</li> <li>• Other?</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> <li>• media</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> </ul>
Parthasarathy (2016)	• India	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and</li> </ul>

		(surveys and interviews) • Case study (including comparative case study)	<b>Actors/stakeholders</b> • Government - local/sub-national • Government - municipal • Government - national • Government - regional/international • Civil society - local • Private sector - local	standards (non-mandatory) • Strategy and planning (non-mandatory) • Advocacy/Activism
Pelling (2011)	<ul style="list-style-type: none"> <li>• Dominican Republic</li> <li>• Guyana</li> <li>• Haiti</li> <li>• Multi-country (more than one)</li> </ul>	<b>Purpose of study</b> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• What works?</li> </ul> <b>Research methods</b> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Action research</li> </ul>	<b>Risk governance</b> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <b>Actors/stakeholders</b> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Communities</li> </ul>	<b>Approaches/interventions</b> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Education and awareness</li> </ul>

<p>Porio (2011)</p>	<ul style="list-style-type: none"> <li>• Philippines</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Communities</li> <li>• Households</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> </ul>
<p>Porio (2014)</p>	<ul style="list-style-type: none"> <li>• Philippines</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• Laws and regulation (mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> <li>• Private finance (including insurance) - formal</li> <li>• Education and awareness</li> </ul>

<p>Ramachan draiah (2011)</p>	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster response</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Security forces - police, army</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Civil society - national</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Emergency response - cash</li> </ul>
<p>Rivera, (2013)</p>	<ul style="list-style-type: none"> <li>• Nicaragua</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Government - regional/international</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>

<p>Romero-Lankao (2013)</p>	<ul style="list-style-type: none"> <li>• Chile</li> <li>• Mexico</li> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Security forces - police, army</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> </ul>
<p>Rumbach (2014)</p>	<ul style="list-style-type: none"> <li>• India</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> </ul>

Saracoglu (2014)	<ul style="list-style-type: none"> <li>• Turkey</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> <li>• media</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Strategy and planning (non-mandatory)</li> </ul>
Set short title	<p><b>Geographical</b></p> <ul style="list-style-type: none"> <li>• Colombia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Religious groups</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Emergency response - in-kind goods/services</li> <li>• Private finance (including insurance) - formal</li> </ul>

			<ul style="list-style-type: none"> <li>• Private sector - local</li> <li>• Communities</li> <li>• Households</li> </ul>	<ul style="list-style-type: none"> <li>• Private finance (including insurance, savings groups, loans, cash) -informal</li> </ul>
Stein (2014)	<ul style="list-style-type: none"> <li>• Colombia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> <li>• Methods development</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Methodological analysis</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Public services - schools, hospitals, health posts</li> <li>• Security forces - police, army</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Private sector - local</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Risk assessment and analysis</li> <li>• Coordination and facilitation</li> <li>• Education and awareness</li> </ul>
Tafti (2013)	<ul style="list-style-type: none"> <li>• India</li> <li>• Iran</li> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Public finance (grant, compensation, loan)</li> <li>• Private finance (including insurance) -</li> </ul>

		<ul style="list-style-type: none"> <li>• Ethnography</li> <li>• Case study (including comparative case study)</li> </ul>	<ul style="list-style-type: none"> <li>• Civil society - local</li> <li>• Private sector - local</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	formal
Tanner (2009)	<ul style="list-style-type: none"> <li>• Bangladesh</li> <li>• China</li> <li>• India</li> <li>• Thailand</li> <li>• Vietnam</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> <li>• Secondary data analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> <li>• Academic, research institute</li> <li>• media</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public/private services (e.g. waste management)</li> <li>• Early warning</li> <li>• Coordination and facilitation</li> <li>• Advocacy/Activism</li> </ul>

Taylor (2015)	<ul style="list-style-type: none"> <li>Indonesia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>Views/perceptions (surveys and interviews)</li> <li>Case study (including comparative case study)</li> <li>Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>Government - local/sub-national</li> <li>Government - municipal</li> <li>Government - national</li> <li>Politicians, elected majors and political parties - local</li> <li>Civil society - local</li> <li>Communities</li> <li>Individuals (e.g. citizens, residents, beneficiaries)</li> <li>Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>Land-use planning and zoning (mandatory and non-mandatory)</li> <li>Permanent relocation of buildings and infrastructure</li> <li>Coordination and facilitation</li> <li>Public finance (grant, compensation, loan)</li> <li>Private finance (including insurance) - formal</li> <li>Private finance (including insurance, savings groups, loans, cash) -informal</li> <li>Advocacy/Activism</li> </ul>
Tran (2013)	<ul style="list-style-type: none"> <li>Vietnam</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>Descriptive (context or relationships)</li> <li>Methods development</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>Views/perceptions (surveys and interviews)</li> <li>Case study (including comparative case study)</li> <li>Action research</li> <li>Methodological analysis</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>Government - local/sub-national</li> <li>Government - municipal</li> <li>Government - national</li> <li>Government - regional/international</li> <li>Civil society - local</li> <li>Civil society - national</li> <li>Civil society - international</li> <li>Private sector - local</li> <li>Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>Land-use planning and zoning (mandatory and non-mandatory)</li> <li>Permanent relocation of buildings and infrastructure</li> <li>Laws and regulation (mandatory)</li> <li>Public policy, guidance, codes and standards (non-mandatory)</li> <li>Strategy and planning (non-mandatory)</li> </ul>

