Article

Geographies of resilience: Challenges and opportunities of a descriptive concept

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Abstract
In disaster science, policy and practice, the transition of resilience from a descriptive concept to a normative agenda provides challenges and opportunities. This paper argues that both are needed to increase resilience. We briefly outline the concept and several recent international resilience-building efforts to elucidate critical questions and less-discussed issues. We highlight the need to move resilience thinking forward by emphasizing structural social-political processes, acknowledging and acting on differences between ecosystems and societies, and looking beyond the quantitative streamlining of resilience into one index. Instead of imposing a technical-reductionist framework, we suggest a starting basis of integrating different knowledge types and experiences to generate scientifically reliable, context-appropriate and socially robust resilience-building activities.

Keywords
co-designing knowledge, development geography, disaster risk reduction, resilience, vulnerability

I Introduction

Generally used to designate the capacity to cope with change and uncertainty, 'resilience' has been replacing 'vulnerability' and 'sustainability' as a currency in academic and policy discourses and as a guiding principle in development planning. The successful resilience renaissance, cutting across academic disciplines and the interface between science, policy and practice, may find its explanation in the 'elasticity' of the term and the 'flexibility' of the concept. While an all-encompassing, multi-interpretable idiom has attractions as a unifying concept and political vision, there is an inherent danger that the term becomes an empty signifier that can easily be filled with any meaning to justify any specific goal – as happened to 'sustainability' to a large degree (see Stumpp, 2013). Thus, it seems to be timely to scrutinize the appropriation and use through a critical lens.

This paper reviews some positions and will highlight less-discussed issues, rather than trying to encompass all the detailed debates,

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literature and analyses; as such, the literature provided is far from comprehensive, instead aiming to extract and address topics which tend to be less discussed or analysed, while emphasizing the contribution of geography. First, the concept of resilience is outlined, giving some background to concerns which in turn lead to diagnostic questions and analytical challenges to provide a basis for moving forward from the critique. Without making a claim to be exhaustive and complete, section III portrays some recent international resilience-building efforts to illustrate further challenges and how geography could contribute to overcoming these challenges. Our intention is neither to criticize nor to promote specific definitions and programmes. Rather, our premise is that highlighting prominent challenges can bring some light to the clouded interpretation of resilience with the suggestion that resilience should be transformed from a mainly descriptive concept ('what is done') into one which includes a normative agenda ('what ought to be done') – ensuring that there is a balance between the factual, descriptive and verifiable aspects of resilience and the ideal, prescriptive and justifiable aspects.

While this transformation presents considerable opportunities, which we describe and suggest should be grasped, a set of challenges to negotiate also exists. They are based upon three connected arguments indicating critiques and ways forward, outlined in section IV. First, relabelling the same challenges that have already been extensively discussed in wide swathes of research, policy and practice is not constructive. Instead, and second, we suggest an agenda of reconnecting resilience within wider, well-established contexts of risk and sustainability. That would connect the descriptive and normative, allowing the concept to be liberated from ideological legacies, permitting missing empirical evidence to be obtained, and letting necessary pragmatic pathways for implementation to be identified – all three with a basis in geography. That also contributes to our suggestions for

moving the resilience agenda forward by attaching knowledge-making to meaning-making, strengthening capacities to shape one's actions rather than simply acting, and linking scientific research more adequately to the needs of policy and practice. Third, we wish to balance descriptive with normative by encouraging a refocusing of resilience on root causes and social transformation – as long established in science, policy and practice.

II Resilience in theory: concepts and characteristics

Over time, and by different academic sectors, the term 'resilience' has been used to express different meanings. As examples from geography, Alexander (2013) provides a detailed historical etymology of the term 'resilience'; Gallopin (2006) thoroughly analyses the conceptual relations of resilience to interrelated key terms such as vulnerability and adaptive capacity; Klein et al. (2003) explore the usefulness of the resilience concept to natural hazard reduction; Porter and Davoudi (2012) offer a worthwhile cautionary note on the politics of resilience for planning; and the critique of MacKinnon and Derickson (2012) on resilience policy and activism is highly insightful. Thus, we present only selected recent definitions and limit our explanations to some significant challenges and ways forward beyond this literature.[1] The definitions are:

> The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions. (UN-ISDR, 2009: 24)

> The ability of assets, networks and systems to anticipate, absorb, adapt to and/or rapidly recover from a disruptive event. (Cabinet Office, 2011: 14)

> The ability of countries, communities and households to manage change, by maintaining or

transforming living standards in the face of shocks or stresses – such as earthquakes, drought or violent conflict – without compromising their long-term prospects. (DFID, 2011: 6)

The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions. (IPCC, 2012: 563)

Resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. (The National Academies, 2012: 1)

Today, resilience is a concept that is applied in various disciplines and different fields, including geography, engineering, psychology and ecology. One common thread among many disciplines is the ability of materials, individuals, organizations and entire social-ecological systems, from critical infrastructure to rural communities, to withstand severe conditions and to absorb shocks.

For ecology, the term's prominence rather than its origins can be dated back to the 1970s (Alexander, 2013; Folke, 2006). Within ecology, resilience was used for a long time before being suggested as 'a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables' (Holling, 1973: 14). The more resilient a system, the larger the stress it can absorb without shifting into an alternate regime or collapsing. In a similar way, the usefulness of the concept was examined in other academic fields, such as psychology and psychiatry (Fonagy et al., 1994).

Meanwhile, geography literature was going beyond a linear conceptualization, by offering another perspective on resilience through the field of natural hazards, including climate change, where various authors (see, for example, background in Gaillard, 2007; McAslan, 2010; Manyena, 2006; O'Keefe and O'Brien, 2013; Timmerman, 1981) applied but extended the psychology and ecology notions, aiming to better understand characteristics of vulnerability and resilience of individuals and communities in the face of social-environmental challenges and changes – that is, how well society could deal with changes and disturbances, such as those caused by extreme environmental events. Of particular relevance is that the ecology literature focused on the natural environment; the psychology literature focused on people; the engineering literature focused on human constructions; and the geography literature integrated the natural environment, the built environment and society. Geography has also provided incisive critiques of different schools of thought, such as Welsh (2013) arguing that the systems approach to resilience has supported neoliberal governance. In many debates across disciplines, though, a recurring question of resilience thinking has been: resilience to what?

Nonetheless, despite the wide range of application and contexts, resilience is not a universally accepted term, nor does it have a universally accepted definition even for single geography fields such as disaster risk reduction (DRR), climate change adaptation (CCA), humanitarian aid or spatial planning (Alexander, 2013; Davoudi, 2012; Lewis and Kelman, 2010; Levine et al., 2012). Likewise, the view of governments and organizations on resilience is diverse: resilience as a process, a state and a quality, ranging from a global focus on food security (e.g. UN Office for the Coordination of Humanitarian Affairs, OCHA) and a national view on critical infrastructure (e.g. energy, water) to a sectoral view on business continuity (e.g. cyber-attacks, market change) and a local focus on climate change (e.g. ICLEI – Local Governments for Sustainability, an international association of local and metropolitan governments dedicated to sustainable development). Sometimes the resilience of individual entities is

focused on, and sometimes the resilience of systems (see also Welsh, 2013). Thus arises the summary question 'resilience of what to what at what scales', which geographers are ideally suited to investigate, given the focus on time simultaneously with space, and society simultaneously with the environment.

