



LUND UNIVERSITY

The Role of Formal and Informal Insurance Mechanisms for Reducing Urban Disaster Risk: A South-North Comparison

Wamsler, Christine; Lawson, Nigel

Published in:
Housing Studies

DOI:
[10.1080/02673037.2011.542087](https://doi.org/10.1080/02673037.2011.542087)

2011

[Link to publication](#)

Citation for published version (APA):

Wamsler, C., & Lawson, N. (2011). The Role of Formal and Informal Insurance Mechanisms for Reducing Urban Disaster Risk: A South-North Comparison. *Housing Studies*, 26(2), 197-223.
<https://doi.org/10.1080/02673037.2011.542087>

Total number of authors:
2

General rights

Unless other specific re-use rights are stated the following general rights apply:
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

The Role of Formal and Informal Insurance Mechanisms for Reducing Urban Disaster Risk: A South–North Comparison

CHRISTINE WAMSLER* & NIGEL LAWSON**

*Global Urban Research Centre (GURC), The Institute for Development Policy and Management (IDPM), University of Manchester, UK & Lund University Centre for Risk Assessment and Analysis (LUCRAM), Lund, Sweden, **School of Environment and Development, University of Manchester, UK

(Received April 2010; Revised November 2010)

ABSTRACT *Climate change and disasters pose a serious and growing risk to sustainable urban development planning, with disasters having quadrupled in the last three decades. The extent of the changing climatic conditions, in combination with growing urbanisation, is making both Southern and Northern institutions and associated social security and governance systems increasingly inadequate in dealing with extreme weather events. This results in an urgent need to discover innovative ways to adapt 'outdated' institutional responses and to increase local-level engagement. This paper analyses current risk financing mechanisms at local and institutional levels in both a Southern and a Northern city (San Salvador and Manchester respectively). The North's dependency on insurance fails to contribute to resilience whereas the South's reliance on non-governmental aid organisations (NGOs) has driven a range of bottom-up approaches that support improved risk reduction. Although measures for risk financing are still not part of the NGOs' repertoire, this provides lessons from which Northern cities could also learn.*

KEY WORDS: Disaster risk reduction, climate change, risk financing, insurance, planning, social housing

Introduction

Climate change and disasters pose a serious challenge to sustainable urban development, placing many cities at risk—and not just cities in the developing world. During the last 30 years, there has been a quadrupling of so-called natural disasters worldwide, resulting in escalating human and economic losses (UNISDR, 2006). The threats posed by climate change are even more worrying, as the urban areas already at risk from disasters are those

Correspondence Address: Christine Wamsler, Lund University Centre for Risk Assessment and Analysis (LUCRAM), Lund, Sweden. Email: christine.wamsler@lucram.lu.se

ISSN 0267-3037 Print/1466-1810 Online/11/020197–27 © 2011 Taylor & Francis
DOI: 10.1080/02673037.2011.542087

most likely to be impacted by climate change in the future (IPCC, 2007a, 2007b; Moser & Satterthwaite, 2008).

In any strategy that aims to help those most at-risk optimise their adaptation to climate change, knowledge transfer is a vital component (IPCC, 2000). The terms ‘knowledge transfer’, ‘technology transfer’ and ‘leapfrogging’, when used with reference to sustainable development, are often considered as meaning a transfer from the Northern to the Southern hemisphere.¹ But do developed nations actually provide valuable lessons for risk reduction and risk financing? Or could they, in fact, also learn from experiences coming from the developing world?

Climate change and increasing urbanisation make Northern institutions and associated social security and governance systems increasingly ineffective in dealing with extreme weather events, such as windstorms, fire, drought, and flooding (Guldåker, 2009; Standing, 2008; Wamsler, 2011). In view of the growing need to find zero- and/or low-carbon adaptation strategies,² such as risk financing mechanisms to transfer or share risk, a comparison of current Northern and Southern strategies could indeed provide valuable input to improve current adaptation.

Against this background, this paper’s objective is to analyse the differences in both the local and institutional risk financing mechanisms to adapt to disasters and climate change in Southern and Northern cities. Whilst this paper focuses on presenting an in-depth analysis of issues associated with risk financing, the research on which it is based also includes the comparison of the other risk reduction measures, namely prevention, mitigation and preparedness for response and recovery (Wamsler, 2011). After the description of the research methodology (second section), the subsequent third section shows the role of risk financing for sustainably reducing increasing risk. The ways in which local people insure themselves against risks are then analysed (fourth section), as are the institutional responses that support or hinder these local efforts (fifth section). Finally, the lessons learned are presented on the basis of a South–North/North–South comparison of the similarities, differences, and gaps between the local household-level reality and the institutional risk financing interventions.

Methodology

This paper is based on a comparative analysis of two innovative research studies, which evaluate the effectiveness of urban development planning in climate and disaster risk management through in-depth case studies (Defra, 2008; Wamsler, 2009). These case studies present cutting-edge research in the sense that they analyse not only the capacities and efforts of organisations that service communities at risk; but also compare them with the local capacities, endeavours, and needs.

The first case study is an analysis of four slum communities in San Salvador, in Central America, namely Los Manantiales, José Cecilio del Valle, Divina Providencia and El Refugio, where flooding and associated landslides are the main hazards to life and livelihoods, followed by earthquakes and windstorms. Semi-structured interviews were held with 62 households, comprising 331 people living at risk. Further interviews were conducted with relevant stakeholders from 40 different organisations at the national and municipal level, including insurance companies, as well as local authorities, utility companies, environmental agencies, civil society organisations and other organisations involved in disaster risk management. The San Salvador case study presented in this paper draws from

two research projects carried out during 2003–2007 and 2009–2010 (Wamsler, 2009, 2010). Related funding bodies were the Swedish International Development Co-operation Agency (Sida), the German Advisory Council on Global Climate Change (WBGU) and the International Institute for Applied Systems Analysis (IIASA).

The second case study focuses on storm-induced pluvial flooding in Heywood, Rochdale, Manchester, England, in August 2004 and July 2006. This type of flooding accounts for approximately 40 per cent of flood damage in England (Defra/EA, 2007), and this figure is likely to increase in the future due to climate change (Defra/EA, 2007). Again, semi-structured interviews were conducted with approximately 44 affected households, as well as 40 staff members from insurance companies and all other relevant organisations (including local authorities, utility companies, environmental agencies and civil society organisations). The Manchester case study draws from research carried out during 2006–2009 (Defra, 2008; Douglas *et al.*, 2010). The funding body was the UK Department for Environment, Food, and Rural Affairs (Defra).

For the data collection, apart from the mentioned semi-structured interviews at the institutional and local levels, the case studies also included group discussions, walk-through analyses, observation and literature review.³ For the data analysis, a combination of grounded theory (Glaser & Strauss, 1967), systems analysis (Sterman, 2000) and cultural theory (Thompson *et al.*, 1990) was applied.

After the data analyses, a series of workshops was held both in San Salvador and in Manchester at which the various stakeholders at institutional and local levels were asked to comment on preliminary research outcomes; the aim of this was to achieve a cross-fertilisation of ideas and knowledge from different sources. This approach was also based on the authors' conviction that a more effective means of responding to disasters and risk is the positive and intelligent participation of those who are most at risk or otherwise directly involved in the management of risk (cf. Hewitt, 1997). The preliminary outcomes discussed included the gaps identified between local and institutional responses and the strategies and measures that had been developed for improved risk reduction and risk financing. This was finally followed up by desk work and minor field studies in 2009/10 to assess the differences between the two case studies.

Risk and the Role of Risk Financing

This section shows why risk financing is important to sustainably reduce risk, linking it with the concept of risk and associated risk factors.

The key concept underlying (disaster) risk management, including risk financing, is the notion of risk. In general terms, risk can be understood as the probability of adverse effects, and (disaster) risk management is thus seen as the reduction of that probability by minimising or preventing those adverse effects. The way in which different research communities and stakeholders define risk dictates how risk management is addressed. Slovic (1999) states that:

whoever controls the definition of risk controls the rational solution to the problem at hand. If risk is defined one way, the one option will rise to the top as the most cost-effective or the safest or the best. If it is defined another way, perhaps incorporating qualitative characteristics and other contextual factors, one will likely get a different

ordering of action solutions. Defining risk is thus an exercise in power, as is its management. (p. 689)

This directly links to risk financing as one potential risk management mechanism. Similarly, Douglas (1992) promotes the idea that 'risk language' has a social function in that it is often used to express blame and to accept or reject responsibility.

Risk research or science has a long tradition in sociology, psychology, philosophy, economics and other disciplines. It had its genesis around the 1950s, and since then has undergone a constant development that has generated various disciplinary trends, risk definitions and theories (Persson, 2007). In this context, it is mainly 'outcome risk' that is researched, that is, the consequences of certain well-defined events (Sahlin & Persson, 1994).

Contemporary conceptions of risk researchers are typically agent-centred. These conceptions entail that risk emerges in a decision situation (e.g. Luhmann, 2005) and/or is man-made (e.g. Beck, 1992; Douglas, 1992). It is argued that a specific risk for a person exists or emerges only with his/her decision and that this risk is 'manufactured' and not of external, natural origin. Other risk researchers, such as Starr (1969), Rescher (1983) and Persson (2007), disagree with these conceptions. In fact, they identify a so-called 'risk-taker fallacy', pointing out that there are also risks that people do not take, but (unintentionally) run. This recognises that 'risk runners' are not necessarily synonymous with 'risk takers'. Against contemporary conceptions, Persson (2007) further argues with the so-called 'risk production fallacy', stating that not all risk that has to be managed is man-made. He thus suggests that risk—man-made or natural—has to be manageable in order to be called risk.

