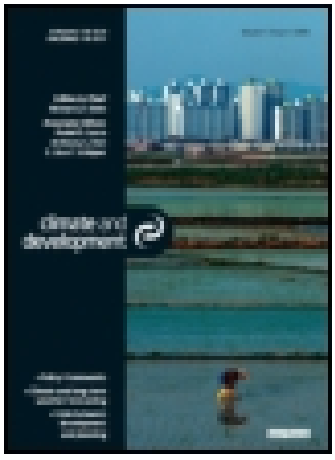

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RESEARCH ARTICLE

Resilience projects as experiments: implementing climate change resilience in Asian cities

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The capacity of actors and institutions to learn and reorganize is central to the resilience of complex systems, particularly in the context of rapidly urbanizing cities. A process of qualitative, reflective research among practitioners within the Asian Cities Climate Change Resilience Network (ACCCRN) showed that development projects and programmes can contribute meaningfully to this capacity when they introduce projects as "experiments". While projects did provide desired tangible benefits to certain groups of actors, many of the most significant contributions to resilience were related to knowledge, networks, information, and greater engagement of citizens with the state. This emphasis on the capacity to learn and reorganize provides a counterpoint to ideas around "implementation" and "mainstreaming" normally promoted within climate change adaptation practice – and, importantly, can help enrich these practices to maximize their effectiveness. This paper focuses on international development projects in particular, although findings have implications for other types of adaptation and resilience initiatives supported by governments, private sector, or community-based organizations.

Keywords: resilience; adaptation; climate change; implementation; social learning

Introduction: what makes this about resilience?

> "*There have been activities building resilience in the past, but using other words or program titles*"– ACCCRN program partner: Semarang City, Indonesia

This official echoed an observation made by a number of her peers: that the majority of projects supported under the banner of "urban climate change resilience" by the Asian Cities Climate Change Resilience Network (ACCCRN) were not entirely novel. ACCCRN has facilitated an assessment and planning process to build resilience in 10 cities across South and Southeast Asia since 2009, providing funding to implement priority intervention projects identified in those plans. In formal discussions and casual conversations, many partners and observers have asked how implementation projects such as mangrove reforestation, rainwater harvesting, early warning systems installation, planning tools development, and riverbank restoration are substantively different from other kinds of development initiatives and government projects undertaken in the past.

The question resonates well beyond the ACCCRN programme. Practitioners and researchers in the international development community frequently acknowledge that initiatives framed in terms of promoting climate change resilience or adaptation draw from the same repertoire of development projects aimed at improving livelihoods, natural resource management, or disaster risk reduction. Though they apply climate change information in their analyses, they prescribe solutions that would have been desirable regardless of changing climate conditions (Schipper, 2007; World Bank Group, 2011).

Given this, the question emerges of what are the characteristics of projects or programmes that *do* meaningfully contribute to the climate resilience of systems, urban or otherwise? This is particularly important, given the context in which programmes like ACCCRN are working – complex urban areas, in which perturbations can have unpredictable ripple effects throughout the system, and in which stakeholders' interests are diverse and contested. In the context of an uncertain future climate, these

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challenges present a set of complex or "wicked" problems (Rittel & Webber, 1973).

This paper draws on theory from natural resource management, resilience, public administration, and development studies to argue that enhancing the capacity of actors and institutions within a system (Tyler & Moench, 2012) to learn and reorganize is the central distinguishing feature of successful efforts to build resilience and promote adaptation in complex, uncertain, contested, and rapidly changing contexts. International development projects are most effective in addressing this central capacity to learn and reorganize when they are designed as "policy experiments". This approach emphasizes knowledge production, collaboration, and deliberation, recognizing that the most important (positive and negative) outcomes are often the unexpected ones (Rondinelli, 1982, 1983). This approach is contrasted with more technocratic and managerial approaches to climate adaptation that represent resilience as being delivered ("implemented") through specific actions, institutionalized and sustained ("mainstreamed") through discreet policy changes.

This research draws on a process of facilitated learning and participatory, qualitative research among practitioners. Its findings suggest that the ACCCRN programme has made important contributions to building capacity to learn and reorganize. The most significant contributions perceived by partners include greater shared understanding of systems, development of collaborations and networks, generation of new information that is more accessible to the public, promotion of decision-making processes that display greater engagement of citizens with the state, and use of climate change information by city institutions. Importantly, these findings present an alternative to the more conventional – that projects would deliver specific measurable benefits through which urban climate change resilience would be clearly demonstrated.

This carries significant implications for international development programming, which relies on projects as a means of delivering targeted results: in this case, resilience. Urban climate change resilience should be considered as more than a catalogue of projects defined by discreet activities. Findings suggest that facilitating projects and programmes with a focus on the capacity to learn and reorganize is what ultimately distinguishes them as contributing to resilience. This also suggests that existing strategic planning approaches to climate change adaptation can be enriched by attentive care to how they facilitate other changes alongside specific activities.

Capacity to learn and reorganize

Increasingly, development projects are asked to address complex or "wicked" problems. Wicked problems are characterized by a seeming intractability and circularity, uncertainty about the future, redistributive implications for entrenched interests, and sharp divergence in interpretations of the problem itself (Rayner, 2006). Rapid, uncoordinated urbanization in the context of climate change is a case in point. Urban systems are vulnerable to a range of shocks and stresses difficult to foresee and act upon in advance, due to intricate interdependencies and feedback mechanisms across scales (Batty, Barrios, & Sinésio Alves, 2006; Ernstson et al., 2010; Pickett, Cadenasso, & Grove, 2004; Wardekker, de Jong, Knoop, & van der Sluijs, 2010; Wilkinson, 2012). With climate change knowledge limited by a variety of factors, it is impossible to precisely predict the nature or magnitude of particular impacts on urban systems that are themselves changing rapidly (Friend et al., 2014; Opitz-Stapleton, 2011). Perhaps most importantly, urban systems exhibit a defining feature of wicked problems: the presence of radically different understandings of the nature and origin of problems, and thus radically different views of how to fix them (Rayner, 2006).