Since the early ecology-based 'bounce back' perspective, drawing on psychology as well, geographical interpretations of resilience have been moving towards 'anticipation', encompassing 'capacity' and 'capability' – and now coming the full way to being suggested as doing better than before by 'bouncing forward' (Manyena et al., 2011). In between remains a plurality of definitions, reflecting the different intellectual traditions and functional needs of the different disciplinary and societal fields, as well as the difficulties in understanding and communicating across disciplines and sectors.

Some recent characterizations of the term 'resilience' outside geography reveal a trend in emulating the ecology basis by considering resilience as an ability of something X to deal with a disturbing stress Y. According to Walker et al. (2006), resilience rests on the abilities to: (1) anticipate and deal with the impacts of natural hazards; (2) adapt to change; and (3) be proactive and self-determining, rather than just reactive and outside-determined. Another observable development is the integration of a 'proactive' and 'transformative' notion into the resilience concept, manifest in the definition of DFID (2011: 6). This descriptive expansion moves the concept more towards the social sciences and philosophy (e.g. Lucini, 2013) – with the normative consequence that it has to deal with 'equity', 'power', 'justice' and 'social capital', thus increasing complexity. Geography continues to provide a solid grounding of theory in reality while linking ecology and society (see also Cote and Nightingale, 2012). Based on vulnerability and development geography, the ability to be resilient is never distributed homogenously within and through social groups. Instead, this

ability is largely determined by social, economic and cultural factors, and, because the minority of a society often holds control over the decision-making for the majority, these factors may often be beyond society's control.

In particular, geographical literature (e.g. Gaillard, 2007; Manyena, 2006; Tobin, 1999) has indicated that a framework which applies natural science thinking to social phenomena can be deeply problematic (see also Adger, 2000). As Porter and Davoudi (2012) remark:

> Resilience science is no different. Translating the ontological assumptions about the nature of the world into the 'socio' end of socio-ecological systems runs into problems that have been expounded, though by no means expunged, by decades of work deconstructing positivism to demote it from its domineering influence in social sciences and planning. These efforts have emphasized that the very categories 'natural' and 'social' are socially constructed and far from naturally occurring. To view them as phenomena for study means they are already positioned within webs of cultural, social and ecological significance: webs of our own making. (Porter and Davoudi, 2012: 331)

Despite all the excitement for an ostensibly new concept, we agree with numerous geography contributions to resilience thinking that it is detrimental and inaccurate to downplay significant structural social-political processes while bypassing the major difference between ecosystems and societies, namely the human capacity for anticipation and learning (Dovers and Handmer, 1992). As a result, a further summary question appears for geographers to tackle: which aspects of the resilience concept are appropriate for social contexts and which ones are inadequate?

While some authors refer to resilience as the 'flip side' of vulnerability, i.e. vulnerability and resilience are opposites (for example, Adger et al., 2005; Folke et al., 2002; Kaly et al., 2002), most geography literature agrees that the

relationship between vulnerability and resilience is not linear and that the characteristics are not entirely independent. Gallopin (2006: 301) notes that vulnerability does not appear to be the opposite of resilience, because the latter is defined in terms of state shifts between domains of attraction, while vulnerability refers to (or at least also refers to) structural changes in the system, implying changes in its stability landscape; a view that matches well with vulnerability as a societal process rather than state (see also Lewis, 1999), with the process view then extending to resilience (Lewis and Kelman, 2010). Gallopin (2006) concludes that resilience is an internal property of the system, not including exposure to perturbations. For Klein and Nicholls (1999) resilience is one factor comprising vulnerability. With respect to coastal hazards, they suggest that vulnerability is a function of: (1) resistance, i.e. the ability to withstand change due to a hazard; (2) resilience, i.e. the ability to return to the original state following a hazard event; and (3) susceptibility, i.e. the current physical state, without taking into account temporal changes.

Aguirre (2007) advances the thesis that vulnerability and resilience are part of a dialectic process taking place over time without end in social organizations operating as complex open systems. J. Lewis (2013: 49) points out that 'recognition that resilience depends upon "the ability of a system, community or society" may be relevant to "potential hazard" but cannot be assumed for an aftermath subject to physical and psychological shock'. Oliver-Smith (2009: 15) remarks that lowering vulnerability may or may not increase resilience, or may even create other forms of vulnerability. Summing up these views – from sociology, architecture and anthropology, respectively – leads to the question: what and who are included and excluded from defining the boundaries of the subject under consideration? Geographers often focus on exactly that question, examining boundaries and scales of space and time to determine what and who are included and excluded – and then asking 'why?'.

Based on the literature analysis and the potential contribution of geographers towards filling in gaps, we provide other less-discussed resilience issues. Regimes that are considered undesirable can be very resilient, e.g. despotic regimes with North Korea referred to as being 'resilient' despite being 'fundamentally weak' (Stares and Wit, 2009: 4). Poverty, corruption and exploitation can also be highly resilient. To this end, while resilience may be important to support and maintain systems in a desirable state, it may also maintain a system in an undesirable state, making recovery or transformation difficult. Mitchell and Harris (2012: 5) have termed this phenomenon the 'dark side of resilience', referring to undesirable systems that have become fixed, and are therefore less responsive to future threats or positive transformation. Therefore, it is not surprising that in policy discourses resilience is often used in relation to resistance against change rather than to continuity through change, as with the North Korea example. Likewise, some system regimes may be considered desirable by some parts of a community and undesirable by others.

Whether it is a descriptive analysis or a normative programme, there is a judgement regarding which resilience should be supported and which should be opposed. Who decides? Are questions of governance and the unequal distribution of power and resources considered in attempts to increase resilience? Participation of people concerned in defining priorities for practical intervention, and building on their strengths and abilities, is appropriate (Le De et al., 2013).

Overall, the relationship between vulnerability and resilience is contextual. Conceptually, it seems a truism that every entity has some degree of vulnerability and some degree of resilience. Both are different manifestations of a variety of response processes to changes (often extreme changes) in the relationship between open dynamical systems and their external environment.

The degree and the exact characteristics of the vulnerability, the resilience, and their interaction and interrelationship depend on each context and are a matter of perception. As an umbrella concept, resilience provides the opportunity to analyse the interactions between domains and between scales (Shaw, 2012) – which is exactly what geographers do. A current challenge with resilience is the multitude of diverse definitions and approaches. Geographers are skilled at melding isolated, descriptive approaches to achieve a more comprehensive understanding of, for example, a phenomenon, a process, a system or interplays among phenomena, processes and systems. Without then losing the need for a more solid description of resilience, the descriptive approach offered by geographers provides the baseline for turning the description(s) into a normative agenda leading to operational tools, policies and actions.