In contrast with risk (and risk management) research, disaster risk management and risk reduction is still a relatively new field of knowledge and activity that has undergone its own seemingly independent evolution. The field is developing slowly, as is its multifaceted process of institutionalisation (cf. Twigg, 2004). The analysis of existing literature shows that disaster risk management seems to have emerged and is evolving, not so much from theory and science, but based on different working experiences. In fact, it has been evolving mainly through the practical use and related analyses, of different approaches to managing risk carried out and evaluated by the humanitarian, development and environmental communities (cf. Maskrey, 1989, 1993; Wijkman & Timberlake, 1984)

Furthermore, disaster risk management seems to have developed in the opposite direction to risk research. In disaster risk management, risk was first understood and dealt with as a purely natural issue, although according to contemporary perceptions, there is no such thing as a 'natural' disaster. The first understanding is referred to as the 'naturalistic paradigm' (Ferrero & Gargantini, 2006) or 'technocratic approach' (Bankoff *et al.*, 2004); the contemporary perceptions fall within the 'multidisciplinary paradigm', which states that all disasters are of socio-natural origin (Ferrero & Gargantini, 2006).

The different components that are considered to be part of disaster risk, and thus characterise the definition of risk and risk reduction, have evolved over time in different ways and within different communities (Adger, 2006; Pelling, 1997). Accordingly, the definition of risk financing, as well as the role and importance given to risk financing for achieving sustainable risk reduction, has changed over time.

In general terms, risk can be understood as the probability of adverse effects, while risk management is seen as the reduction of that probability by minimisation or prevention of those adverse effects. Today, climate and disaster risk is commonly defined as:

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions. (UNISDR, n.d.)

Accordingly, climate and disaster risk (R) is usually equated both to hazard (H) and to vulnerability (V):

$$R = H * V$$

The growing interest of some researchers and practitioners in responding to the negativity of the term 'vulnerability', and linking risk management with people's positive capacities and livelihood assets (Davis *et al.*, 2004), is reflected in the following extended risk equation:

$$R = H * V * LC$$

where *LC* represents lack of capacity (i.e. mechanisms and structures) to respond to *and recover* from hazards and disasters. In the context of this paper, it is important to note that *LC* was originally only related to disaster response, and thus to measures of disaster preparedness. It is only in recent years that increased emphasis has also been given to the (lack of) capacity to *recover* from disasters (cf. UNISDR, 2009), consequently also leading to an increased role given to measures of risk financing.

Equation 2 is mathematically identical to the equation $R = H * V / C$ presented by UNISDR (2002), but does not mix factors/variables with positive and negative connotations. The equation is not intended as a mathematical formula but as representative of a qualitative notion or definition. This definition of risk clearly illustrates that even a small rise in one of the three risk components has a multiplicative effect on the others and can thus result in a major increase in risk. In other words, it shows that even if the hazard is small, the risk can be very high. This high risk can be caused by (a) the high level of socio-economic, physical, institutional and/or environmental vulnerability of the area affected, and/or (b) the low level of the capacity (i.e. mechanisms and structures) to respond *and recover* on the part of the individual residents, households, and communities, or the institutions serving them (cf. Wamsler, 2009). Moreover, the risk equation indicates that even if an area is highly exposed to hazards, the risk can be very small if it is 'offset' by a low degree of vulnerability and a high degree of capacity to respond *and recover*. In this context, it is important to highlight that, in itself, climate change is not a hazard but a process of change that affects hazards, vulnerabilities and capacities to respond and recover. In short, it affects all risk factors as described in the risk equation above. Risk reduction or adaptation to this process of change involves efforts to limit the harm it may cause.

In summary, by definition, risk must be tackled not only by addressing the hazards and vulnerabilities, but also by increasing capacities to respond *and recover*. Such a comprehensive approach is crucial if sustainable risk reduction is to be achieved. This demonstrates the role and potential of risk financing mechanisms. Whilst such mechanisms do not have a direct effect on (a) an area's exposure to climate-related and non-climate-related hazards, or (b) the location-specific vulnerabilities to these hazards, they can considerably improve (c) the existing local and institutional capacity that can assist in responding to and, mainly, recovering from resultant disasters (cf. Equation 2).

In other words, risk financing mechanisms are crucial to complement the other risk reduction measures of prevention, mitigation and preparedness, which respectively address the existing hazards, vulnerabilities, and response and recovery capacities.

Local-level Capacities for Risk Financing

This section presents the local risk reduction mechanisms of individuals, households and communities in San Salvador and Heywood to adapting to climate change and increased disaster risk. Key literature on risk management and adaptation (such as Satterthwaite, 2007; Twigg, 2004; UNISDR, 2004) commonly makes use of the terms ‘local coping capacity’, ‘local coping strategies’ and ‘local adaptive capacity’ (usually, however, without defining them). They are used here as synonyms and as an umbrella term for all types of local-level responses and associated capacities of individuals, households and communities at risk that aim to reduce and manage existing climate and disaster risk.⁴ On the basis of the definition of risk described in the second section of the paper (cf. Equation 2), this also includes the local responses and capacities for risk financing to recover from hazards. An analysis of these risk reduction strategies, which highlights the key features and the approaches most commonly used by affected populations, is now presented.

*The Southern Context: The Case of San Salvador*⁵

‘We are always trying to improve, little by little, step by step, in order to become more secure’. This statement by a slum dweller in San Salvador illustrates the constant efforts to cope with disasters and disaster risk in poor communities. In fact, the first case study of four slums in San Salvador found more than 100 coping strategies in use by the urban poor to deal with risk. Out of these 100 identified coping strategies approximately 35 aim at improving people’s capacity to recover from disasters.

Risk financing strategies: self-insurance. People try to improve their capacity to recovery in two different ways, namely by:

- establishing a ‘security system’ that helps people to obtain ‘ready money’ for reconstruction and rehabilitation of damaged, destroyed, or lost belongings, assets, structures, and systems; and
- establishing appropriate recovery mechanisms and structures that can facilitate the reconstruction and rehabilitation process.

The former is part of risk financing or so-called self-insurance. In literature, the term ‘risk financing’ is mainly used at the institutional level and usually describes only formal financing measures to transfer or share risk. Hence, the broader term ‘self-insurance’ was selected here to describe the strategies identified, which include formal and informal, and monetary and non-monetary mechanisms. The literature on disaster risk management generally uses the terms ‘informal insurance’, ‘self-insurance’ or ‘informal self-insurance’ synonymously and—as in ‘coping strategy’—without definition (e.g. Twigg, 2004; UNISDR, 2004). Based on the research outcomes, self-insurance is defined here as ‘the establishment of formal or informal “security systems” that help people obtain “ready

money” in form of financing sources or mutual social help in the aftermath of hazards or disasters’ (cf. Wamsler, 2009, p. 178).

Financing sources are, for instance, informal and formal credits, donations, additional income, the selling price of assets and monetary compensation. Mutual help can include offering refuge, temporary custody of children, fostering a child, labour work for reconstruction or washing and cleaning. In other words, to insure themselves, slum dwellers take pre-disaster action in the hope of obtaining direct or indirect compensation if a hazard leads to death, injury or loss of property or income. They thus ensure that they can bounce back faster, than if they do not have self-insurance, to their former standard of living, or an even higher one.

Self-insurance was identified to include local-level responses for transferring or sharing the risk at different levels to other parties, namely at the level of:

- individuals,
- households, and
- communities.

Individual and household level measures identified are, for example, arrangements to allow access to informal and formal credit mechanisms, donations, savings, additional income and the sale of assets—immediately, if need be. A concrete example of the latter is the acquisition and maintenance of physical assets, such as construction materials, which can easily be sold if a household has to meet the cost of recovery expenses. In fact, to alleviate financial distress, one of the slum dwellers interviewed had sold seven roofing sheets of corrugated iron, and then temporarily re-roofed his home with an old car body. He had consciously not nailed down the roofing sheets of corrugated iron to his wooden roof construction so that they did not get holes, and, thus, he could resell them at a higher price. Further important risk financing strategies at the individual or household level, reported by slum dwellers, were saving money ‘under the mattress’ and trying to get their properties legally recognised. The latter is seen as a key strategy—having a legal home is considered to be a household’s main asset, as it can also be (better) sold if funds are needed.

Compared with the strategies undertaken by individuals and households, community and hierarchically based risk-financing comprise (a) the creation of organised structures to insure oneself, and (b) strategies to access services or assistance offered by different institutions, thereby tapping into formal or informal risk-financing mechanisms. It includes, for example, the establishment of community emergency funds, creating linkages with government and (mostly) non-government institutions, such as religious bodies (which offer help after disasters), and illegally accessing formal insurance mechanisms. In fact, while slum dwellers are not generally believed to have a culture of insurance, in two cases residents had illegally obtained employment certificates enabling them to pay into the social security system, even though they were not formally employed. In addition, 26 of the 331 people interviewed had health insurance as they worked in the formal market; one-third of the interviewees were interested in acquiring property disaster insurance (the other two-thirds had no opinion on the subject).