How to approach the urbanization and climate change nexus thus emerges as a core conceptual challenge. In the case of climate change adaptation, there is often a heavy focus on finding "solutions" to what is perceived as a technical problem (Fortier, 2010; Garschagen, 2011). However, complex social problems rarely have optimal solutions, and the framing of problems reflects specific values and interests. Efforts at wholesale reform often fail due to opposition, or they produce important unintended consequences (Brunner et al., 2005). Rather, addressing complex or "wicked" problems requires a particular set of responses outside the repertoire of conventional management approaches. Rayner (2006) and Verweij and Thompson (2006) characterize these as "clumsy solutions" (drawing on Shapiro, 1988). Clumsy solutions are piecemeal, experimental approaches to addressing large problems. They seek value in different problem interpretations and compromises between them, avoiding alienation of any key constituencies. This could mean working at multiple scales with a diversity of actors and institutions, leveraging hierarchal, market-based, and grassroots solutions alike (Rayner, 2006).

Resilience theory provides another lens with a similar set of principles for addressing complex problems. Resilience emphasizes the need for flexible, adaptive approaches to managing change, crisis, or uncertainty through learning, experimentation, and incremental change (Armitage, Berkes, & Doubleday, 2007; Berkes, 2007; Carpenter & Gunderson, 2001; Folke, Colding, & Berkes, 2003; Olsson, Folke, & Berkes, 2004; Olsson et al., 2006; Pelling, High, Dearing, & Smith, 2008; Tyler & Moench, 2012). This requires an ever-deepening understanding among stakeholders of the system in question (Folke, Hanh, Olsson, & Norberg, 2005). Iterative interactions and deliberation help build formal and informal networks (or parallel "shadow systems"), trust, and collective action (Adger, 2003; Olsson et al., 2006; Pelling et al., 2008). By

combining or "co-producing" new knowledge (Forsyth, 1996) from across sectors and scales, social learning processes of this nature can help actors gain increasingly holistic understanding of systems, the relationships between parts, and feedback mechanisms (Armitage et al., 2007; Davidson-Hunt & O'Flaherty, 2007; Gadgil, Berks, & Folke, 2003; Reed et al., 2013). Learning-by-doing through small experiments gives stakeholders the opportunity to take structured steps in testing new ways to understand and approach managing natural resources, providing services, or governing other systems (Olsson et al., 2004).

In this way, building resilience requires robust mechanisms for creating shared knowledge, developing networks and trust among stakeholders, and testing new management techniques. Such processes increase the likelihood that incremental solutions will be identified, mutually agreed upon, and adopted in anticipation of, or following, a disaster (Brunner et al., 2005; Olsson et al., 2006).

Resilience has influenced approaches in other fields of practice such climate change adaptation (Bahadur, Ibrahim, & Tanner, 2010) and urban planning (Ahern, 2011; Wilkinson, 2012).[1] Yet, despite its nuance in addressing complex systems operating at multiple scales, this line of argument has been critiqued for failing to consider the significance of power in shaping such social learning processes. Insights from development studies suggest that the policy problems resilience theory attempts to address are themselves the outcomes of power imbalances, rather than accidents of policy. Fundamental disputes over the nature of transitions or access to resources (Arthur, Friend, & Marschke, 2009; Evans, 2011) and differential abilities among stakeholders to effectively participate (Armitage, Marschke, & Plummer, 2008) make this particularly relevant for urban areas. These insights can complement resilience theory in such contexts. Lebel et al. (2006), for instance, have identified the need to link principles of adaptive governance with principles of good governance, and particularly assuring social justice. Action Research/Learning provides guidance for building capacity of more marginalized stakeholders in order challenge underlying assumptions and power structures (Tschakert & Dietrich, 2010). Reed et al. (2013) argue that learning processes can seek to address power imbalances through building advocacy networks, opening spaces for public dialogue, and increasing access to information and power and control over knowledge. These elements, when paired with principles from resilience theory, constitute essential elements of the capacity of actors and institutions within a system to effectively learn and reorganize.

International development projects and climate change resilience

Responding to climate change is becoming a key priority within international aid and development. At the same time, the shift towards a predominately urban world is precipitating among diverse disciplines a growing interest in cities, their particular strengths and vulnerabilities. A variety of organizations have developed strategic planning approaches, guidance, and tools for cities to adapt to climate change (e.g. see Loftus, Howe, Anton, Philip, & Morchain, 2011; UN Habitat and International Institute for Environment and Development, 2012; UNISDR, 2012; World Bank Group, 2011). These documents prescribe a series of steps to guide cities in assessment, planning, implementation, and monitoring. Through this process, adaptation actions – policy changes, investments, initiatives – are identified, prioritized, and implemented. This will often take the form of dedicated projects to be financed by development agencies or government budget. Guidelines encourage cities to adopt "best practices" from other cities responding to similar challenges. Alongside projects and investments, analysis of climate change is "mainstreamed" into current plans to minimize adverse impacts from (or take advantage of) climate change.