III Resilience in practice: examples and essentials

While the academic debate on describing resilience continues, governments around the world have developed plans and programmes that aim to guide cities, communities and authorities towards achieving it. In general, building resilience is said to be done by reducing exposure and the sensitivity to shocks, as well as by increasing adaptive capacity (IPCC, 2012). Whatever course of action is chosen, it has to be considered through time (ex-ante, during shock and ex-post) and given uncertainties. There are notable efforts regarding community resilience, ranging from Tobin's (1999) 'holy grail of hazards planning' to Twigg's (2009) set of 'characteristics of a disaster resilient community'. Here, the focus lies on recent international attempts to increase resilience to demonstrate gaps in what is being done and ways forward to fill in those gaps.

In 2010, the UN International Strategy for Disaster Reduction (UN-ISDR) launched the 'Making Cities Resilient' campaign – 'My City is Getting Ready' – to achieve resilient, sustainable urban communities, with a growing number of local governments that are taking action to reduce the risks to disasters, based on common standards and tools (Valdés et al., 2013). This 2010–2015 World Disaster Reduction Campaign addresses issues of local governance and urban risk while drawing upon the sustainable urbanization principles developed in the UN-Habitat World Urban Campaign 2009–2013. In addition to 'a handbook for mayors and local government leaders', UN-ISDR (2012: 25) provide the so-called 10 essentials for making cities resilient:

1. Put in place organization and coordination to understand and reduce disaster risk, based on participation of citizen groups and civil society. Build local alliances. Ensure that all departments understand their role in disaster risk reduction and preparedness.
2. Assign a budget for disaster risk reduction and provide incentives for homeowners, low-income families, communities, businesses and the public sector to invest in reducing the risks they face.
3. Maintain up-to-date data on hazards and vulnerabilities, prepare risk assessments and use these as the basis for urban development plans and decisions. Ensure that this information and the plans for your city's resilience are readily available to the public and fully discussed with them.
4. Invest in and maintain critical infrastructure that reduces risk, such as flood drainage, adjusted where needed to cope with climate change.
5. Assess the safety of all schools and health facilities and upgrade these as necessary.

6. Apply and enforce realistic, risk-compliant building regulations and land use planning principles. Identify safe land for low-income citizens and upgrade informal settlements, wherever feasible.
7. Ensure that education programmes and training on disaster risk reduction are in place in schools and local communities.
8. Protect ecosystems and natural buffers to mitigate floods, storm surges and other hazards to which your city may be vulnerable. Adapt to climate change by building on good risk reduction practices.
9. Install early warning systems and emergency management capacities in your city and hold regular public preparedness drills.
10. After any disaster, ensure that the needs of the affected population are placed at the centre of reconstruction, with support for them and their community organizations to design and help implement responses, including rebuilding homes and livelihoods.

The self-driven essentials of this checklist-type framework, which outlined principles for local governments, rather than providing an assessment tool for building resilience, could be criticized for not providing clear standards that urban planners, city developers or DRR managers could put into practical application. A further concern is that a reliable baseline is not realized, because the targets are subjective, based on perceptions (see also D. Lewis, 2013).

At the World Urban Forum in Naples in September 2012, UN-ISDR and UN-HABITAT agreed to strengthen joint efforts to promote disaster-resilient cities. One approach is the new City Resilience Profiling Programme (CRPP). With an indicative budget of US$8 m, the aim is to develop a comprehensive and integrated urban planning and management approach for measuring and monitoring urban resilience globally (D. Lewis, 2013). Such approaches are to be commended and built upon. This one begs the question about how urban resilience and rural resilience (and peri-urban resilience?) are differentiated – and should they be differentiated? The discipline of geography interrogates exactly these problems; for instance, by investigating the interconnections – sometimes lack of connections – among political influences, power relations, access rights and choices for different settings (e.g. urban, peri-urban and rural) and for different methodologies (e.g. descriptive concepts, normative agendas and linking these two). Whereas the descriptions in section II do not always lend themselves to operational application, the normative approaches taken by UN-ISDR and UN-HABITAT have the potential of applying the theoretical literature more, as geographers have done (Wisner et al., 2004).

An example aiming to do so is from the Organisation for Economic Co-operation and Development (OECD), starting with risk and then moving to resilience. A decade ago, the organization identified emerging systemic risks, outlined the challenges for OECD countries and set out recommendations for improving risk management (OECD, 2003). With the growing recognition that different types of risks are interconnected, resilience became a focal point of recent activities. For instance, a workshop on 'Building resilience for adaptation to climate change in the agriculture sector' was co-organized in April 2012, questioning the notion of resilience from different angles (Meybeck et al., 2012). In 2013, the OECD carried out an online brainstorming survey and a literature review to clarify what resilience means in practice. Moreover, it set up recommendations to guide countries to more resilient growth, to help them monitor good practices and to improve the well-being of local communities after disasters (OECD, 2013: 219):

1. Make sure that short-term decisions do not constrain long-term options.
2. Identify the economic base and the social and economic drivers specific to the region to increase its resilience.
3. Develop an integrated strategy to redevelopment after a natural disaster by strengthening the dialogue among stakeholders to raise the profile of needed reforms and quality of decisions.
4. Strategic choices have to be locally led.
5. Use the occasion of a crisis to introduce reforms or standards for the country.
6. Foster public participation to help decision-making.
7. Make public deliberation a regular component of the regional development strategy.
8. Build trust, increase accountability of policy-making and improve capacity of administrations.

In addition to the activities of international organizations, a number of federal efforts have been taken by various countries – such as Australia, the UK and the USA – to improve their concept of resilience at a national level, often starting with the operational aspects without fully accounting for the descriptive and theoretical debates. In 2009, the Council of Australian Governments (COAG) agreed to implement a resilience-based approach to disaster management and, subsequently, the National Emergency Management Committee developed a National Strategy for Disaster Resilience which was adopted by the COAG on 13 February 2011. With the Strategy and its seven priority areas to build community disaster resilience, the Australian Government underscores that a national, coordinated and cooperative effort is needed (Dufty, 2012: 41):

1. Leading change and coordinating effort.
2. Understanding risks.

3. Communicating with and educating people about risks.
4. Partnering with those who effect change.
5. Empowering individuals and communities to exercise choice and take responsibility.
6. Reducing risks in the built environment.
7. Supporting capabilities for disaster resilience.

In March 2010, the UK Government published the Strategic Framework and Policy Statement setting out the processes, timescales and expectations for a Critical Infrastructure Resilience Programme (Cabinet Office, 2010); a Summary of the Sector Resilience Plans 2010; and Interim Guidance to the Economic Regulated Sectors (Cabinet Office, 2011: 9). The UK's resilience approach focuses on four components: resistance, reliability, redundancy and response/recovery. This vocabulary is comparatively technocratic, relying on engineering and infrastructure conceptualizations, but the documents nonetheless display significant societal aspects and are a useful contribution from the normative and operational side, to be further linked back to descriptive and theoretical approaches.