Directly interlinked with self-insurance is the second type of strategy which also aims to help people (better) recover from the impacts of hazards or disasters by establishing appropriate recovery mechanisms and structures that can facilitate the reconstruction and rehabilitation of damaged, destroyed or lost belongings, assets, structures and systems. In comparison to self-insurance, this type of strategy can be initiated in a pre-disaster

context and it can also be ad hoc. Based on the household level, a typical example of associated adaptive capacity is the way in which people diversify their sources of income after a disaster has occurred, for instance, by temporarily taking on a more profitable job in the construction sector, and by creating contact and co-operation with government and (mostly) non-governmental institutions, such as religious bodies which can be 'tapped into' if post-disaster assistance is needed. The creation and encouragement of reciprocally dependent relationships to improve economic status also falls under this type of coping strategy, as remittances from abroad tend to increase and play an enhanced role during recovery. According to Agunias (2006), remittances rise when an economy suffers a downturn or macroeconomic shocks due to a natural disaster. Following the 2001 earthquakes, the Central Reserve Bank of El Salvador estimated that Salvadorans living abroad sent home US\$1.9 billion in remittances (UNDP, 2004). As of 2004, remittances totalled US\$2.5 billion (SELA, 2005) and assisted more than one-fifth of all households (UNDP, 2005).

Financing and other local barriers to effective risk financing. In the four slums analysed, households spent on average around 9 per cent of their income on reducing climate and disaster risk, that is, US\$26 out of an average monthly household income of US\$284 (Wamsler, 2007). This figure is intriguing, even more so if one considers that it excludes construction materials that are obtained for free (such as stones and sand from riverbeds or old tyres from friends used for physical mitigation),⁶ free labour from family members, the opportunity costs of the considerable amount of time spent on adaptation, and the negative impacts of some coping strategies, for example, the high interest rate paid to money lenders and the financial losses due to adjustments in assets and activities caused by risk exposure (cf. Dercon, 2003). On top of the large costs incurred by local risk reduction measures, there are also substantial post-disaster expenses, for example, replacement of belongings washed away during floods and landslides; recovery efforts; temporary loss of income; and loss of the gradual and incremental investments made in the building of housing and community infrastructure.

The lack of financial resources due, for example, to unemployment and low-income levels, was mentioned frequently by interviewees as one of the underlying causes of risk and disaster occurrence (and of the limited 'success' of local-level measures of risk reduction (including self-insurance). Apart from financial issues, slum dwellers mentioned a series of other barriers to improving their risk financing capacity. These included lack of support from government agencies and insurance companies, an unwillingness to invest in formal or informal insurance due to the ever-present threat of slum clearance, a poor sense of mutual rights and obligations in the communities regarding maintenance and development of the settlements (e.g. neighbours excavating the slopes below houses or constructing latrines close to declivities), as well as a lack of knowledge regarding adequate risk reduction and the potential of risk financing.

Finally, it has to be noted that the various coping strategies for risk reduction and financing identified, although crucial, are fairly weak. Slum dwellers reported that it can take them several years to recover from single-hazard events and that, to do so, they are dependent mainly on outside help. There are several reasons for this: first, urbanisation and the increasing ease of mobility it brings can lead households to 'default' on their obligations to relatives and neighbours. Second, different income levels (ranging from US\$120–750 per household and US\$30–500 per worker) foster individualistic behaviour,

with the better-off households opting out of mutual and hierarchical arrangements. In addition, slum dwellers have little to sell (e.g. no livestock or agricultural produce) to help themselves or others in need. Third, the need to compete economically, which at present mainly rewards (productive) specialisation and intensification (instead of diversification) can reduce the capacity to cope with changing climatic conditions and disasters. Finally, slum dwellers simultaneously and persistently experience bad conditions over a period of years. Even after the weather has returned to normal, the adverse environmental changes caused by floods and landslides (such as run-off and poor soil) continue to be felt. Under these conditions, formal risk financing is generally no real option.

*The Northern context: The case of Manchester*⁷

The residents of Heywood, Manchester, were unprepared for the flood events of 2004 and 2006. Hardly any coping strategies were actually used until after the 2006 flooding. As stated by the Pitt Review (Pitt, 2008), this situation was common to many flood areas in Manchester and in England as a whole.⁸

It was virtually impossible to identify any measures in use by local residents, either before or after the events of 2004 and 2006, which were aimed at reducing (or avoiding) hazards. In addition, over one year after the 2006 floods only 27 per cent of the victims interviewed had installed, or were installing, some form of mitigation measure to reduce their vulnerability to floods in the future or to increase their preparedness. The few mitigation measures identified were mainly ad hoc in the sense that they were carried out without pre-disaster planning and with little input from insurers or the agencies involved in flood risk management. They also had a strong focus on reducing only physical vulnerability. In one instance, a resident had even installed a small drain and illegally connected it to the adjacent sewer. In terms of local adaptive capacity in the case study area, the most prevalent strategies for coping with stresses and shocks were, indeed, risk financing mechanisms aimed at improving people's capacity to recover.

Risk financing strategies. Risk financing through formal insurance was seen by the homeowners as the most important coping capacity. Indeed, many feel that an insurance policy is not only all the protection they need but also the most effective risk reduction strategy available to them. Accordingly, flood victims look primarily to the insurance industry for compensation, and consequently the first reaction of most Heywood residents who were flooded was to contact their property insurer.

All the households surveyed had contents insurance (as part of their household insurance). After the two Heywood flood events, insurance claims resulted in payouts of typically between £30 000 and £45 000. These payments did not, however, cover the costs of temporary accommodation, which for most people was required on the two occasions for three to eight months at a time. After payout, the property owners faced varying increases in insurance premiums and in the 'excess', that is, the uninsured loss that they would have to pay in the event of a further claim. The increase of excess levies varied from zero to £15 000. Premiums went up in some cases, ranging from a modest to a threefold increase. In some cases further insurance was refused.

As the insurer's liability is to replace loss and not to provide improvement, there was little incentive to repair flood-damaged properties with resilient materials, as insurers

Box 1.

Millers Brook Close, Heywood

Planning permission for a cul-de-sac development of 14 detached and semi-detached town houses on the vacated site of the former St. Luke's school was granted in 1987. The area is low-lying and in a small dip in the ground at the bottom reaches of Millers Brook and there is empirical evidence by local residents that the school yard was regularly flooded. Planning permission included consultation with the Borough Engineer, North West Water Authority and Environmental Health and there were neither comments nor objections. The applications state that surface water and foul sewage will be connected to the main drainage system which was an old combined sewer.

The Close now suffers from sewer flooding in the road and to garages most winters and all but two of the properties which are on raised ground suffered internal flooding in 2004 and 2006. There is an area of made ground between the close and Millers Brook which could potentially house a detention basin or large swales. The utility company has in fact publicly stated that the flooding to Millers Brook Close could potentially be remedied by a holding tank costing in the region of £600 000. This sum is quite possibly less than the total value of all the insurance payouts made to people in Millers Brook Close in 2004 and 2006.

Following the 2006 event, one property only in the Close was chosen at random for inclusion on OFWAT's DG5 Register* but it has a low priority rating and no remedial action will be taken during the current 5-year Asset Management Plan which lasts until 2010. Residents are frustrated by the lack of action to reduce future flood risk. One resident at a meeting with the utility company asked: 'How many times do I have to be flooded before I am at risk of being flooded?'

The area is now severely blighted: one house was recently sold for rental at just under half of the pre-2004 value. At a meeting between residents the local authority, a local councillor and representatives from the utility company, the following issues were identified as the key concerns:

- property blight due to one of the properties' inclusion on the DG5 Register*;
- uninsured losses and insurance cover;
- whether the local authority would be culpable because planning permission should not have been granted unconditionally;
- the lack of a requirement in 1987 to upgrade the drainage system and to convert it from a combined to a separated system; and
- how legislation can be allowed to precluding action when an acceptable cost-effective remedy will be ignored for the foreseeable future because of Millers Brook Close's low priority rating.

Note: *The so-called DG5 Register lists properties where flooding has been reported. As the Register has a severe weather clause, it generally does not include small-scale pluvial flooding. Although flood victims can request that their property is included on the Register, many homeowners are usually reluctant to report flooding because of potential loss of insurance coverage and property blight and may try to quietly sell their home instead.

would not pay for that. Simply moving a fuse box to a higher place on the wall was considered to be an improvement and therefore not covered. According to Pitt (2008), only few insurance companies in England allow payment up to the like-for-like amount, with the policyholder paying the extra cost of a resilient repair. For householders in one area of Heywood, the cost of the infrastructure required to mitigate flooding would be likely to exceed the total amounts paid to claimants (see Box 1).

After risk financing in the form of a formal insurance policy, owning a property was identified as the second most important strategy for risk financing to ensure themselves. People's life savings and ambitions are invested in their homes and their owners see them as their most important asset and as a buffer against all types of shocks and stresses. However, the houses in Heywood that were flooded are now blighted and unsaleable (see Box 1), and for many selling the property without disclosing its actual flood risk is the last resort.

Measures aimed at establishing appropriate recovery mechanisms and structures that can facilitate the reconstruction and rehabilitation process were exceptional and of a temporary nature. The election of a spokesperson could, for example, have been an important way of improving the mechanisms and structures for future recovery. However, associated contact and communication established with local authorities and other stakeholders involved in flood risk management were established only to deal with the 2006 floods and not meant to be anything more permanent.