These guidebooks acknowledge the challenges of complexity, uncertainty, and governance in rapidly developing cities. World Bank Group (2011) and UN Habitat and International Institute for Environment and Development (2012) point to the defining relationship between climate change vulnerability, "development deficits," and underlying governance and institutional factors (like insecure land tenure) that makes populations more vulnerable. Consequently, they argue, adaptation efforts depend on effective decision-making processes and institutions. UNISDR (2012) recommends that effective disaster resilience will often require better enforcement of existing regulations, such as building codes and land-use planning. World Bank Group (2011) notes, "adaptation is not a one-time effort but an ongoing cycle of preparation, response, and revision" (6). Experience suggests that indeed, strategic planning of this nature can provide a robust platform for building resilience through facilitating learning processes (Goldstein, 2009; Reed et al., 2013).

Nevertheless, evident throughout these sets of guidelines is the strong emphasis on implementation of adaptation actions. This is perhaps best demonstrated by UN-Habitat's (2011) instruction to "put planning into practice" through implementation. The implication here is that adaptation is achieved through discreet projects or investments. Such a perspective risks undervaluing the knowledge, deliberation, interaction and negotiation processes associated with resilience. Further, as argued by Friend et al. (2014), the discourse of "mainstreaming" indicates that adaptation or resilience can be achieved largely by the very institutions and processes that are identified as being weak (or largely non-existent) in the first place. This is a common but "killer" assumption in the governance contexts of most rapidly developing cities. In their review of existing urban climate action plans, Birkmann,

Garschagen, Kraas, and Quang (2010) observe a common but unfounded expectation that legal and regulatory institutions such as building codes and zoning plans will contribute to adaptation, even though under normal circumstances these institutions are poorly enforced or non-functional. Indeed, they may in fact serve a different political purpose than taken at face value (Friend et al., 2014). The guidance documents on city climate change adaptation offer very little consideration of how to fill these governance gaps or of how to create the effective decision-making processes and institutions on which resilience depends.

Projects as policy experiments

Given that most actions carried out under climate change programmes are performed as projects, questions about the framing of problems and the design of projects are highly relevant.

"Projects" encompass discreet sets of activities with a dedicated budget and timeline intended to deliver predefined, measurable results in response to a specific problem.

An earlier body of knowledge from public administration and development studies provides insights into how projects can go beyond this, contributing to addressing complex social problems (Rondinelli, 1982, 1983; Clay and Schaffer, 1984; Wright & Shore, 1997). Rondinelli (1982, 1983) advocates an approach to designing projects as "policy experiments". Viewing projects as experiments recognizes that the nature of problems and their solutions is exploratory at best. Their purpose therefore is to test solutions to problems, leading to progressive improvements in the understanding and framing of the problem itself and where it fits within overall systems. In this way, experiments provide vital space for social learning, interaction, development of social networks and visioning among disparate groups of actors.

In order to function as experiments, projects should entail:

- Incremental planning, with the ability to change strategy or expectations as understanding of the context evolves;
- Creating spaces for interaction and social learning for implementers, consultants, and stakeholders to find courses of actions that are mutually acceptable (as opposed to optimal);
- Minimizing dependence on specialist, technical analysis and highly data-dependent strategies in favour of qualitative methods that engage people in courses of action from their experience and intuition;
- Reducing large programmes and projects to smaller components, which are more manageable and allows for greater flexibility.

Projects with these kinds of characteristics seek to have an impact beyond specific, deliverable benefits.

Bulkeley and Castan Broto (2013) argue the need to examine such urban climate change experiments, which play a more important role in urban governance than often acknowledged by mainstream literature. They argue that such experiments can "challenge regime dominance" of prevailing systems, highlighting the importance of *who* gets to experiment. In this way, the nature and objectives of any project are highly relevant.

We argue that in whatever arena, projects will be more effective in building resilience if they are structured to enhance capacity for the broader processes of learning and reorganizing. When addressing climate change resilience, projects should provide space to move away from technical approaches to addressing complex challenges as though problems are discreet, manageable and predictable to processes that support iteration, collaboration, and the capacity to learn and reorganize.

Reflections from urban climate change resilience initiatives in eight Asian cities

Initiated in 2008, ACCCRN is a multi-year, multi-partner programme spanning 4 countries and 10 cities. It was designed to

> … demonstrate a diverse range of effective approaches, processes and practices for assessing and addressing urban climate vulnerabilities, and through this base of practice and knowledge to catalyse attention, funding additional actions for building urban climate change resilience in more places. (ACCCRN, 2012)

It works in the cities of Hat Yai and Chiang Rai in Thailand, Semarang and Bandar Lampung in Indonesia, Can Tho, Da Nang, and Quy Nhon in Vietnam, and Gorakhpur, Surat, and Indore in India.

ACCCRN was structured similarly to the strategic planning processes described previously, encompassing engagement, assessment, planning, and implementation.[2] Significantly, it included parallel knowledge management and learning programmes for implementers in each country. Since 2011, ACCCRN has provided grant funding to small "intervention" projects based on City Resilience Strategies and donor funding criteria, approved on a case-by-case basis. ACCCRN in this way encompasses both an overarching programme and a portfolio of projects. At the time of writing, 36 projects amounting to USD $15.5 million have been implemented or are currently in the process of implementation across the ten cities. Projects supported under ACCCRN projects include a variety of activities as described in Brown, Dayal, and Rumbaitis del Rio (2012) and ACCCRN (2013).

Projects were structured and organized with a defined set of activities, dedicated budget, and finite timeline. In this way, they can be seen as conventional development projects. As with any portfolio of projects, they varied in levels of risk and ambition. The degree to which projects achieved specific objectives is covered through monitoring and evaluation efforts that are independent of this research, which sought to answer a different set of questions.