In the USA, eight federal agencies and one community resilience group affiliated with a National Laboratory asked the National Research Council (NRC) to recommend necessary approaches to increase national resilience to disasters (The National Academies, 2012: 1). Subsequently, the NRC study committee is currently undertaking efforts to: (1) define 'national resilience' and frame the main issues related to increasing resilience in the USA; (2) provide goals, baseline conditions, or performance metrics for national resilience; (3) describe the state of knowledge about resilience to hazards and disasters; and (4) outline additional information, data, gaps and/or obstacles that need to be addressed to increase the nation's resilience to disasters (see also Cutter and Zoback, 2013). It is encouraging

to see both definitional discussions and operational approaches, but the framing of the recommendations is technocratic, being heavy on quantitative data while not acknowledging wide swathes of qualitative research with solid evidence for the success of resilience endeavours, e.g. Cutter and Zoback's (2013: 89) sweeping and inaccurate statement that 'We have little empirical evidence regarding the value of disaster mitigation, with only one comprehensive study conducted to date'. This is not to deny the need for the recommendations given, but to move beyond description through data (e.g. 'true or false'), to emphasize equally normative aspects of resilience (e.g. 'better or worse'), to include qualitative analyses alongside quantitative analyses, and to include values and preferred norms alongside facts and observations.

The recent resilience-building efforts undertaken by international organizations and national governments illustrate the tendency to integrate various societal actors and local knowledge into the activities. There is increasing recognition that achieving disaster resilience is not solely the domain of disaster professionals but a shared responsibility across society. Resilience continues to be mainly externally defined by expert knowledge from academia, international organizations and governmental agencies. Efforts to clarify 'what resilience means in practice', such as the OECD brainstorming survey, capture mainly the 'practice of professionals', rarely shedding light on the 'practice of affected people at risk'. Local knowledge can also contribute to the interpretation and validation of activities to move beyond the usual data-mining toward comprehensive partnerships between researchers, programmers and the targeted communities.

The often-seen lack of wide-ranging involvement in defining, interpreting and validating resilience is related to another observable characteristic: the quantitative attempt to measure indicators for certain dimensions of resilience. While the political-administrative request to quantify resilience is comprehensible, i.e. to target resources, to measure impact and to judge cost-benefits, along with the quantification of resilience comes its decontextualization, making it more difficult to recognize relevant contributing factors and to gain a full picture of how hazards shape a community's or country's response to them. That is especially the case with efforts to collapse all resilience indicators into a single index, because subtleties and contexts can be lost. As Levine et al. (2012: 2–3) correctly remark, quantitative approaches face the challenge of constructing resilience from factors that are found from the household level to the national and international level. Factors that cannot be captured with available data through measurable indicators, such as power relations, are often neglected, and this can lead to administrative-operational interventions that do not fully factor in other relevant determinants of resilience.

Despite the many decades since resilience became engrained in social sciences, especially driven by geographers, it is surprising to see that power, governance and social capital are not playing a more prominent role in both theoretical and practical approaches aiming at increasing resilience. The dominant understanding of resilience as a 'buffer capacity for preserving what we have and recovering to where we were' and the resulting emphasis on a 'bounce-back-ability' discloses not only a lack of critical social geography input (Davoudi, 2012: 301–302), but also the underlying assumption that more resilient people can 'bounce back better'. The latter requires more empirical evidence, given the wider literature demonstrating how often this does not happen (for example, Glantz and Jamieson, 2000; Lewis, 1999; Wisner et al., 2004) – literature which also queries why people would want to bounce back (even 'better') to a situation anywhere near their original situation of rampant, chronic vulnerability, poverty and lack of sustainability.

As such, we highlight that further assessments should identify and determine 'to where', 'to

what level' and 'in what direction' of 'bounce back' should be considered appropriate (see also Kennedy et al., 2008; Manyena et al., 2011). That is especially the case since it is clear that, as with development programmes, the resilience-building process itself, however defined, will produce winners and losers, create power divisions, and will not always reach those who are most in need of support (Wisner et al., 2012).

Another related drawback of many resilience-building programmes is certainly that resilience was rarely acknowledged *before* a shock, stress or disaster occurred. That makes the resilience building at any scale and evaluation of resilience investments challenging to measure and validate. Capacity to alter socio-economic processes and to modify societal contexts that are the root causes of vulnerability remain largely unknown. For instance, MacKinnon and Derickson (2012) argue that capitalism is the most powerful set of processes at work and consider the resilience of places as misplaced in terms of spatial scale since the processes which shape resilience operate primarily at the scale of capitalist social relations. As with the geographers MacKinnon and Derickson (2012) and Welsh (2013), we also have concerns regarding the mobilizing discourse of resilience that places the responsibility squarely on communities and regions to further adapt to the logic and implications of global capitalism and many other influences external from their own control.

Geographers have examined and illustrated the importance and role of space in the causes and differentiation of risk (e.g. Müller-Mahn, 2012; Weichselgartner, 2013). Considering the relevance of locality for risk governance, a 'resilience of place' approach, including institutional and state activities, faces potentially being 'misplaced' in terms of spatial scale. Irrespective of the method or programme, scales have to be temporally and spatially confined in order to measure resilience – a role often played in geography research when considering both society and the natural environment. By defining the urban or national scale as the arena for increasing resilience to specific shocks and stresses, which have their own temporal and spatial scales, these concepts and programmes inevitably have limitations. Many processes driving and shaping resilience operate on larger or smaller scales than the urban or national scale – and they often vary between scales. Extrapolating measures from one scale to another or making assumptions based on the obtained findings for other parts of the same entity could result in an incorrect picture. Attempts to capture the state of and progress towards resilience can therefore be limited without a solid geography foundation, showing how geographers can and should be involved in this work.

According to Silva Villanueva (2011: 7), three characteristics are mainly responsible: (1) approaches that focus on inputs and outputs rather than processes; (2) capture of a static rather than a dynamic picture; and (3) a narrow focus on system effectiveness and efficiency rather than assessing processes of change or transformation. As long as resilience-building efforts operate without a clear baseline against which to make decisions regarding the resilience level, it will remain difficult to systematically translate the various national legislation and international commitments into resilience, despite the goodwill of many decision-makers in policy and practice. Turning that goodwill into results, using among others Silva Villanueva's (2011) ways forward, is the focus of section IV.