Financing and other local barriers to effective risk financing. Sustainable risk reduction can only be achieved if risk is addressed holistically, that is by addressing all three risk factors (cf. third section and equation 2). Heywood residents' strong focus on risk financing is thus not effective in terms of achieving long-term resilience. However, residents have been discouraged from increasing their flood resilience for a number of reasons. First, was the belief (in 2004) that the next flood would be a long time in the future, which, of course, turned out not to be the case. Second, was the lack of knowledge and access to advice on the most appropriate risk reduction measures that should be taken. As mentioned above, only 27 per cent of Heywood homes with internal flooding in 2004 and 2006 have actually installed some form of adaptive risk reduction measures to deal with potential future flooding. However, the residents of an additional 25 per cent of homes flooded stated that although they would like to take preventive measures, they do not know what to do or they feel that there is nothing they can do to avoid flooding. The cost of potential risk reduction measures (such as floodgates which can cost up to £2000) has also discouraged people from carrying out improvements. This reluctance to invest in flood resilience is related to three other issues: (a) people's 'blind' belief and confidence in formal insurance; (b) the fact that Heywood residents would prefer a professional engineer to remove the risk altogether by improving drainage; and (c) the common belief that it is the government's responsibility to take action. In fact, residents argued that it was not up to them but to the local authority or the utility company to take risk reduction measures to adapt to increasing risk of flooding. The interviewees also claimed to have received no response when they asked the utility company for protection, that attending public meetings was useless, that attempts to get a response from the local authority were in vain, and that they felt lost in the maze of institutions involved in flood management. With the 2004 and 2006 experience, the belief and confidence in insurance seem to have also vanished.

Institutional Responses: Support of or Hindrance to Local Risk Financing and Resilience

The previous section presented the local risk financing mechanisms of individuals, households and communities in San Salvador and Heywood in adapting to climate change

and increased disaster risk. The existing institutional risk financing mechanisms are now analysed, as are other institutional responses that support, hinder or complement local risk financing. This section includes the actions of both governmental, non-governmental and private organisations.

*The Southern Context: The Case of San Salvador*⁹

In the interviews conducted in disaster-prone communities in San Salvador, slum dwellers often saw national and municipal authorities as well as the private sector as unhelpful, and even a hindrance, to their efforts to reduce, transfer or share risks in order to improve their situation. Many promises had been made by such institutions, but not kept.

Support for risk reduction by governmental and private organisations. As in most (developing) countries there is a general unwillingness on the part of national and municipal authorities and the private sector to work with low-income groups, especially those living in informal settlements (Moser & Satterthwaite, 2008). Accordingly, El Salvadoran planning authorities and insurance companies provide little support to the communities analysed and have little knowledge of their actual living conditions. As a result, action taken by them and information on risk reduction and financing given by them were viewed as contradictory and often unreliable.

Support for risk reduction by non-governmental organisations. While support from governmental organisations is barely existent in the areas analysed, there are various housing NGOs, both national and international, that do provide assistance. These organisations use different approaches to reduce risk associated with disasters and climate change faced by the poor, such as *in situ* house improvements and settlement upgrading projects. During the last two decades, most of the housing NGOs working in these fields have had to make good the damage caused by disasters to some of their former projects and have faced financial loss because of the repairs that they have had to carry out. This has led to an increased awareness of the shortcomings of the purely physical/structural approach that they had adopted and to the realisation that more-integrated and participatory approaches were needed. On this basis, some housing NGOs have been reducing their one-sided focus on construction-related work and, step by step, have been adopting non-construction-related risk reduction—including risk financing.¹⁰ Nevertheless, this is still not the case for the majority of NGOs.

Institutional support for informal risk financing: self-insurance. While the NGOs do provide assistance and implement projects, including measures aimed at prevention, mitigation and preparedness for response, these usually have little impact on people's capacity for recovery. In other words, local mechanisms for self-insurance and recovery are generally little analysed and supported within the framework of the projects. This results not only in few measures for risk financing, but also in the creation of barriers for local self-insurance. For example, families wishing to obtain micro-credits for future risk reduction or recovery needs from other institutions cannot use the project houses as collateral, as assisted housing cannot become bank property in the event of default. This presents a barrier to future coping, as project beneficiaries are unable to use their 'improved' assets effectively.

Institutional and formal risk financing. It was ascertained that credits given for social housing provision generally include compulsory life insurance to cover the debts. The insurance fees are included in the monthly credit repayment, and are calculated on the basis of the loan balance (around one per cent per year), or on the basis of the total credit amount (approximately 0.005 per cent). Hence, monthly costs are either fixed or decreasing, and generally range between US\$0.25–0.80. Depending on the insurance policy, the credit is either completely or partly cancelled if the borrower dies.

Only three housing organisations have included life insurance as part of their credits, and this only as a result of recent disasters. One of them is Habitat for Humanity, which has adopted life insurance directly in combination with disaster property insurance. This policy package costs approximately US\$ 2.20 per month, a price negotiated on the basis of the organisation's yearly construction work in El Salvador of around 600 housing units.

To date, only one of the NGOs interviewed has added disaster property insurance to its housing credit schemes. However, after a house is paid for, the insurance is cancelled and is not replaced by any mechanism for financing future damage. This is despite the fact that some representatives of the organisations reported that approximately 4–5 per cent of their project houses, as well as the organisations themselves (for example, their private access roads), have been affected by disasters.

Housing NGOs further provide special funds for non-recoverable credits, by including a small percentage in the housing credit (i.e. 0.5 per cent annually during the life of the debt, or a certain percentage included in the interest charges). Such funds are seldom used to ease disaster-affected slum dwellers. An exception is the case of Habitat for Humanity, which, after Hurricane Stan in 2005, used its fund to amortise the outstanding credits of six project beneficiaries living in a location that was officially declared uninhabitable. None of the organisations analysed provides a financing mechanism that could finance the relocation of affected former project beneficiaries. With regard to subsidies from national and international organisations, they are not usually conditional upon an insurance policy being bundled with accompanying credits.

The direct offer of disaster insurance is not common. However, interest in risk financing is slowly growing. In fact, the Hurricane Stan disaster led to ongoing negotiations among several housing NGOs and national insurance companies. The insurance companies that were interviewed have now included disaster property insurance for social housing in the portfolio with premium rates of 0.034 per cent of the house value plus administration fees, or rates of a total of approximately US\$2 per month. Damage from all types of natural disasters is covered, as is damage related to construction errors. However, representatives of insurance companies admit that the impact of such an insurance policy on promoting risk reduction is poor, as mere compliance with formal construction procedures is seen as a sufficient basis for buying insurance.

In addition, the differing organisational philosophies and working approaches that drive social housing projects are partly a barrier for fostering formal disaster insurance. At one extreme are organisations, such as FUSAI, who designs housing financing mechanisms that are as close as possible to market structures. Credits and revolving funds have to be financially sustainable and competitive, and housing donations are only exceptionally used for project implementation. Formal insurance, being a market-based instrument, is seen as an important future and complementary mechanism. At the other extreme are organisations, such as FUNDASAL, which see housing first and foremost as a human right, and who work primarily with subsidies from donor organisations and less with micro-credits.

Formal insurance is seen as an inadequate mechanism for the low-income sectors that would only increase costs and endanger the access to housing of the poorest people. However, increasingly integral and comprehensive projects are the aim, including risk reduction.

Whilst organisational philosophies differ strongly, the working approach for implementation is not diverse, focusing on social patterns with either an individualistic or a communitarian bias. It tends to be based on community action (such as cleaning sewage systems) and the establishment of hierarchical structures (such as the establishment of emergency committees or institutionally based early-warning systems). In fact, participation, mutual help and the establishment of community structures were identified as being among the most fundamental principles of project implementation, but this situation completely overlooks the fact that local adaptation strategies, including strategies for risk financing, are mainly of an individualistic nature.

Lacking legal body for risk reduction and financing. With regard to national and municipal legislation, international organisations have provided financing to help create or revise policies and policy instruments to improve their potential to support risk reduction and adaptation, often in the context of their post-disaster assistance work. For example, the national policy for housing adopted shortly after Hurricane Mitch in 1999 addressed, for the first time, the management of environmental risks. Between 2001 and 2004, the first draft policy for land use planning was developed through co-operation between the Ministry of Housing and Urban Development and the Ministry of Environment. Risk reduction is included as one of the six sub-programmes of El Salvador's national land use plan. The draft policy was, however, strongly criticised for its centralised and non-participatory character, restricted focus on natural hazards, and its proposal to establish an additional legal and institutional system for risk reduction (GTZ, 2003). In contrast to the draft policy for land use planning, some of the municipal land use plans include risk reduction in a more cross-cutting manner. Nevertheless, none of the legal bodies mentioned include issues related to formal or informal risk financing.

Disaster-related legislation dates back to 1976, when the Law for Civil Defense came into effect. After Hurricane Mitch in 1998, a new Bill for relief and civil protection against natural disasters was presented. A number of NGOs heavily criticised this bill as being based on a military and centralised vision. The Ministry of Environment demanded its technical and juridical revision, arguing that the Bill was focused solely on emergency management, but should, in fact, be elaborated as an integral part of the land use planning policy (GTZ, 2002, 2003). Since 2001 different organisations have developed policy guidelines for risk reduction, but these have not been adopted nor do they include issues related to risk financing.

Across the board, policies and policy instruments at both national and municipal level, as well as related guidelines, have (a) generally not considered or even recognised local adaptive capacity, including self-insurance; (b) do not include risk financing as an important part of risk reduction; and (c) often do not clearly determine the roles and responsibilities of associated stakeholders.

Apart from the lack of a body of adequate legislation to support risk financing, the existing regulations for risk reduction are obsolete, not complied with, and not enforced (resulting in an increasing number of people settling in risky locations without adequate support).

Inter-institutional competition and lack of data sharing. The integration of the fields of urban planning and disaster management progressed strongly in El Salvador after Hurricane Mitch and the 2001 earthquakes. However, this was certainly not achieved through better inter-institutional co-operation. The alliances established, though required by the organisations to initiate a shift toward integrating the different fields, were mainly of a temporary nature, and most of the additional knowledge and capacities needed were built up independently and internally (e.g. through the use of short-term consultants). Increased competition instead of co-operation was the outcome. In addition, whilst the increased integration of urban planning and disaster management led to the inclusion of measures of prevention, mitigation and preparedness for response into social housing projects, measures of risk financing were (and still are) generally seen to be of little importance and relevance for such projects.