			<ul style="list-style-type: none"> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	
Voorst (2015)	<ul style="list-style-type: none"> <li>• Indonesia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Communities</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Public finance (grant, compensation, loan)</li> </ul>
Voorst, (2015)	<ul style="list-style-type: none"> <li>• Indonesia</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Security forces - police, army</li> <li>• Politicians, elected majors and political parties - local</li> <li>• Civil society - local</li> <li>• Private sector - local</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Permanent relocation of buildings and infrastructure</li> <li>• Temporary relocation of people and assets</li> <li>• Laws and regulation (mandatory)</li> <li>• Early warning</li> <li>• Emergency response - in-kind goods/services</li> <li>• Advocacy/Activism</li> </ul>

			<ul style="list-style-type: none"> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	
Wamsler, (2013)	<ul style="list-style-type: none"> <li>• El Salvador</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• Management post-disaster response</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• United Nations and inter-governmental international</li> <li>• Government - municipal</li> <li>• Government - regional/international</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> <li>• Academic, research institute</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Public policy, guidance, codes and standards (non-mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• promotion non-disaster sensitive livelihoods/economic development</li> <li>• Risk assessment and analysis</li> <li>• Coordination and facilitation</li> <li>• Emergency response - in-kind goods/services</li> <li>• Private finance (including insurance) - formal</li> </ul>
Wamsler (2007)	<ul style="list-style-type: none"> <li>• El Salvador</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster response</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Ecosystem services (e.g. reforestation, soil erosion)</li> <li>• Temporary relocation of people and assets</li> <li>• Public/private services (e.g. waste management)</li> </ul>

		<p>systematic)</p> <ul style="list-style-type: none"> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<ul style="list-style-type: none"> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Religious groups</li> <li>• Private sector - local</li> <li>• Private sector - national</li> <li>• Communities</li> <li>• Households</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<ul style="list-style-type: none"> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Public finance (grant, compensation, loan)</li> <li>• Private finance (including insurance) - formal</li> <li>• Private finance (including insurance, savings groups, loans, cash) -informal</li> </ul>
Wamsler (2012)	<ul style="list-style-type: none"> <li>• El Salvador</li> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Case study (including comparative case study)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Management pre-disaster (risk reduction)</li> <li>• monitoring and control (residual risk and uncertainty)</li> <li>• Management post-disaster recovery and reconstruction</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Civil society - national</li> <li>• Civil society - international</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Temporary relocation of people and assets</li> <li>• Risk assessment and analysis</li> <li>• Early warning</li> <li>• Private finance (including insurance) - formal</li> <li>• Private finance (including insurance, savings groups, loans, cash) -informal</li> </ul>

			<ul style="list-style-type: none"> <li>• Religious groups</li> <li>• Communities</li> </ul>	
Ward (2013)	<ul style="list-style-type: none"> <li>• Indonesia</li> <li>• Multi-country (more than one)</li> </ul>	<p><b>Purpose of study</b></p> <ul style="list-style-type: none"> <li>• Descriptive (context or relationships)</li> </ul> <p><b>Research methods</b></p> <ul style="list-style-type: none"> <li>• Views/perceptions (surveys and interviews)</li> <li>• Literature review (non-systematic)</li> <li>• Case study (including comparative case study)</li> <li>• Document review (primary data)</li> </ul>	<p><b>Risk governance</b></p> <ul style="list-style-type: none"> <li>• Risk appraisal</li> <li>• Risk evaluation</li> <li>• Management pre-disaster (risk reduction)</li> </ul> <p><b>Actors/stakeholders</b></p> <ul style="list-style-type: none"> <li>• Government - local/sub-national</li> <li>• Government - municipal</li> <li>• Government - national</li> <li>• Civil society - local</li> <li>• Communities</li> <li>• Individuals (e.g. citizens, residents, beneficiaries)</li> </ul>	<p><b>Approaches/interventions</b></p> <ul style="list-style-type: none"> <li>• Buildings and infrastructure (new, maintenance and retrofitting)</li> <li>• Land-use planning and zoning (mandatory and non-mandatory)</li> <li>• Laws and regulation (mandatory)</li> <li>• Strategy and planning (non-mandatory)</li> <li>• Education and awareness</li> </ul>

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