IV Critical challenges: from a descriptive concept to a normative agenda

1 Relabelling: reinventing the wheel

The use of the term 'resilience' to reframe the same challenges that have previously been discussed as 'disaster risk reduction' and 'vulnerability' – among many other terms – is suggested as being a positive framing to

encourage people to move forward and to seek positive approaches (for example, Folke et al., 2002; Kaly et al., 2002). However, empirical evidence is almost never presented to affirm or rebut that assertion, beyond the comfortable assumption that it is better to be resilient. There is a sneaking suspicion that much of what has been recently labelled 'resilience' is 'old wine in new bottles'. As imposingly illustrated by Chambers (2012), words are instruments of power and, in science, fashionable words are used to impress colleagues and win research proposals. It is without doubt that an extensive knowledge system exists with regard to 'dealing with disaster impacts' and 'adapting to changing environments', which is frequently not considered by researchers and not applied to maximum effect by decision-makers in policy and practice. The lesson here is simple: Learn from the history of scientific research rather than trying to reinvent extensively discussed concepts with new terms. In addition, empirical studies are needed on how people and communities connote 'resilience' with different definitions and responses to allegedly positive or allegedly negative framings.

Claiming that theoretical concepts – and a reframing of theoretical concepts with new terms – can support the design and implementation of resilient communities or countries might be proven to work in certain circumstances, yet the evidence currently available provides many examples where ill-understood planning and spatial development has increased social vulnerability (e.g. Lewis, 1999; Wisner et al., 2004, 2012). As such, improving physical (infrastructure) resilience without adequately addressing social resilience illustrates short-term thinking in dealing with a longer-term future. One recent example is the 2010 Haiti earthquake. Port-au-Prince still exists as a city, but the social fabric has been shattered and the short-term horizon of most post-disaster activities has prevented the opportunity to establish social change (Schuller and Morales, 2012).

So far, structural shifts have not followed the tectonic shifts. Hence, various researchers, such as Paton (2006), believe that DRR by itself will not necessarily build disaster resilience in communities. They feel that social interactions, competencies and interactions improved by 'community development' activities form a necessary component of resilience-building (Dufty, 2012: 41). Given that this work exists with both a theoretical and empirical basis, it should be applied to focus on long-term structural, sociopolitical processes (e.g. Wisner et al., 2004, 2012) rather than trying to produce something 'new' and 'original' which yields reinvention.

As such, the use of 'resilience-building' programmes to repack the same activities that have been unsuccessful under previous framings might be appropriate to experiment with. So far, empirical evidence is lacking that substantive positive change will result. If the goal is to significantly change structural processes so that disaster risk and disaster impacts are reduced, irrespective of the framing or labelling, it is important to understand the fundamental concepts involved and the root causes for the observations seen. By its over-use as the new 'buzz-word', as J. Lewis (2013: 50) remarks, 'resilience' may be damaging to practical understanding of the causative processes of vulnerability and of how disasters come to be created. Resilience theory may even have detracted from long-established understandings of vulnerability as a consequence of long-term causative processes, reducing it merely to box-ticking assessments of post-disaster evidence of those processes. Resilience development and empirical studies should be based on those long-established understandings rather than trying to move away from them.

The same applies to the present publicity surrounding climate change, which overshadows other significant long-term human-caused environmental processes (e.g. soil degradation, groundwater drawdown), as well as past DRR policies, strategies and efforts. Mercer (2010)

asks: are we reinventing the wheel? In her description, CCA experience generally stems from global policy agendas, rather than practical implementation, and CCA strategies at the community level are similar to, if not the same as, DRR strategies. Cannon and Müller-Mahn (2010) illustrate how the climate change debate is influencing how development is conceptualized, negotiated and implemented, and ultimately shifting research interests and perspectives, from vulnerability studies to resilience thinking – with highly specific definitions of 'vulnerability' and 'resilience'.

Consequently, while this shift in conceptualizing resilience is problematic for the normative contents of development, we believe that the new concepts bear new opportunities and can open up fresh perspectives. Since the way we think about terms influences where we look for solutions, and the shape and character of the means we use to attain those solutions, a starting point for potential change lies in disclosing the full range of resilience thinking and embracing the frequently ignored social-political aspects (Weichselgartner, 2001). Building resilience, especially with a geographic focus on space, suggests to us the opportunity to address under-studied elements, to gain understanding about the historical and sociopolitical processes that create and maintain social vulnerabilities, and to develop designs capable of identifying options for intervention and leverage points that can move cities and societies towards less vulnerable development pathways. Not relabelling but reframing resilience allows values to be identified, choices to be made, and political pathways to be identified (Shaw, 2012: 309).

2 Reconnecting: risk and sustainability

We suggest potential pathways, mainly but not exclusively from the geography literature, by which resilience could be included in other international and community goals, whether by incorporating it explicitly into indicators or

by cross-referencing it to other goals. For instance, as Ferris (2011) and Handmer and Monson (2004) illustrated, a range of specific rights exist that may be mobilized to reduce vulnerability and tackle disasters. In fact, dealing with many of the constituents of social vulnerability comes within the ambit of existing laws governing human rights. We agree that this is a way forward, since substantial resilience could be built by increased compliance with international law through measures such as exhortation, shaming, trade pressure, diplomatic persuasion and citizen activity.

Mitchell and Harris (2012) consider resilience as an integrating concept that allows multiple shocks and stresses and their impacts on ecosystems and society to be considered together in the context of development programming. That is a fair argument, but empirical evidence for supporting the assertion is lacking. We suggest that care is needed in introducing new ideas under assumed auspices without determining empirically whether or not it is indeed an advantage. In contrast to trying to be new and innovative, policy-makers and practitioners often prefer to fall back on more familiar and tangible concepts with which they have practical experience. That way, they can feel more comfortable about knowing the implications and how to succeed. As shown in the previous section, these familiar and tangible concepts exist, with a strong scientific basis covering theory, empirical evidence and their links.

In particular, we suggest that risk and sustainability, while recognizing their limitations, provide such familiar frameworks, facilitating a cross-issue discussion across academic disciplines and societal sectors. Although these terms have multiple definitions and have been debated and critiqued thoroughly – especially in terms of whether or not they are or could be made tangible – we suggest that it is precisely because of this past work that they are useful for connecting with resilience. People have schools of thought and identify with them – the

characteristic of familiarity, which resilience does not have. The criticisms and challenges of the theory and practice of risk and sustainability are well known so that the terms' limitations are the starting point. Approaches to overcome limitations and disagreements would be devised as part of any work, based on people's operational experience.

In contrast, resilience is still undergoing soul-searching in the literature with viewpoints scattered while aiming for consolidation into schools of thought and some reconciliation among disparate viewpoints (including within geography; see note 1). That can be assisted by reconnecting with the other terms that have matured as a result of this lengthy process. The debates around resilience, risk and sustainability often reveal similar shortcomings for each term, yet risk and sustainability offer practical experience and familiarity which resilience has not yet achieved to the same degree.

Moreover, resilience with its suggested change of perspective and ongoing debates may turn out to be a pragmatic bridge to positively connect research to the needs of policy and practice. Mitchell and Harris (2012: 2–3) point to the fact that resilience approaches share important characteristics with the risk concept. Among others, they (1) provide a holistic framework for assessing systems and their interaction, (2) emphasize capacities to manage hazards or disturbances, (3) help to explore options for dealing with uncertainty, surprises and changes, and (4) focus on being proactive.