The inter-institutional competition described can also be seen in the lack of data sharing between different organisations. Insurance companies do not have access to any existing risk data collected by both governmental or non-governmental organisations, and there is hardly any data sharing between governmental organisations. For example, the Municipality of Santa Tecla, one of the areas most severely affected by recent disasters, could not obtain the data it required from national planning authorities to carry out local risk assessments.

In addition, every organisation draws up risk maps in different ways, resulting in incompatibilities between them, which not only reduces their usefulness for disaster and land use planning, but also prevents capacities being fostered at the local level. In addition, digital maps have mostly been prepared by external consultants over a very short period of time. Thus, they are not regularly updated or disseminated, are not the result of participatory efforts, and lack even the basic knowledge that is available at local or municipal level.

No disaster forecast and early warning. In 2001 a National Service for Risk Reduction, Mapping and Monitoring (entitled SNET) was established as part of the Ministry of Environment. Nevertheless, there are hardly any formal mechanisms for disaster forecasting or early warning available for those living in marginal and informal areas. This obstructs local coping and potential insurance coverage due to a lack of data required for risk mapping, zoning and/or weather index insurance.

*The Northern Context: The Case of Manchester*¹¹

Without exception, all residents interviewed in Heywood felt let down or victimised by the insurance companies, governmental agencies and legislators who, in their opinion, should be the ones protecting them. Of particular concern was, first, the slow and inadequate response of the emergency services. For example, heavy vehicles would cross flooded areas, creating a wash that caused secondary flooding to several houses. Second, residents were concerned that nothing was being done to help them adapt to future flood risk. Third, they were confused about who was responsible for helping them protect their properties. Fourth, the loss or inadequacy of their insurance coverage which is making them increasingly vulnerable. Legislative and institutional issues contributed to this situation, constraining effective risk reduction and risk financing both before and after the 2004 and 2006 floods and hampering local action.

Institutional and formal risk financing. The insurance industry is responsible for covering insured homeowners against loss. Flood risk is usually covered as a standard part of business and household insurance. Flood risk insurance is not compulsory in the UK but most insurance companies provide cover as a part of a bundle with other perils in a household policy (Clarke, 1998). The insurance of private homes in the UK is entirely private and has been guaranteed by the industry for everyone until recently. An agreement was in place between the industry and government in order to protect houses that were at risk. However, this guarantee is no longer in place and the insurance industry policy is now to provide cover when the risk is less than 1 in 75 years, or in other words greater than an annual probability of 1.3 per cent. Where the level of risk is greater, i.e. a greater probability, then insurers will need to determine that improvements to flood defences are in place. Insurers will look favourably at homeowners who have themselves installed resilience methods by reducing the excess, but they will not provide loans for their installation and are unable to finance post-disaster resilience measures (Association of British Insurers & National Flood Forum, 2007). In principle, the insurance industry looks to the government, the local authorities and the utility industry to manage the risk of flood damage occurring (Pitt, 2008).

Flood risk cover will invariably be refused in areas which are considered to be at risk of frequent flooding by the environmental agency, and exceptions to a refusal to insure are only possible where the homeowner is able to demonstrate the installation of robust flood resilience measures. In addition, repeated claims invariably result in increased premiums, increased excesses and even refusal to insure.

No governmental support for local risk financing: individual insurance policies. A voluntary agreement between the insurance industry and the government to provide insurance cover to houses at risk has been revoked. Consequently, insurers can withdraw cover for certain buildings or even areas that are considered to be at risk of frequent flooding. Climate change is a major issue for the insurance industry, with the cost of inland and coastal floods likely to more than double this century. Insurers need to see a reduction in risk or they will react to protect their business and withdraw cover. In contrast to a development in a recognised river flood plain or coastal risk area, small urban catchments (such as Heywood) are unlikely to appear in flood risk maps. Therefore, after an event (such as the 2004 and 2006 floods), the insurers are likely to adopt a cautious approach to a future risk of flooding (Douglas *et al.*, 2010; Osbourne, 2008). People's most important coping strategy, namely, risk financing through the acquisition of an insurance policy, is thus becoming less and less effective.

Inter-institutional competition and lack of data sharing. Responsibility for flood risk management in the UK is fragmented (Coulthard *et al.*, 2007). While there are a huge number of different organisations involved in the management of riverine and coastal flooding, no agency is explicitly responsible for urban pluvial flooding. The governmental environmental agency is responsible for coastal and main riverine flooding. The local authority has responsibility for surface water runoff and ordinary watercourses and is the sole agency responsible for granting planning permission for all new developments. The utility company is responsible for the underground drainage and the sewage system and it is not a statutory consultee to the planning process.¹² In addition, there is a lack of inter-institutional co-operation between the environmental agency, the local authorities, utility

industry, and the insurance industry, and there is an active tendency for these agencies to blame each other for the Heywood floods. The result is that residents are confused about who to ask for help or advice, if they do ask their demands are turned down, they are frustrated, and finally there is little action at the local level.

Inter-institutional competition also constrains the insurance industry from providing a standard charge for flood risk insurance and a unified response to flood damage claims, also resulting in major variances of payouts, excesses against future claims and increased premium rates. In addition, non-betterment clauses constrain them from instigating resilience measures.

The ambiguous institutional setting and inter-institutional competition also becomes apparent in the lack of adequate data on pluvial flooding and data sharing. Neither the environmental agency nor national or local authorities maintain robust records of past pluvial flood events and the best record of the extent and the impact of the 2004 and 2006 flood events in Heywood is in local newspaper reports.¹³ Past pluvial flooding is not marked on existing flood maps and there are no historical flood data on such events.

Much information on pluvial flooding is in the hands of insurance and utility companies, which view them as confidential. Since there is no compulsion for them to make the data available, they are not accessible despite their potential value. The resulting lack of access to information hampers both governmental and local-level responses.

Other issues also affect the situation. First, the utility companies inherited an antiquated sewage system on privatisation in 1989 and several private sewers which feed into the system are still unknown to them. Second, many local streams which were culverted during the 19th and early 20th century urban expansion have become part of the sewage system and this exacerbated the Heywood flood events. Neither of these streams is included in the environmental agency's register of critical ordinary watercourses. Third, the fear of property blight prevents the general public from reporting pluvial flood events. Finally, the trend toward the privatisation of public services (all of which diminishes the availability of information, local control, and finally local action taking).

No forecasts or early warning for urban flooding. Weather forecasting at a geographical scale where it can reliably inform on the type of summer storms that caused the 2004 and 2006 flood events in Heywood is not, at present, available. The flood risk maps of the environment agency still forms the benchmark in England for flood warning and thus flood preparedness but they are, as yet, of zero value in providing preparedness for pluvial urban flooding such as that which occurred in Heywood. Hence, the national Floodline does not cover pluvial flooding. In addition, the data available to Strategic Flood Risk Assessments that include pluvial flooding is at too coarse a resolution to reliably inform exactly which neighbourhood locations are at risk of flooding and which are not. This constrains potential insurance coverage due to a lack of information required for risk mapping, zoning and/or weather indexed policies, and it further prevents potential victims from taking preparedness action through, for example, the timely installation of temporary flood barriers.

Low priority given to flood risk by local planning authorities, and lack of knowledge about it. A key objective of the Planning Policy Statement 25 (PPS 25) states that the aims of planning policy on development and flood risk are to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at

risk of flooding, and to direct development away from areas at highest risk. Where new development is, exceptionally, necessary in such areas, the policy aims to make it safe without increasing flood risk elsewhere and where possible, to reduce flood risk overall (DCLG, 2006). However, although in recent years significant advances have been made in including flood risk management and risk reduction measures in urban planning, major gaps persist. In two of the six areas analysed (namely, Millers Brook Close and Lane End), planning permission was granted for new houses to be constructed, although there was empirical evidence that the areas had been experiencing regular flooding even during moderate rainfall (see Box 1). No one had assessed whether or not the local drainage system could cope with these developments.¹⁴ The planning department of the local authority admitted that it was unable to undertake a proper hydrological assessment because it possessed neither the personnel nor the expertise. The fact that relevant information is not used as a basis for actual land use decisions results in: (a) an increasing number of people living in floodplains;¹⁵ (b) inadequate support and control of locally based action; (c) actually supports inadequate local coping (for example, the illegal connections being made to the antiquated sewers mentioned above); and (d) hardly any considerations being given to risk financing issues.

Lacking legal body for risk reduction and financing. Related to many of the issues mentioned previously is the fact that there is a lacking legal body regarding pluvial flood management, flood response plans, national policies to co-ordinate responsibilities in times of flood and data sharing. Neither the building regulations nor the planning guidance for England and Wales consider flood resilience as a requirement for new buildings (cf. Crichton, 2005). The Unitary Development Plan for Heywood does not include any guidance on pluvial flooding; and existing guidance by Communities and Local Government on the construction of new buildings to cope with flood risk does not necessarily result in flood-resilient construction in small urban catchments, as it does not deal with flooding of the sewers. Moreover, repairs carried out to buildings after floods are typically not subject to the building regulations, all of which makes it difficult to access adequate assistance, support and information on what local adaptation measures are needed. Furthermore, the importance of assessing and supporting localised responses is hardly mentioned in the existing national or municipal policies or policy instruments.