Methodology

This research aimed to assess how ACCCRN's body of work was uniquely about, and how it has contributed to, resilience. This question emerged over the course of several years from structured learning and discussions among ACCCRN partners, incorporating critical academic perspectives on resilience and urban development (see Friend & Moench, 2013; Friend et al., 2014; Reed, Vu, Thinpanga, & Friend, 2012; Reed et al., 2013). It builds on a recognition that resilience can vary depending on how, by whom, and for whose benefit the system is defined (Friend & Moench, 2013).

Research engaged partners from the cities of Hat Yai and Chiang Rai in Thailand, Semarang and Bandar Lampung in Indonesia, Can Tho, Da Nang, and Quy Nhon in Vietnam, and Gorakhpur in India. After identifying key questions in a small group, regional partners and country coordinators from each ACCCRN country developed a set of semi-structured interview questions translated into local languages. Interviews were held subsequently with staff from implementing organizations. These partners in turn held focus group discussions and semi-structured interviews with partners from the ACCCRN cities. In this way, the methodology drew on thinking from the Most Significant Change (Davies & Dart, 2005) evaluation approach, in its focus on encouraging stakeholders directly involved in projects to reflect and ask questions of each other in an open-ended manner: to capture intended as well as untended outcomes of projects; and to collect multiple layers of stories and observations.

Questions were adapted to contexts and language and sought to document perceptions, beliefs, and values related to resilience and ACCCRN projects. Interviews sought to elicit discussion on:

- What is the meaning or purpose of resilience?[3]
- What were the most significant changes as a result of ACCCRN?
- Was ACCCRN different from other programmes and projects in the past? If so, how?

These discussions included follow-up questions, informal discussion, and, in some cases, debate.

Following these discussions, a representative group of nine met to share results in a two-day workshop. An active, facilitated discussion allowed the research team to identify commonalities and differences in experiences and responses. Researchers shared and grouped Most Significant Changes and definitions of resilience, ranked project activities by objectives and effectiveness, outlined resilience timelines, and developed key messages for target audiences.

The methodology was designed for researchers to encourage learning, critical reflection and cross-fertilization contributing to better practice for ongoing work. This was facilitated in part by existing rapport among the group. Trust helped to create an environment for critical self-reflection, in a way that external monitoring or research teams would likely have struggled to achieve.

Equally, this may represent a methodological weakness. Researchers were themselves stakeholders in the work rather than detached observers. Secondly, though data were recorded in various forms, it was highly qualitative in nature. Interpretations evolved throughout the process and were influenced through discussions and debate. This was intended to encourage social learning within this group of actors, but these factors may have also introduced a risk of bias into analysis and findings.

Findings

The core finding of this research is that for projects within ACCCRN, their contribution to urban climate change resilience depended as much on the ways in which projects were carried out as the deliverable benefits of projects themselves. In other words (as summarized by one research partner): resilience is about "doing things differently, not doing different things".

Some projects led to direct, observable, and measurable benefits that tangibly improved residents' lives. Partners highlighted several examples of this, including rainwater harvesting, community-based flood management, and new storm rescue equipment. Improvements in drainage infrastructure in Mahewa Ward, Gorakhpur meant that residents did not experience flooding in 2013, despite the heaviest rainfall in years. Homeowners in Da Nang benefiting from a revolving loan programme for construction of storm resistant housing expressed an increased sense of personal safety and security from the home improvements. Indeed, all of the 243 new housing units managed to avoid significant damage after a significant typhoon in October 2013 (Phong, 2013).

However, for many of the projects across ACCCRN, the tangible benefit was seen as only one among several important indicators of success. More importantly, projects provided a window of opportunity for facilitating other kinds of changes, especially related to knowledge and information, networks, and new forms of management and engagement. Many were subtle changes that would be apparent only to long-term city stakeholders and, in most

cases, were not the primary stated goal of projects. Research partners themselves were surprised at the degree to which stakeholders highlighted these softer, less tangible changes.

The observed changes are categorized thematically below. They resonate with many of the ideas outlined above in resilience thinking: social learning, trust building, development of deeper knowledge in the face of uncertainty, and testing new forms of management (Armitage et al., 2008; Folke et al., 2003). It also reflects the governance themes of access to information, democratizing science, and empowerment principles argued in development studies and urban studies (Arthur et al., 2009; Friend et al., 2014; Pieterse, 2009).

Deepening of knowledge and understanding about the systems

Partners across ACCCRN gained a deeper understanding of the city as a whole, complex system, linkages across scales, and underlying drivers of vulnerability. This has helped city stakeholders to move away from focusing on "parts" of the city and discrete problems. Instead, city stakeholders are seeing issues, problems, and spaces as interconnected. This has in turn led to more work that addresses multiple, long-term drivers of vulnerability and that pursue new and innovative ways of working. In India, staff of the local NGO Gorakhpur Environmental Action Group (GEAG) described having a greater appreciation of complexity and interconnections across systems and space. They noted that as an organization, GEAG has begun to think more systematically about the relationship between peri-urban and urban areas, developing urban agriculture initiatives that would help reduce urban flood risk and improve rural livelihoods.

In Quy Nhon City and Binh Dinh Province in Vietnam, a variety of government departments, influential former city leaders, and local media outlets are looking at a serious flood in 2009 from a new perspective: they now see the flood as a result of urban expansion into hazardous areas, rather than simply as an outcome of extreme rainfall upstream. Former Chairmen of the Provincial People's Committee are among prominent figures to state publicly that existing development in low-lying areas would exacerbate risk under conditions of climate change.