Already 15 years ago, Gray and Wiedemann (1999) mentioned that risk management and sustainable development have much mutual relevance and could each benefit from more intensive exchange. Both risk management and sustainable development are frameworks for studying and managing environmental impacts of human actions and human responses to environmental phenomena. By definition, both risk and sustainability are concerned with the future and decisions that affect the future.

Nonetheless, different perceptions and definitions of the two terms are applied by different scientific communities and decision-makers to discuss and address similar problems. A systematic exploration of the relationships and synergies between the two concepts would permit resilience to better reconnect with these terms and would engage with the long-standing literature on them, particularly to make resilience more practical, tangible and connected to familiarity.

A baseline already exists. Dovers and Handmer (1992) provided a significant but often neglected starting point for this work when they discussed managing risk and uncertainty, constructed a typology of resilience, and defined an approach to sustainability. There is no intimation that risk and sustainability represent a panacea. Instead, they represent a known and accepted foundation for moving forward with resilience by reconnecting with established concepts, rather than trying to present something new which is not particularly original. That will assist in consolidating the nebulous understandings of resilience into a tangible and normative focus for action based on solid theory completing descriptive approaches.

3 Refocusing: root causes and social transformation

The suggestion of a transition from a descriptive concept to a normative agenda, balancing both, provides opportunities to address under-studied elements, such as entitlements, power, access, choice and equity, all of which are extensively discussed in risk and sustainability research, policy and practice with geographers taking a leading role (e.g. Gaillard, 2007; Hewitt, 1983; Mercer, 2010; O'Keefe and O'Brien, 2013; Wisner et al., 2004). With a 'new' focus on resilience, some development and planning approaches are seen to shift from static to dynamic, from linear to non-linear, from short-term reaction to long-term strategy – and, as such, they

partially move back to 'old' foci and traditional development concepts such as the Sustainable Livelihoods Approach (Chambers and Conway, 1992) and to dealing with vulnerability reduction as a development strategy (Lewis, 1999). Yet, even if spatial planners and developers are motivated to perform these welcome shifts, in operational practice the resilience label can often be used to keep control over established actions rather than to question the status quo and find solutions to problems.

While traditional quantitative risk-thinking, i.e. risk as a product of hazard probability and potential damage, over-emphasizes stability, objectivity and prediction, the apolitical equilibrium-thinking, be it the belief in a former one to which a resilient entity bounces back or a new one to which it bounces forward, over-emphasizes the return to 'normal' (Weichselgartner, 2003). At the expense of adaptability and transformability, both approaches end up labelling change as negative, mostly without questioning why people are at risk, whom this normality is legitimate for or desired by, and what this normality exactly entails. Hurricane Katrina revealed long-existing social-cultural disparities in the city of New Orleans that amplified the devastation and subsequently shaped the context of recovery efforts (Dowty and Allen, 2011; Weber and Peek, 2012). Moreover, it illustrated that hazard protection is a socially isolated activity and disaster response is solely an event-focused reaction – both highly professionalized but seldom viewed as an integral part of a larger development context (Weichselgartner and Brévière, 2011). Thus, returning to pre-disaster normality is not always a suitable goal and should not be articulated as such – even if to support resilience.

Moreover, the apolitical ecological resilience thinking tends to favour established social processes and traditional societal structures at the expense of social transformation. Thinking of societal processes as merely moderating the effects of natural hazards is not just inadequate,

but also misconceived (Hewitt, 1983). Understanding the historical and sociopolitical processes that create and maintain social vulnerabilities is the basis for effective DRR (Alexander, 2012; Lewis, 1999; Wisner et al., 2004, 2012). We suggest emulating that approach by examining the root causes of, or the baseline for, resilience.

Focusing on easy-to-measure symptoms and available-to-process data of resilience – instead of the forces, dynamics and power relations that are at the root of much vulnerability – inevitably results in undifferentiated 'communities at risk', common 'vulnerable countries' and generalized 'resilient pixels'. To overcome this focus, we suggest that resilience should not be detached from the underlying causes of (what is effectively social-political) vulnerability. Otherwise, the chronic sources of vulnerability remain unsolved and continue generating vulnerable, barely resilient groups (Lewis, 1999). Rather than viewing resilience within closures of a specific ideological construction, we suggest resilience to be foregrounding the question of social transformation 'of whom and to where and at what temporal and spatial scales' – which is what geographers study.

V Conclusion: co-designing resilience

We briefly outlined the concept of resilience, focusing on how geographers contribute to the discussion, and portrayed some recent international resilience-building efforts to elucidate less-established questions to highlight less-discussed issues and to provide ways forward from identifying gaps. The current transition of resilience from a descriptive concept to a normative agenda provides both challenges to overcome and opportunities to take up, by ensuring that both are balanced and support each other in practical implementation of resilience approaches.

In summary, we have two major concerns about the current resilience theory and

application, leading to a proposed starting point for moving forward to overcome these concerns. First, too many resilience-building activities draw upon unchallenged assumptions about the social world, effectively imposing a technical-reductionist framework upon more complex webs of knowledge, values and meaning – and thus action. Instead, a 'critical resilience-thinking through locality and marginality' is essential, particularly for geographers involved in DRR, CCA, human development and spatial planning, among other fields. Due to the consideration of space and time, including boundaries and scales of processes and phenomena, geographers have the skills and mind-set to integrate environmental and societal contributions to resilience without neglecting the differences between environmental and societal characteristics.

Second, the contemporary quantitative production mode of streamlining resilience into one community signature or country index hides far more than it discloses. In particular, geographical differentiation, cultural heterogeneity and social plurality may be named with regard to local practices and knowledge-making traditions. Produced in a specific science-policy setting with particular institutional arrangements, decontextualized top-down knowledge on resilience offers a severely limited guide to operational practice, and may have considerably less purchase in problem-solving than pursuing co-designed bottom-up knowledge.

The key starting point is integration of different kinds of knowledge and a variety of experiences in which scientists, the public and decision-makers in policy and practice collaborate to generate not only scientifically reliable but also context-appropriate, socially robust and actionable knowledge (Weichselgartner and Kasperson, 2010), while always keeping in mind that knowledge integration is necessary but not sufficient. Knowledge integration is a starting basis for resilience-building programmes that are co-designed by scientists,

practitioners and target communities because those are less likely to depoliticize resilience thinking and the causal processes inherent in creating vulnerable people and communities. Using that as a way to move forward with a normative agenda producing an explicit operational definition and concrete baselines will overcome resilience's vagueness at the conceptual level and its disconnect from people's experience on the ground.