The insurance industry has no direct influence on building regulations, although insurers may advise government on the development of the regulations (cf. Crichton, 2005). Common areas where insurance claims arise with respect to buildings are wind storm damage, rain leakage into buildings from driving rain and leaking pipework. The first two of these issues are covered by the building regulations. However, there is no such requirement for flood resilience. Obviously, insurers would welcome building regulations that reduced the amount of damage experienced in a flood and the subsequent cost and time of repair. Insurers will not provide insurance to any owner of a building that has not achieved full building control compliance. Therefore, the future insurability of the building will depend upon compliance with a resilient repair assessment under the building regulations.

No financial support of infrastructure improvement in pluvial flood risk areas. In England, to instigate priority funding to improve the local drainage capacity, the Water Services Regulation Authority economic regulator of the water and sewerage sectors

(OFWAT) lists properties where flooding has been reported, or is deemed to be a recurring risk, on their DG 5 Register. As the Register has a severe weather clause, it generally does not include small-scale pluvial flooding. Although flood victims can request that their property is included on the Register, many homeowners are usually reluctant to report flooding because of potential loss of insurance coverage and property blight and may try to quietly sell their home instead (see Box 1). Consequently, many properties at risk from pluvial flooding are not included in the DG 5 Register, and this restricts prioritisation of upgrades to the local drainage system.

The insurance industry has recently stated its unhappiness at the level of flood defence investment by the government in general and considers that it should at least double (Defra/EA, 2007). The insurance industry has further promoted the idea of mortgage lenders paying for resilience by allowing homeowners to add to their existing mortgage in order to fund the difference between a like for like repair and a flood resilient repair. The Association of British Insurers has estimated that flood protection measures cost between £2000 and £6000 to deal with flash-floods using dry proofing measures, and from £20 000 up to £40 000 to make buildings resilient for long duration floods. However, flood resilient repair can save between 50 per cent and 80 per cent of the cost of a future flood (Association of British Insurers and National Flood Forum, 2007).

Discussion and Conclusion

Climate change and disaster pose a serious and growing risk to sustainable urban development planning, with disasters having quadrupled in the last three decades. The extent of the changing climatic conditions, in combination with growing urbanisation, is making both Southern and Northern institutions and associated social security and governance systems increasingly inadequate in terms of dealing with extreme weather events (Guldåker, 2009; Wamsler, 2011). Together with the growing need to find zero- and/or low-carbon adaptation strategies, such as risk financing mechanisms to transfer or share risk, this results in an urgent need to discover innovative ways of adapting the 'outdated' institutional responses and complementing them with increased local-level engagement. Against this background, this paper analyses current risk financing mechanisms at local and institutional levels in both a Southern and a Northern city. The previous sections describe separately the analyses of the different research levels (i.e. the local and institutional level) and from the different geographical contexts (i.e. San Salvador and Manchester). In the following, the results from the different levels and geographical contexts are compared.

Local-level Capacities for Risk Financing: A South–North Comparison

The case study of the floods in Heywood, Manchester, together with studies and literature review of other European cases (e.g. Pitt, 2008; Standing, 2008),¹⁶ show the tendency for people in the North to have a strong belief in hierarchical structures and social (insurance) mechanisms to help them deal with disasters. However, Heywood residents were somewhat disabused of this belief by the 2004 and 2006 floods, as their efforts to access the assistance they needed were frequently futile.

In terms of local adaptive capacity for risk reduction (including prevention, mitigation, preparedness and risk financing), the most prevalent Northern strategies for coping with

stresses and shocks are identified as, first, obtaining insurance coverage and, second, owning a home. A home is seen as the most important asset, providing security and a 'buffer' against unforeseen events. Unfortunately, in Heywood, Manchester, neither strategy has turned out to be effective in terms of coping with the increased prevalence of pluvial floods. First, insurance companies would not cover all the losses, their payouts could not be used to improve homes' resilience to future floods, premiums and excess charges were considerably increased, and in some cases further insurance was even refused. Second, people's homes became blighted and unsaleable. Apart from insurance cover and homeownership, none of the Heywood flood victims had specific strategies to deal with stresses and shocks (such as floods) and adapt to climatic changes. Even after the 2006 floods, only 27 per cent of the flood victims began to implement some mitigation and preparedness measures. Moreover, these were mainly individualistic and restricted to minor physical/structural improvements related to better dry-proofing.

In contrast, in the slum areas analysed in San Salvador, virtually all the residents are actively adapting to their risk situation (which seems to be a common feature in the South (cf. Jabeen *et al.*, 2009; Wisner *et al.*, 2004, 2007)). The types of coping strategies used are also comprehensive in the sense that they: (a) address all three risk components (i.e. hazards, vulnerability and capacity to respond and recover); (b) tackle physical, environmental, economic, social/cultural, organisational, and institutional issues; and (c) combine measures that are individualistic, communitarian, and hierarchical. Whilst people apply little formal risk financing mechanisms (such as formal insurance), they have developed a range of innovative and informal mechanisms for self-insurance in order to share or transfer their high level of risk.

Similar to the situation in Heywood, Manchester, people in San Salvador have also lost their trust in community cohesion and hierarchical institutional structures and thus focus mainly on individualistic measures to achieve long-term resilience. In addition, some of the various coping strategies identified are weak and deficient. San Salvadorians, like the residents of Heywood, Manchester, are thus frequently dependent on outside help and call upon either governmental or non-governmental organisations for more assistance. In both case studies, the reasons given for little or inadequate coping capacity for risk reduction and risk financing are strongly related to a lack of access to information and financial resources.

In conclusion, the paper shows that the most prevalent strategies of people in the North to cope with shocks and stresses are, first, obtaining insurance coverage and, second, owning a home. In the South, formal insurance does not play a major role for the urban poor. However, in both hemispheres a home is seen as the most important asset, providing security and a 'buffer' against unforeseen events. Furthermore, a comparison of the two case studies indicates that apart from the strong differences in the level of local engagement, increasing climate change seems to bring the situation in the North and the South into increasing convergence, in the sense that people at risk: (a) are invariably excluded from accessing (affordable) insurance policies; (b) have no real opportunity to use their home as an asset to cope with shocks and stresses; (c) receive inadequate institutional assistance in terms of both obtaining protective infrastructure (such as sewers or improved drainage systems) and receiving information and support on reducing risk and post-disaster help; and (d) even feel in some cases driven to find illegal solutions to their situation, such as making unauthorised connections from drains to sewer systems, selling houses without disclosing the actual flood risk, and gaining illegal access to insurance.

Institutional Responses for Risk Financing: A South–North Comparison

While it can be argued that Northern authorities are better prepared for ‘conventional’ weather extremes (such as riverine flooding), the systems and mechanisms associated with these extremes are ‘outdated’ in the context of climate change and the increased pluvial flooding (such as urban flash floods) that is one of its consequences (Defra/EA, 2007). In other words, adaptation to climate change and weather-induced events is in its infancy. This is especially true with regard to current risk financing mechanisms where private insurance increasingly cannot be obtained by those people living at risk.^{17,18} In terms of government responses, the highly localised flash flooding of the type seen in Heywood, Manchester, produced by local extreme thunderstorm precipitation, is widely recognised by professional water scientists and engineers as a major problem throughout Europe (cf. Aronica & Lanza, 2005; La Barbera *et al.*, 1994).

In addition, the comparative analysis described in the fourth and fifth sections indicates striking similarities between the institutional responses in the North and South that hamper local risk reduction and risk financing. In both case studies, the institutional framework can undermine local coping capacities for risk reduction and risk financing. In fact, there are not enough formal incentives or encouragement and insufficient information to take adequate individual action and to adequately insure themselves. None of the government agencies responsible for planning, disaster management or adaptation have provided personal counselling or advice on possible risk financing measures to either the disaster victims or the local communities.

Another similarity is the divide between those responsible for urban planning and those responsible for the management of the risk related to climate change and disaster. Although in recent years both professional communities have made significant advances toward integration, there is evidence that actual land use decisions are still not being taken on the basis of all the relevant available information and that disasters are a low priority for many urban authorities. Risk, and especially risk financing, is thus clearly being exacerbated by the actions of various planning authorities over many years. This can be attributed to competition between different organisations, political manoeuvring, a lack of institutional cohesion, a lack of participatory and consensus-based approaches in the development, enforcement and monitoring of laws and policies, as well as inadequate financial resources. All this results in an increasing number of people living at risk, as well as poor provision of insurance, protective infrastructure and urban services. It can be argued that because exceptional high intensity short duration downpours could occur almost anywhere, insurance against pluvial flooding is a widespread risk for which premiums ought to be relatively low (Kron, 2009). However, the Heywood, Manchester, case study showed that this is not the case.

Apart from the similarities mentioned, there are also a number of differences. The institutional landscape in the South is very different from that in the North in the sense that it is mainly NGOs that are engaged in the areas analysed in San Salvador, while in Heywood, Manchester, it is mainly government and private organisations. In San Salvador, the NGOs do, to some extent, counterbalance the limitations of the government. They have been reducing their one-sided focus on construction-related work and have been adopting a broader approach, including non-physical/structural risk reduction and adaptation. Moreover, they generally assess, plan and implement their projects on the basis of participatory approaches and increasingly consider local adaptive capacities.

In conclusion, the comparison between risk reduction and risk financing mechanisms in San Salvador and Manchester indicate that climate change and urbanisation increase not only the vulnerability of cities to disasters and the number, predictability, frequency and severity of the hazards that they face. In fact, climate change and urbanisation also undermine the effectiveness of institutional responses and risk financing mechanisms which were designed to be applied in the event of more 'usual' and more 'predictable' hazards and associated impacts. In Southern cities, the low level of institutional capacity to respond to disasters can, to an extent, be compensated for by the rich range of innovative local-level responses developed by people living at risk. This is because Southern cities generally have a long history of dealing with disasters and coping with the limitations in national and local governments. However, the same is not true of the North where local coping strategies are comparatively poorly developed and generally considered harmful in terms of interfering with governmental and other institutional adaptation responses (Douglas *et al.*, 2010; Pitt, 2008). A typical example mentioned by authorities is that, during drought periods, households generally cope with water scarcity by storing water, which leads to an increased water consumption. With the urgent need to discover innovative ways of combating climate change and complementing 'outdated' institutional responses, it can be argued that this also puts a greater onus on local-level engagement in the North as well.