In Thailand, applying a perspective on urban systems starting with an understanding of urbanization as a complex process, highlighted the challenge of coordinating among the different levels of political administration in Thailand's governance structure. ACCCRN partners increasingly understand that climate change compounds existing problems like water shortage, floods, and environmental degradation that stem from past failures to effectively govern or plan for urbanization, often due in part to a lack of coordination in planning in management amongst administrative units. As a result, cities have moved away from supporting actions primarily at the administrative municipal (*Thetsaban Nakhon*) level of Hat Yai and Chiang Rai cities, to building partnerships with surrounding municipalities that represent functional urban conglomerates.

Collaboration and networking building

Many ACCCRN participants observed the emergence of new networks in their cities, noting the increased capacity among stakeholders to engage in effective collaboration. Inter-agency and cross-scale networks are stronger, especially among groups interested in disaster risk reduction. Partners have identified a higher level of trust among many individuals and organizations that led to freer exchange of ideas and information, constructive deliberations over plans and programmes, and collective action on issues of mutual interest.

In Hat Yai City, municipal departments, civil society organizations, provincial agencies, and neighbouring municipalities are working together in unprecedented ways on flood risk reduction initiatives. The city has set up a mechanism to collect data related to flood risk from multiple agencies and makes it publicly available online in real time. Through this, individuals and organizations that previously experienced rivalry or distrust are regularly engaging and working together constructively.

In Can Tho city, the Department of Construction and central business district (Ninh Kieu) administration are working together and exchanging information on urban plans for the first time, identifying inconsistencies and conflicts between different sets of plans.

The research confirmed however that depending on their designs, projects equally can undermine collaboration and further entrench silos. In several cities, stakeholders perceived that one organization or coterie had come to view itself as lead implementer (rather than as facilitator) of a climate change agenda. One participant described this as a "climate resilience mafia". Financial support and recognition afforded by projects served in some cases to further entrench their expectation for maintaining unique control. Groups came to expect that the ACCCRN programme and indeed other donors would pass all grants directly through them, rather than distributing across a variety of stakeholders. These practices were ultimately seen as threatening effective cross-sectoral, cross-scale collaboration.

Information generation and sharing

ACCCRN projects introduced new ways of generating and sharing data that allowed it to be used more widely and effectively. Derived from new formal and informal collaborative relationships, many governments engaged in efforts to expand data sharing and access with other

government departments, in contrast to conventional practices of hoarding data to retain departmental status. In other cases, new information was generated by and made accessible to multiple stakeholders, practices that also increased levels of trust in the data. These changes have contributed back to knowledge generation processes. In some cases, they have helped to support evidence-based decision-making in both the private and public realms.

In Hat Yai, requests for data normally require long bureaucratic procedures, but working group members are now able to leverage relationships from the city's ACCCRN working group to access it from each other with little more than a phone call. Likewise, a new website in Can Tho now houses meteorological, socio-economic, sectoral, and environmental data from a number of different departments. This allows officials and researchers to efficiently access relevant data at one central location rather than seeking data through dispersed bureaucratic processes and agencies.

Real-time information on salinity levels in Can Tho's river systems is available and accessible online. Unlike with earlier assessments and models of salinity intrusion, government and university members alike see the new data as credible and reliable. The effort has led to a reconsideration of project and government budgets. In Hat Yai, a new flood monitoring system allows residents to track the development of floods online. The website has become a trusted source of information among households, business, and government agencies about urban flood risks. It now fills the role of poorly performing state systems.

In contrast, projects that generate information but do not share it could actually increase vulnerability. Implementing partners in one city were concerned that results from spatial flood analysis would not be made publicly available, or that the general public would be unable to interpret them. They observed that like urban development plans, spatial hazard data or maps have the potential to be highly political. Analysis can be withheld from the public precisely because it appears at odds with existing plans, entrenched interests, or investments. Alternatively, it can consolidate power of a particular agency with unique access to it, by requiring payments or consulting services.

Experimentation and learning-by-doing

Stakeholders in ACCCRN cities have developed experimental approaches for addressing existing problems. This learning-by-doing process has helped to demonstrate new alternatives to conventional top-down methods, leading a range of actors to support or adopt them.

In Chiang Rai, a coalition of stakeholders is restoring an eroded section of the Kok River. The restoration fuses natural elements of the ecosystem with functional needs, providing a more sustainable alternative to the concrete embankment method that is commonly used throughout Thailand and that was originally planned by the municipality.

Residents of Mahewa ward in Gorakhpur have developed their own decentralized waste management and drainage systems. These interventions have successfully reduced waterlogging and sanitation problems in the absence of effective state support, and have become a sustained practice in the ward.

The Da Nang City Women's Union is for the first time systematically collecting and aggregating demographic and socio-economic data from constituent households to assess its success in reaching target groups. They are presenting this information to other agencies and constituents to discuss the merits of different approaches to housing.

Deliberation, public dialogues, and advocacy

Citizens groups and NGOs are more effectively demanding accountability from the state on issues ranging from environmental management to urban services. New information and advocacy approaches have helped to expand debate, dialogue, and mobilization around critical development decisions, including in the more constrained political environments of Vietnamese cities.

A ward-level Citizens Committee in the Mahewa ward resilience initiative in Gorakhpur successfully lobbied the City Government to provide roads and storm water drainage in the ward. This Committee is also now actively monitoring budgets and technical specifications to ensure service delivery. At the same time, a citizen's group *Mahanagar Paryavaran Manch* (City Environment Group) composed of 62 citizens from communities, business associations, NGOs, and academia have successfully advocated with the municipality to remove illegal encroachments from a water body considered critical for urban drainage, Ramgarh lake, which in turn enabled the City Government to apply for a large grant from the Central Government for lake restoration.

When a developer received approval for a new residential and industrial development in a mangrove conservation area in Semarang, local government partners and community members successfully mobilized against the decision, eventually reversing the approval. Authorities and partners are now seeking to tighten zoning regulations to protect long-term eco-system restoration initiatives.