This approach would acknowledge explicitly that resilience cuts across societal and environmental processes and that resilience can and should be applied to support, rather than detract from, sustainability. By better defining and operationalizing resilience, and by doing so in different contexts in order to compare the similarities and differences, resilience will go beyond programme timelines and will facilitate long-term organizational learning and action. Mitchell (2012: 11) sets out a valuable checklist that can be used for developing targets and indicators on disaster resilience:

1. Be motivating – ambitious but achievable.
2. Be amenable to aggregation globally but also suitable for translating to national, sub-national and community levels.
3. Include outcome-oriented components.
4. Include risk reduction components.
5. Add value rather than focusing on aspects that are already improving (e.g. mortality rates).
6. Be simple and straightforward to communicate.
7. Be measurable, though not necessarily already measured globally, with the potential for a baseline to be created.
8. Be able to capture trends in intensive and extensive risk.

But this checklist represents ideas more than specific actions. This paper extends such ideas to a practical, normative agenda by explaining how past work can be used to build resilience,

how to avoid a technical-reductionist frame-work, and how to ensure that descriptive science is transformed into an action agenda.

Science should not only be a producer of resilience-related knowledge but also an agent of social transformation. That can be achieved by promoting justice – as geographers do, both socially and spatially – to increase the equity of knowledge and resource distribution and access, which are fundamental components of operational resilience. As Davoudi (2012) reminds us:

> In applying an ecologically rooted concept to the social setting, we need to tread carefully and ensure that in trying to understand society through the lens of ecology, we do not lose the insights from critical social science. In the social world, resilience has as much to do with shaping the challenges we face as responding to them. (Davoudi, 2012: 306)

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Note

1. We are aware of the numerous papers on the meaning and critique of 'resilience' in journals such as *Resilience: A Journal of the Environmental Humanities*, *Ecology and Society*, *Resilience: International Policies, Practices and Discourses* and *Resilience: Interdisciplinary Perspectives on Science and Humanitarianism*, but we take our paper in other directions rather than following the same pathways which these papers and journals cover in admirable detail and depth.

References

Adger WN (2000) Social and ecological resilience: Are they related? *Progress in Human Geography* 24(3): 347–364.

Adger WN, Hughes TP, Folke C, Carpenter SR and Rockström J (2005) Social-ecological resilience to coastal disasters. *Science* 309(5737): 1036–1039.

Aguirre BE (2007) Dialectics of vulnerability and resilience. *Georgetown Journal of Poverty Law and Policy* 14(1): 39–59.

Alexander DE (2012) Models of social vulnerability to disasters. *RCCS Annual Review* 4. doi: 10.4000/rccsar.412.

Alexander DE (2013) Resilience and disaster risk reduction: An etymological journey. *Natural Hazards and Earth System Sciences* 13(11): 2707–2716.

Cabinet Office (2010) *Strategic Framework and Policy Statement on Improving the Resilience of Critical Infrastructure to Disruption from Natural Hazards*. London: Cabinet Office.

Cabinet Office (2011) *Keeping the Country Running: Natural Hazards and Infrastructure*. London: Cabinet Office.

Cannon T and Müller-Mahn D (2010) Vulnerability, resilience and development discourses in context of climate change. *Natural Hazards* 55(3): 621–635.

Chambers R (2012) *Provocations for Development*. Rugby: Practical Action Publishing.

Chambers R and Conway GR (1992) Sustainable rural livelihoods: Practical concepts for the 21st century. Discussion Paper 296. Brighton: Institute of Development Studies.

Cote M and Nightingale AJ (2012) Resilience thinking meets social theory: Situating social change in socio-ecological systems (SES) research. *Progress in Human Geography* 36(4): 475–489.

Cutter SL and Zoback ML (2013) Improving the nation's resilience to disasters. *EOS, Transactions of the AGU* 94(9): 89–90.

Davoudi S (2012) Resilience: A bridging concept or a dead end? *Planning Theory and Practice* 13(2): 299–307.

Department for International Development (DFID) (2011) Defining disaster resilience: A DFID approach paper. London: DFID.

Dowty RA and Allen BL (eds) (2011) *Dynamics of Disaster: Lessons on Risk, Response, and Recovery*. London: Earthscan.

Dovers SR and Handmer JW (1992) Uncertainty, sustainability and change. *Global Environmental Change* 2(4): 262–276.

Dufty N (2012) Using social media to build community disaster resilience. *The Australian Journal of Emergency Management* 27(1): 40–45.

Ferris B (2011) *The Politics of Protection: The Limits of Humanitarian Action*. Washington, DC: Brookings Institution.

Folke C (2006) Resilience: The emergence of a perspective for social-ecological systems analyses. *Global Environmental Change* 16(3): 253–267.

Folke C, Carpenter S and Elmqvist T (2002) *Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations*. Stockholm: Environmental Advisory Council to the Swedish Government.

Fonagy P, Steele M and Steele H (1994) The Emanuel Miller Memorial Lecture 1992: The theory and practice of resilience. *Journal of Child Psychology and Psychiatry* 35(2): 231–257.

Gaillard J-C (2007) Resilience of traditional societies in facing natural hazards. *Disaster Prevention and Management* 16(4): 522–544.

Gallopin GC (2006) Linkages between vulnerability, resilience, and adaptive capacity. *Global Environmental Change* 16(3): 293–303.

Glantz MH and Jamieson D (2000) Societal response to hurricane Mitch and intra versus intergenerational equity: Whose norms should apply? *Risk Analysis* 20(6): 869–882.

Gray RCR and Wiedemann PM (1999) Risk management and sustainable development: Mutual lessons from the approaches to the use of indicators. *Journal of Risk Research* 2(3): 201–218.

Handmer JW and Monson R (2004) Does a rights based approach make a difference? The role of public law in vulnerability reduction. *International Journal of Mass Emergencies and Disasters* 22(3): 43–59.

Hewitt K (ed.) (1983) *Interpretations of Calamity from the Viewpoint of Human Ecology*. London: Allen and Unwin.

Holling CS (1973) Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4: 1–23.

Intergovernmental Panel on Climate Change (IPCC) (2012) *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Kaly U, Pratt C and Sale-Mario E (2002) Environmental Vulnerability Index (EVI) project: Initial testing of the global EVI. Report 453. Suva: South Pacific Applied Geoscience Commission.

Kennedy J, Ashmore J and Babister E (2008) The meaning of 'build back better': Evidence from post-tsunami Aceh and Sri Lanka. *Journal of Contingencies and Crisis Management* 16(1): 24–36.

Klein RJT and Nicholls RJ (1999) Assessment of coastal vulnerability to climate change. *Ambio* 28(2): 182–187.

Klein RJT, Nicholls RJ and Thomalla F (2003) Resilience to natural hazards: How useful is this concept? *Global Environmental Change Part B: Environmental Hazards* 5(1–2): 35–45.

Le De L, Gaillard J-C and Friesen W (2013) Remittances and disaster: A review. *International Journal of Disaster Risk Reduction* 4: 34–43.

Levine S, Pain A and Bailey S (2012) The relevance of 'resilience'? HPG Policy Brief 49. London: Overseas Development Institute.