Comparison of Local and Institutional Responses for Risk Financing: A South–North Comparison

Apart from the analysis at the local levels and the analysis at the institutional levels, the differences in local-level and institutional-level approaches were also investigated. The research reveals an enormous gap between local-level and institutional responses on the part of governmental agencies in both Southern and Northern cities. In other words, in neither hemisphere do the different efforts to reduce, share and transfer risk complement each other. The key features related to this gap and the barriers to effective risk reduction and risk financing that result from them are now summarised.

- (1) Urban authorities mainly consider how to mitigate physical vulnerability and how to deal with imminent emergencies; they fail to address risk more holistically, and hardly consider measures for risk financing.
- (2) Urban authorities are usually unaware of people's local coping efforts to reduce risk, including their formal and informal efforts to insure themselves and the financial impacts of these.
- (3) People living at risk have a tendency to lose trust in hierarchical institutional structures where risk reduction and risk financing is concerned, and even fear being 'taken for a ride' by insurance companies and national and municipal authorities.
- (4) While people's strategies for coping with increasing risk and disasters are mainly based on individualistic behaviour (such as attaining insurance policies), the institutional assistance on offer focuses on providing uniform, short-term and more community-based or hierarchical solutions.
- (5) While local coping strategies for risk reduction and financing are diverse and crucial for adapting to increasing risk, they are insufficient to keep pace with the growing impacts of climate change.

- (6) The current structures and mechanisms in place on the institutional (and associated legal) level are inadequate in terms of supporting local risk financing and dealing with climate-related disasters; this is evidenced by across-the-board inadequacies—in policies, policy instruments, data recording and sharing, weather forecasting, early-warning mechanisms and inter-institutional co-operation.

In conclusion, the two case studies demonstrate that the local responses of those affected and the institutional responses by governmental agencies are not complementary. Even worse, the institutional and policy landscape often increase urban risk and undermine local capacities. In fact, urban authorities hardly ever support local capacity for risk reduction and can actually undermine it. This is especially true for local risk financing strategies of people to ensure themselves for future risk. For example, in the case of San Salvador, assisted programme housing cannot be used by beneficiaries as collateral for future (post-disaster) credits to recover and increase resilience. In the UK, the free market insurance industry and agreements between the government and the insurance industry leave an increasing number of vulnerable people without adequate cover against natural disasters such as flooding.

As a result, even after institutional assistance for recovery and/or risk reduction is provided, people usually continue to cope with increasing climate change and disaster risk *just as they did before* (without obtaining better information or arrangements for improving and financing their own efforts. In the North, this seems to lead to a growing dependency on insurance companies and, in the South, to continued reliance on NGOs. However, while insurance companies do not provide the type of assistance that allows urban resilience to be improved, Southern NGOs have developed a range of bottom-up approaches that support improved risk reduction. Although measures for risk financing are still not part of these NGOs' 'normal' repertoire, this provides valuable lessons from which Northern cities could also learn.

Hence, this research demonstrates the need for the South, as well as the North, to adapt the institutional approaches used at present so that they provide better support for local-level risk reduction in the future. In this context, bottom-up planning and both formal *and informal* measures for risk financing (which include monetary and non-monetary insurance mechanisms) were identified to play a crucial role. This means fostering the use of zero- and low-carbon adaptation mechanisms and adopting measures that are not simply physical/structural. It further supports recent advances in the conceptualisation of risk and risk reduction, which have been giving increasing importance to (supporting) people's capacity to recover from future disasters.

Notes

¹ The use of the terms/labels 'North' and 'South' are used in this paper because they are broadly accepted in both the disaster literature and in the literature dealing with different types of knowledge transfer.

² So-called 'low-carbon-intensive adaptation strategies' or 'zero- and low-carbon adaptation strategies' are measures to reduce climate-related risks that do not generate (much) carbon emissions.

³ The target population (i.e. the households most at risk that have been affected by recent disasters) consisted in both cases of 100 households, and the selection of the specific interviewees of the target population was based on a combination of stratified and random sampling.

- ⁴ The IPCC (2007b) provides a definition for 'adaptive capacity', not specifically 'local adaptive capacity', stating that 'adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences'.
- ⁵ This section is based on Wamsler (2007, 2009) and follow-up research during 2009/10.
- ⁶ 'Physical mitigation' includes constructive or structural measures taken to reduce existing physical vulnerability.
- ⁷ This section is based on Defra (2008), Douglas *et al.* (2010) and follow-up research undertaken in 2009/10.
- ⁸ In 2008, the UK Cabinet Office published the so-called 'Pitt Review', a report on lessons to be learnt from the severe flooding in many parts of England in June and July 2007, following the wettest three-month period since records began. Whilst there were no reports of serious flooding in Greater Manchester in 2007, there is considerable synergy on coinciding issues between the interim conclusions in the Pitt Review and in the findings of the Manchester case study (cf. Defra, 2008).
- ⁹ This section is based on Wamsler (2007, 2009) and follow-up research during 2009/10.
- ¹⁰ The success of more integral projects was substantiated in Divina Providencia, one of the communities analysed, where human and material losses after the 2001 earthquakes were comparatively small.
- ¹¹ This section is based on Defra (2008), Douglas *et al.* (2010) and follow-up research undertaken in 2009/10.
- ¹² Information based on personal communication with Morrow, B., United Utilities, in 2007.
- ¹³ Information based on personal communication with Lambert, C., Heywood Councillor, in 2008.
- ¹⁴ The primary issue for objection for planning permissions for new developments are usually concerns on the part of the highway department, congestion, separation distances from existing developments and design issues.
- ¹⁵ In the UK, approximately 40 000 planning applications to develop in floodplains are made each year, the majority of which are permitted (Young, 2001). In 1996, approximately 4000 houses were built in the floodplain compared with around 24 000 being built in 2000 (Crichton, 2001).
- ¹⁶ The analysis also refers to the experience of many of the 14 partner cities of the Green and Blue Space Adaptation for Urban Areas and Eco Towns (GRaBS) project. See <http://www.grabs-eu.org/partners.php>
- ¹⁷ Analyses of other Northern systems confirm the outcomes of the Manchester case study. For example, insurance against flooding in France is based on the principles of 'community risk-sharing' whereby 'any citizen who has contracted an insurance policy covering damage ... contributes to the 'natural catastrophes' cover, whether or not they are concerned by these natural risks' (Camphuis, 2007, p. 487). However, flooding has to be recognised as a natural catastrophe by Interdepartmental Decree, before any damage can be covered by this system. This may, in effect, exclude localised flood damage as a result of sewer or stormwater drainage systems from cover. As such, also the flood risk management system of France may have little influence on the management of surface water drainage and sewerage as a potential source of flooding, in practice.
- ¹⁸ This research suggests that where private insurance cannot be obtained by people not living on flood plains, or in areas without a long history of flooding, further research should be undertaken to test the hypothesis that the government should consider becoming the insurer of last resort to prevent property blight. Further, re-instatement claims should include flood resilience measures, even when this could be perceived to include betterment.

References

- Adger, W. N. (2006) Vulnerability, *Global Environmental Change*, 16(3), pp. 268–281.
- Agunias, D. (2009) Remittance trends in Central America, *Migration Information Source*, (MFI), 1 April. Available at www.migrationinformation.net/pdf/Migration_Information_Source-Central_America.pdf (accessed 12 August 2009).
- Aronica, G. T. & Lanza, L. G. (2005) Drainage efficiency in urban areas: a case study, *Hydrological Processes*, 19(5), pp. 1105–1119.