The topic of climate change and environmental limits has entered and helped to fuel a policy debate among government officials and in the media in Quy Nhon. Previously, the need for floodways and alternative expansion plans to upland areas was a marginal view held by a small group of environmental planners. It has since become a subject of research and discussion amongst a wider audience of citizens from different sectors.

Climate science informing decision-making

New analysis incorporating climate change is being considered in some state decision-making processes. While this indicates some specific changes to plans, budgets, infrastructure designs, for example, it more importantly signifies heightened awareness and political will for addressing climate change among policy-makers.

Monitoring report results showing negligible salinity levels in Can Tho city's water system has put an end to concerns about saline intrusion as an immediate threat. It has led departments to direct budgets for mitigating saline impacts toward addressing water quality in urban and peri-urban areas more generally.

In Da Nang's Department of Construction, planners are using a hydrological model and climate change scenarios to help other departments assess infrastructure designs. A new bridge under consideration by the Department of Transportation was redesigned in order to accommodate higher river volume, as a result.

The Vietnamese Prime Minister has approved a request from the Binh Dinh Province (Quy Nhon City) People's Committee to revise its urban master plan, directing expansion towards communes to the west rather than the north, as recommended in the ACCCRN-supported study. This change results from a set of urban development decisions, among which climate change played a role (DiGregorio, 2013).[4]

New analysis developed through the climate resilience process in Semarang prompted the health department to develop a more aggressive strategy on mosquito eradication. In Gorakhpur, almost all district service delivery departments have included climate change considerations in the latest District Disaster Management Plan document.

Discussion

The emphasis placed on these changes – the emergence of new knowledge, networks and collaborations, experimental approaches to management, information generation and sharing, and deliberation and public dialogue – is striking. ACCCRN did not use a fixed concept of resilience throughout the programme, but research partners picked up on themes relating to the capacity to learn and reorganize conventional ideas about implementing and mainstreaming climate change adaptation.

Though the headings given above illuminate similarities, it is worth noting that the nature of the changes varied across the cities. Almost all city partners highlighted that stakeholder networks had expanded or been strengthened over the course of ACCCRN, in particular noting the changes in attitudes and practices surrounding information sharing. Yet research partners from Gorakhpur and Semarang, for instance, were alone in observing that ACCCRN had helped to create new state–civil society coalitions to mobilize on behalf of resilience objectives. Evidence of enhanced capacities among low-income stakeholders was unique to Gorakhpur.[5] This suggests that more effective resilience projects might incorporate these aspects explicitly in their design.

It is also important to highlight that despite the broadly positive characterization of these headings, some projects did exhibit elements that can threaten resilience at the local level, such as certain organizations dominating resilience networks, resource capture, or hoarding of new and valuable data. These examples are equally critical for design of future resilience initiatives.

Observed changes related to how climate science informs decision-making resemble the concept of "mainstreaming" from climate adaptation guidance. Indeed, in some instances, official policy is considering climate change information and incorporating this into decision-making processes. However, in ACCCRN cities, these changes almost always hinged on other changes that had preceded them, such as the emergence of relationships, networks, coalitions, new information, and iterative interactions. In most cases, partners did not see policy changes as a finite end goal; rather, they were among an ongoing suite of small, incremental shifts that were gradually contributing to increased resilience. Viewed in this light, meaningful mainstreaming more closely resembles slower, deliberative governance processes (Leach et al., 2007) or clumsy solutions (Verweij & Thompson, 2006).

What then is the role of development projects and programmes in resilience? Projects clearly played an important part. Within cities, they provided entry points and incentives for significant changes to take place and engaged organizations that had not previously considered the impacts of climate change on their sectors. This included projects on dengue fever that engaged the health sectors in Can Tho and Semarang and urban climate change resilience curriculum development in primary and secondary schools that supported collaboration with education departments in Bandar Lampung and Da Nang city. In other cases, projects provided "stepping stones" to address complex problems by starting from points of consensus and mutual interest. In Hat Yai, for instance, enthusiasm for developing an early warning system transcended organizational rivalries and generated collective action. This later enabled stakeholders to work on similar issues at a river basin level. In these cases, the specific topics and activities supported by projects, especially some of the earlier projects, were critical in setting the stage for processes to address more complex issues.

Across cities, the same projects did not necessarily deliver the same important changes. The Vietnamese cities of Da Nang and Quy Nhon are a case in point. In both places, ACCCRN supported partners to develop hydrological models to project flood impact under climate and urban development scenarios. These models were intended as

decision support tools for urban planning and flood risk reduction. Yet the institutional settings and motivations of implementing partners using these tools produced very different results. Whereas in Da Nang project implementers from the Department of Construction focused on providing tools for discreet technical interventions, Quy Nhon partners from the Department of Natural Resources and Department of Planning and Investment used it to help frame a larger political argument about how and where the city should develop. Da Nang city officials are now using the tool to make design decisions about infrastructure. There has been little debate on larger development trajectories, as have occurred in Quy Nhon (Henceroth et al., 2013). Differences like these challenge conventional assumptions about implementation projects building resilience. In particular, they challenge the idea of "best practice" solutions that can be replicated across contexts.

On the other hand, projects with very dissimilar topics could contribute to resilience in similar ways. Many of the approaches that produced significant changes in knowledge, networks, information, public discourse, or improved capacities appeared across projects and cities. Participatory assessments led by stakeholders and supported by expert mentors played an important role in co-producing new knowledge (Forsyth, 1996; Reed et al., 2013) that provide more "knowledge of the whole system rather than detailed knowledge of its parts" (Folke et al., 2005) and challenge existing assumptions about how systems function. This helped to open discussions around important development decisions and to mobilize coalitions.