Lewis D (2013) Reducing risk and building resilience in cities. *Natural Hazards Observer* 37(4): 10–13.

Lewis J (1999) *Development in Disaster-Prone Places: Studies of Vulnerability*. London: Intermediate Technology Publications.

Lewis J (2013) Some realities of resilience: A case-study of Wittenberge. *Disaster Prevention and Management* 22(1): 48–62.

Lewis J and Kelman I (2010) Places, people and perpetuity: Community capacities in ecologies of catastrophe. *ACME* 9(2): 191–220.

Lucini B (2013) Social capital and sociological resilience in megacities context. *International Journal of Disaster Resilience in the Built Environment* 4(1): 58–71.

McAslan A (2010) *The Concept of Resilience: Understanding its Origins, Meaning and Utility*. Adelaide: Torrens Resilience Institute.

MacKinnon D and Derickson KD (2012) From resilience to resourcefulness: A critique of resilience policy and activism. *Progress in Human Geography* 37(2): 253–270.

Manyena SB (2006) The concept of resilience revisited. *Disasters* 30(4): 434–450.

Manyena SB, O'Brien G, O'Keefe P, et al. (2011) Disaster resilience: A bounce back or bounce forward ability? *Local Environment* 16(5): 417–424.

Mercer J (2010) Disaster risk reduction or climate change adaptation: Are we reinventing the wheel? *Journal of International Development* 22(2): 247–264.

Meybeck A, Lankoski J and Redfern S (eds) (2012) Building resilience for adaptation to climate change in the agriculture sector. Proceedings of a Joint FAO/OECD Workshop. Rome: Food and Agriculture Organization of the United Nations.

Mitchell T (2012) Options for including disaster resilience in post-2015 development goals. ODI Background Note, September. London: Overseas Development Institute.

Mitchell T and Harris K (2012) Resilience: A risk management approach. ODI Background Note, January. London: Overseas Development Institute.

Müller-Mahn D (ed.) (2012) *The Spatial Dimension of Risk: How Geography Shapes the Emergence of Riskscapes*. Abingdon: Routledge.

O'Keefe P and O'Brien G (2013) *Managing Adaptation to Climate Risk: Beyond Fragmented Responses*. Abingdon: Routledge.

Oliver-Smith A (2009) Sea level rise and the vulnerability of coastal peoples: Responding to the local challenges of global climate change in the 21st century. InterSecTions No. 7/2009. Bonn: UNU-EHS.

Organisation for Economic Co-operation and Development (OECD) (2003) *Emerging Systemic Risks in the 21st Century: An Agenda for Action*. Paris: OECD.

Organisation for Economic Co-operation and Development (OECD) (2013) *Policy Making after Disasters: Helping Regions Become Resilient – The Case of Post-Earthquake Abruzzo*. Paris: OECD.

Paton D (2006) Disaster resilience: Integrating individual, community, institutional, and environmental perspectives. In: Paton D and Johnston D (eds) *Disaster Resilience: An Integrated Approach*. Springfield, IL: Charles C. Thomas, 305–316.

Porter L and Davoudi S (2012) The politics of resilience: A cautionary note. *Planning Theory and Practice* 13(2): 329–333.

Schuller M and Morales P (eds) (2012) *Tectonic Shifts: Haiti Since the Earthquake*. Sterling, VA: Kumarian Press.

Shaw K (2012) 'Reframing' resilience: Challenges for planning theory and practice. *Planning Theory and Practice* 13(2): 308–312.

Silva Villanueva P (2011) Learning to ADAPT: Monitoring and evaluation approaches in climate change adaptation and disaster risk reduction – challenges, gaps and ways forward. Discussion Paper 9. Brighton: Institute of Development Studies.

Stares PB and Wit JS (2009) *Preparing for Sudden Change in North Korea*. New York: Council on Foreign Relations, Center for Preventive Action.

Stumpp E-M (2013) New in town? On resilience and 'resilient cities'. *Cities (32)*: 164–166.

The National Academies (2012) *Disaster Resilience: A National Imperative*. Washington, DC: National Academies Press.

Timmerman P (1981) *Vulnerability, Resilience and the Collapse of Society: A Review of Models and Possible Climatic Applications*. Environmental Monograph 1. Toronto: Institute for Environmental Studies, University of Toronto.

Tobin GA (1999) Sustainability and community resilience: The holy grail of hazards planning? *Global Environmental Change Part B: Environmental Hazards* 1(1): 13–25.

Twigg J (2009) Characteristics of a disaster-resilient community: A guidance note. Version 2. London: DFID Disaster Risk Reduction Interagency Coordination Group, UK Department for International Development.

United Nations International Strategy for Disaster Risk Reduction (UN-ISDR) (2009) *Terminology on Disaster Risk Reduction*. Geneva: UN-ISDR.

United Nations International Strategy for Disaster Risk Reduction (UN-ISDR) (2012) *How to Make Cities More Resilient: A Handbook for Mayors and Local Government Leaders*. Geneva: UN-ISDR.

Valdés HM, Amaratunga D and Haigh R (2013) Making cities resilient: From awareness to implementation. *International Journal of Disaster Resilience in the Built Environment* 4(1): 5–8.

Walker B, Gunderson L and Kinzig A (2006) A handful of heuristics and some propositions for understanding resilience in social-ecological systems. *Ecology and Society* 11(1): 13.

Weber L and Peek L (eds) (2012) *Displaced: Life in the Katrina Diaspora*. Austin, TX: University of Texas Press.

Weichselgartner J (2001) Disaster mitigation: The concept of vulnerability revisited. *Disaster Prevention and Management* 10(2): 85–94.

Weichselgartner J (2003) Toward a policy-relevant hazard geography: Critical comments on geographic natural hazard research. *Die Erde* 134(2): 181–193.

Weichselgartner J (2013) *Risiko – Wissen – Wandel: Struk-
turen und Diskurse problemorientierter Umwelt-
forschung*. München: Oekom.

Weichselgartner J and Kasperson RE (2010) Barriers in the
science-policy-practice interface: Toward a knowledge-
action-system in global environmental change research.
Global Environmental Change 20(2): 266–277.

Weichselgartner J and Brévière E (2011) The 2002
flood disaster in the Elbe region, Germany: A lack
of context-sensitive knowledge. In: Dowty RA and
Allen BL (eds) *Dynamics of Disaster: Lessons on
Risk, Response, and Recovery*. London: Earthscan,
141–158.

Welsh M (2013) Resilience and responsibility: Governing
uncertainty in a complex world. *The Geographical
Journal*. doi: 10.1111/geoj.12012.

Wisner B, Blaikie P, Cannon T, et al. (2004) *At Risk: Nat-
ural Hazards, People's Vulnerability and Disasters*.
London: Routledge.

Wisner B, Gaillard JC and Kelman I (eds) (2012)
Handbook of Hazards and Disaster Risk Reduction.
Abingdon: Routledge.