- Association of British Insurers and National Flood Forum (2007) *Repairing Your Home or Business After a Flood—How to Limit Damage and Disruption in the Future* (The Association of British Insurers and the National Flood Forum).
- Bankoff, G., Frerks, G. Hilhorst, D. (Eds) (2004) *Mapping Vulnerability: Disasters, Development and People* (London: Earthscan).
- Beck, U. (1992) *Risk Society: Towards a New Modernity* (translated from the German *Risikogesellschaft*, published in 1986) (London: Sage).
- Camphuis, N-G. (2007) French regulations for urban flood management, in: R. Ashley, S. Garvin, E. Pasche, A. Vassiliopoulos & C. Zevenbergen (Eds) *Advances in Urban Flood Management*, pp. 483–498 (London: Taylor & Francis).
- Clark, M. J. (1998) Flood insurance as a management strategy for UK coastal resilience, *The Geographic Journal*, 164(3), pp. 333–343.
- Coulthard, T. J., Frostick, L., Hardcastle, H., Jones, K., Rogers, D., Scott, M. & Bankoff, G. (2007) *The 2007 Floods in Hull*. Final report by the Independent Review Body, 21 November (UK: Hull City Council).
- Crichton, D. (2001) An insurance perspective. Speakers' notes from the Town and Country Planning Association Conference, A Flooded Environment: Planning for Homes, London, 8 November.
- Crichton, D. (2005) *Flood Risk & Insurance in England and Wales: Are there Lessons to be Learned from Scotland?* Technical Paper 01 (London: Benfield Hazard Research Centre).
- Davis, I., Haghebaert, B. & Peppiatt, D. (2004) *Social Vulnerability and Capacity Analysis*. ProVention project on 'Tools for Community Risk Assessment & Action Planning' (Geneva: ProVention Consortium).
- DCLG (Department of Communities and Local Government) (2006) *Planning Policy Statement 25: Development and Flood Risk* (London: DCLG).
- Defra/EA (UK Department for Environment, Food, and Rural Affairs) (2007) *Incident Management and Community Engagement*. Theme Work Plan, 2005–2010 of Defra and Environment Agency Flood and Coastal Erosion Risk Management R&D Programme, June 2007 (London: Defra/EA).
- Defra (2008) *Risk Assessment and Risk Management for Small Urban Catchments*. Research project final report. Authors: Lawson, N., Douglas, I., Garvin, S., Richards, J., Tippett, J. & White, I. (London: Defra).
- Dercon, S. (2003) Poverty traps and development: the equity efficiency trade-off revisited. Paper presented at the conference on Poverty, Inequalities and Growth: What a Stake for Development Aid? Agence Française de Développement (AFD) and the European Development Research Network (EUDN), Paris, 13–15 November.
- Douglas, M. (1992) *Risk and Blame* (London and New York: Routledge).
- Douglas, I., Garvin, S., Lawson, N., Richards, J., Tippett, J. & White, I. (2010) Urban pluvial flooding: a qualitative case study of cause, effect and nonstructural mitigation, *Journal of Flood Risk Management*, 3(2), pp. 112–125.
- Ferrero, A. & Gargantini, D. (2006) The new Latin American network 'Habitat at Risk,' *Open House International* (OHI), 3(1), pp. 148–153, Special issue on 'Managing urban disasters'.
- Glaser, B. G. & Strauss, A. L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research* (New York: Aldine de Gruyter).
- GTZ (Gesellschaft für Technische Zusammenarbeit) (2002) *Análisis de la estrategia institucional del proyecto RETOS*. Author: Carlos Umaña, unpublished project document (El Salvador: GTZ).
- GTZ (2003) *Contribución al desarrollo de la institucionalidad local de la gestión de riesgo desde la perspectiva municipal*. Author: Carlos Umaña, unpublished project document, (El Salvador: GTZ).
- Guldåker, N. (2009) *Krishantering, Hushåll och Stormen Gudrun*, Doctoral Dissertation, Lund, Lund University.
- Hewitt, K. (1997) *Regions of Revolt. A Geographical Introduction to Disasters* (Edinburgh: Longman).
- IPCC (Intergovernmental Panel on Climate Change) (2000) *Methodological and Technological Issues in Technology Transfer*. A Special Report of IPCC Working Group III. Summary for policy makers (Geneva: IPCC).
- IPCC (2007a) *Climate Change 2007: The Physical Science Basis*. Summary for policy makers. Fourth Assessment Report (Geneva: IPCC).
- IPCC (2007b) *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Summary for policy makers. Fourth Assessment Report (Geneva: IPCC).
- Jabeen, H., Allen, A. & Johnson, C. (2009) Built-in resilience: learning from grassroots coping strategies to climate variability. Paper presented at the World Bank Urban Research Symposium, Marseille, France, 28–30 June.
- Kron, W. (2009) Flood insurance: from clients to global financial markets, *Journal of Flood Risk Management*, 2(1), pp. 68–75.

- La Barbera, P., Lanza, L. & Parodi, U. (1994) A stochastic framework for the modelling of failures in urban drainage systems due to microscale effects. In: *Proceedings of Specialty Conference on 'Modelling of Flood Propagation Over Initially Dry Areas'* (pp. 197–208), Milan, 29–30 June.
- Luhmann, N. (2005) *Risk: A Sociological Theory* (New Brunswick and London: Aldine Transaction).
- Maskrey, A. (1989) Disaster mitigation: a community based approach, *Development Guidelines No.3* (Oxford: Oxfam).
- Maskrey, A. (1993) *Los desastres no son naturales*, La Red (Colombia: Tercer Mundo Publisher).
- Moser, C. & Satterthwaite, D. (2008) Towards pro-poor adaptation to climate change in the urban centres of low- and middle-income countries. Working paper (London: IIED (International Institute for Environment and Development)).
- Osbourne, H. (2008) Home insurance: flood-risk properties could be 'uninsurable', *The Guardian*, Wednesday 18 June.
- Pelling, R. (1997) A political ecology of urban flood hazard and social vulnerability in Guyana, PhD Thesis, University of Liverpool.
- Persson, J. (2007) *Risker i lunskaopens mellanrum [Risks in the interstices of knowledge]* (Nora: Nya Doxa).
- Pitt, M. (2008) *Learning Lessons from the 2007 Floods* An independent review by Sir Michael Pitt (London: Cabinet Office).
- Rescher, N. (1983) *Risk: A Philosophical Introduction to the Theory of Risk Evaluation and Management* (Lanham: University Press of America).
- Sahlin, N. -E. & Persson, J. (1994) Epistemic risk: the significance of knowing what one does not know, in: B. Brehmer & N. E. Sahlin (Eds) *Future Risks and Risk Management*, pp. 37–62 (Dordrecht and London: Kluwer Academic Publishers).
- Satterthwaite, D. (2007) Climate change and urbanization: effects and implications for urban governance. United Nations expert group meeting on Population Distribution, Urbanization, Internal Migration And Development (New York: United Nations Secretariat).
- SELA (Latin American Economic System) (2005) Migrations and remittances in Latin America and the Caribbean: intra-regional flows and macroeconomic determinants. XXXI Regular Meeting of the Latin American Council, 21–23 November (Caracas: Venezuela).
- Slovic, P. (1999) Trust, emotion, sex, politics, and science: surveying the risk-assessment battlefield, *Risk Analysis*, 19(4), pp. 689–701.
- Standing, T. (2008) Challenges for preparedness. PowerPoint presentation of Chief Fire Officer Terry Standing, Gloucestershire Fire and Rescue Service, UK, for the International Exploratory Workshop on Changing Climate—Changing Risks, organized by Lund University Centre for Risk Analysis and Management (LUCRAM).
- Starr, C. (1969) Social benefit versus technological risk, *Science*, 165(3899), pp. 1232–1238.
- Sterman, J. D. (2000) *Business Dynamics: Systems Thinking and Modelling for a Complex World* (Boston: Irwin McGraw-Hill).
- Thompson, M., Ellis, R. & Wildavsky, A. (1990) *Cultural Theory* (Oxford: Westview Press).
- Twigg, J. (2004) *Disaster Risk Reduction: Mitigation and Preparedness in Development and Emergency Programming*. Good Practice Review (London: ODI (Overseas Development Institute)).
- UNDP (United Nations Development Programme) (2004) *Reducing Disaster Risk: A Challenge for Development* (New York: UNDP, Bureau for Crisis Prevention and Recovery (BCPR)).
- UNDP (2005) *Informe Sobre Desarrollo Humano El Salvador 2005: Una Mirada al Nuevo Nosotros*. El Impacto de las Migraciones (San Salvador: UNDP).
- UNISDR (United Nations International Strategy for Disaster Reduction) (n.d.) *Terminology: Basic Terms of Disaster Risk Reduction*. Available at www.unisdr.org/eng/library/lib-terminology-eng%20home.htm (accessed 10 November 2008).
- UNISDR (2002/4) *Living with Risk: A Global Review of Disaster Reduction Initiatives* (Geneva: UNISDR-United Nations Publications).
- UNISDR (2006) *Disaster Statistics 1991–2005*. Available at www.unisdr.org/disaster-statistics/introduction.htm; www.unisdr.org/disaster-statistics/pdf/2005-disaster-in-numbers.pdf (accessed 5 November 2008).
- UNISDR (2009) *Terminology on Disaster Risk Reduction* (Geneva: UNISDR).
- Wamsler, C. (2007) Bridging the gaps: stakeholder-based strategies for risk reduction and financing for the urban poor, *Environment and Urbanization*, 19(1), pp. 115–142.
- Wamsler, C. (2009) *Urban Risk Reduction and Adaptation: How to Promote Resilient Communities and Adapt to Increasing Disasters and Changing Climatic Conditions?* (Saarbrücken: VDM Publishing).

- Wamsler, C. (2010) *Forecasting Societies' Adaptive Capacities to Climate Change: Empirical Study on Key Factors Involved in Past Vulnerability in Central America*. IIASA interim project report, summary of the outcomes of the project component b of the EU project 'Forecasting Societies' Adaptive Capacities to Climate Change'.
- Wamsler, C. (2011) Complementing institutional with localized strategies for climate change adaptation: a South-North comparison, *Disasters* (forthcoming).
- Wijkman, A. & Timberlake, L. (1984) *Natural Disasters: Acts of God or Acts of Man?* (London: Earthscan).
- Wisner, B., Blaikie, P., Cannon, T. & Davis, I. (2004) *At risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed. (London and New York: Routledge).
- Wisner, B., Mascarenhas, A., Wamsler, C., Arnold, M. & Haghebaert, B. (2007) Community and civil society perspectives, local knowledge and coping strategies. Workshop Concept Note for the ProVention Consortium Forum 2007 Making Disaster Risk Reduction Work, Dar es Salaam, February 13–15 2007 (Geneva: ProVention Consortium). Available at www.proventionconsortium.org/themes/default/pdfs/Forum07/ws4_local_perspectives.doc (accessed 12 August 2008).
- Young, B. (2001) Is the planning system able to deliver an appropriate response to current and future flood risk? Speakers' notes from the Town and Country Planning Association Conference, A Flooded Environment: Planning for Homes, London, 8 November.