At the same time, new information systems helped to make data and science more accessible to citizens and less exclusively expert driven (McCormick, 2007). Learning processes when deliberately planned helped to build capacity among marginalized citizens to use this knowledge and engage with the state (Arthur et al., 2009). This was particularly the case when the project included these participants as active co-designers of projects (Rondinelli, 1982) rather than as passive beneficiaries.

Cross-sectoral assessments, databases development, or data information systems helped to break down existing relationship and organizational silos, in particular by reversing the common conception that departments need to withhold and hoard information in order to gain prestige, projects, and partnership. As argued by Pelling et al. (2008), shadow networks like those developed in ACCCRN have strong potential to influence the operations of organizations and institutions. Establishing joint project activities, working groups, and neutral spaces (both in a figurative and literal sense) helped to bridge gaps in collaboration. Finally, regular critical reflection among project implementers proved crucial for building this capacity to learn and reorganize.

The findings suggest that the ways in which projects were facilitated played a decisive role in the changes that they helped to foster. These facilitation approaches, rather than the activities they support, are the important "best practices" with the most potential for replication and success across contexts.

Conclusion

This paper has sought to address the question evoked by a range of practitioners and researchers: in what way are projects building resilience? This question becomes increasingly critical with the growing imperative to adapt to climate change, especially as more and more donors, governments, and NGOs move into this area. This interest has spurred a search for replicable actions for building resilience across geographical locations and socio-political contexts. But currently there is little clarity around what might distinguish "resilience" initiatives for international development projects, and much of what is presented as resilience appears similar to actions under earlier, more established themes of work.

In order to thrive under conditions of uncertainty, complexity and climate change, resilience requires first and foremost the capacity to *learn and reorganize*. This ability to organize and evolve with new information and threats is especially important considering the contexts in which these actions are proposed: rapid development, diverse interests, competition for resources and power, and non-transparent governance systems. Responding to complex challenges, critical development scholars have for several decades argued for approaching projects as "policy experiments", an approach to project design and management echoed in resilience thinking. This contrasts with mainstream approaches to climate change adaptation. The latter emphasizes the need to "implement" adaptation at a certain stage in a planning cycle, implying that the implementation stage and parallel "mainstreaming" processes are the main stages through which cities become resilient.

Research from ACCCRN shows that "implementation" of projects can indeed bring significant tangible benefits to actors who need them. More importantly, however, ACCCRN-supported projects provided the platforms necessary to facilitate a variety of other processes inducing softer changes: deeper knowledge of whole systems; emergence of new or stronger stakeholder networks; generation of new information by government and citizens; experimentation with new strategies for managing urban ecosystems or services; heightened engagement of civil society with the state; changes in decision-making based on climate change. These changes emerged through the ways in which projects were facilitated.

These results have a number of implications for the practice of urban climate change adaptation. If one takes resilience as being about the capacity of actors and institutions within complex systems to learn and reorganize,

any initiative aimed at building resilience should facilitate a process of learning and networking among stakeholders. It should build new knowledge, foster experimentation, and deepen political discourse and engagement. Facilitating projects in this manner is what ultimately distinguishes them as urban climate change resilience initiatives – even if they are titled or funded under themes like disaster risk reduction, or poverty alleviation, and support these particular thematic objectives as well.

Projects themselves do not build resilience and cannot be simply transferred from context to context. The degree to which projects themselves can lead to completely different results – such as described in the case of Da Nang and Quy Nhon – cautions against packaging them as necessarily replicable or as "best practices". On the other hand, certain facilitation approaches (expert coaching, participatory assessments, experimental designs, etc.) do work effectively across contexts in building capacity to learn and reorganize.

The findings have important implications particularly for international development programmes that rely on projects to deliver resilience. Viewing resilience in this way can also help to enrich strategic planning approaches to climate change adaptation. Assessments, planning, consultations, and projects can always be effective (more "about resilience") when they incorporate these facilitation elements deeply in their design.

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Notes

1. Worth noting as well is that as resilience becomes a development buzzword, the technical meaning of resilience originating from research on socio-ecological system is being diluted by simpler, more popular connotations (Friend & Moench, 2013).
2. For a detailed description of the ACCCRN programme design, see ISET (2011).
3. This research also covered what was meant by urban climate change resilience as a specific area of practice. Divergent understandings of "resilience" and urban climate change resilience had emerged among programme's partners (Friend & Moench, 2013). In particular, there was debate regarding the relationship between resilience and poverty and whether the commonly cited "capacity to bounce back" was an appropriate definition for resilience in developing contexts. This debate resonated with critical discussions among the research community (Cannon & Manh-Mueller, 2010, Davoudi, 2012). Findings about how the concept of UCCR was translated, interpreted, and evolved among programme's partners are elaborated in a companion publication (Henceroth et el., 2013).
4. Based on further research, (DiGregorio, 2013) gives a full analysis of this decision-making process in Quy Nhon, which he views as a primarily centred on the city's expansion area and goals of meeting population and territorial criteria for Vietnam's city classification system. He argues that as a result of the 2009 and the ACCCRN-supported study, "climate change has become a context for their plan, which along with geography, creates certain limits to the form of urban development" (M. DiGregorio, personal communication).
5. Of course, this does not necessarily indicate that such changes did not occur, but that they were picked up on as among the most highly significant by research partners in other cities.

References

ACCCRN. (2012). *Asian cities climate change resilience network*. The Rockefeller Foundation. Retrieved August 4, 2013, from http://www.acccrn.org/sites/default/files/documents/ACCCRN%20Brochure.pdf

ACCCRN. (2013). *ACCCRN city project catalogue*. Bangkok: Asian Cities Climate Change Network (ACCCRN). Retrieved August 5, 2013, from http://www.acccrn.org/resources/documents-and-tools/2012/08/01/acccrn-city-projects-catalogue

Adger, W.N. (2003). Social capital, collective action, and adaptation to climate change. *Economic Geography*, *79*(4), 387–404.

Ahern, J. (2011). From fail-safe to safe-to fail: Sustainability and resilience in the new urban world. *Landscape and Urban Planning*, *100*, 341–343.

Armitage, D., Berkes, F., & Doubleday, N. (2007). *Adaptive co-management: Collaboration, learning, and multi-level governance*. Vancouver: UBC Press.

Armitage, D., Marschke, M., & Plummer, R. (2008). Adaptive co-management and the paradox of learning. *Global Environmental Change*, *18*(1), 86–98.

Arthur, R., Friend, R., & Marschke, M. (2009). Fostering collaborative resilience through adaptive co-management: Reconciling theory and practice in the management of fisheries in the Mekong region. In B.E. Goldstein (Ed.), *Collaborative resilience: Moving through crisis to opportunity* (pp. 255–281). Cambridge, MA: MIT Press.

Bahadur, A.V., Ibrahim, M., & Tanner, T. (2010). *The resilience renaissance?. Unpacking of resilience for tackling climate change and disasters*. Brighton: IDS.

Batty, M., Barrios, J., & Sinésio Alves, J. (2006). Cities: Continuity, transformation and emergence. In J. McGlade & E. Garnsey (Eds.), *Complexity and co-evolution: Continuity and change in socio-economic systems* (pp. 61–76). Cheltenham: Edward Elgar.

Berkes, F. (2007). Understanding uncertainty and reducing vulnerability: Lessons from resilience thinking. *Natural Hazards*, *41*, 283–295.

Birkmann, J., Garschagen, M., Kraas, F., & Quang, N. (2010). Adaptive urban governance: New challenges for the second generation of urban adaptation strategies to climate change. *Sustainability Science*, *5*, 185–206.

Brown, A., Dayal, A., & Rumbaitis del Rio, C. (2012). From practice to theory: Emerging lessons from Asia for building urban climate change resilience. *Environment and Urbanization*, *24* (2), 531–556.

Brunner, R.D., Steelman, T.A., Coe-Juell, L., Cromley, C.M., Edwards, C.M., & Tucker, D.W. (2005). *Adaptive*

governance: Integrating science, policy, and decision making. New York, NY: Columbia University Press.

Bulkeley, H., & Castan Broto, V. (2013). Government by experiment? Global cities and the governing of climate change. *Transactions of the Institute of British Geographers*, *38*(3), 361–375. doi:10.1111/j.1475-5661.2012.00535.x

Cannon, T., & Manh-Mueller, D. (2010). Vulnerability, resilience and development discourses in context of climate change. *Natural Hazards*, *55*, 621–635.

Carpenter, S.R., & Gunderson, L.H. (2001). Coping with collapse: Ecological and social dynamics in ecosystem management. *BioScience*, *51*(6), 451–457.

Clay, E.J. & Schaffer, B.B. (Eds.). (1984). *Room for Manoeuvre: An exploration of public policy in agriculture and rural development*. Canbury, NJ: Associated University Presses.

Davidson-Hunt, I.J., & O'Flaherty, R.M. (2007). Researchers, indigenous peoples, and placed-based learning communities. *Society & Natural Resources: An International Journal*, *20* (4), 291–305.

Davies, R., & Dart, J. (2005). The Most Significant Change' (MSC) Technique: A guide to its use. Retrieved August 2, 2013, from http://www.mande.co.uk/docs/MSCGuide.pdf

Davoudi, S. (2012). Applying the resilience perspective to planning: Critical thoughts from theory and practice. *Planning Theory & Practice*, *13*(2), 299–333.

DiGregorio, M. (2013). Planning to plan: Quy Nhon prepares for a new master plan. ISET (unpublished).

Ernstson, H., van der Leeuw, S.E., Redman, C.L., Meffert, D., Davis, G., Alfsen, C., & Elmqvist, T. (2010). Urban transitions: On urban resilience and human-dominated eco-systems. *A Journal of the Human Environment*, *39*(8), 531–545.

Evans, J.P. (2011). Resilience, ecology and adaptation in the experimental city. *Transactions of the Institute of British Geographers*, *36*, 223–237.

Folke, C., Colding, J., & Berkes, F. (2003). Synthesis: Building resilience and adaptive capacity in social-ecological systems. In J. Colding, C. Folke, & F. Berkes (Eds.), *Navigating social-ecological systems: Building resilience for complexity and change* (pp. 352–387). Cambridge: Cambridge University Press.

Folke, C., Hanh, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, *30*, 441–473.

Forsyth, T. (1996). Science, myth and knowledge: Testing Himalayan environmental degradation in Thailand. *Geoforum*, *27*(3), 375–392.

Fortier, F. (2010). Taking a climate chance: A procedural critique of Vietnam's climate change strategy. *Asia Pacific Viewpoint*, *51*(3), 229–247.

Friend, R., Jarvie, J., Reed, S.O., Sutarto, R., Thinphanga, P., & Toan, V.C. (2014). Mainstreaming urban climate resilience into policy and planning; reflections from Asia. *Urban Climate*, *7*, 6–19. doi:10.1016/j.uclim.2013.08.001

Friend, R., & Moench, M. (2013). What is the purpose of urban climate resilience? Implications for addressing poverty and vulnerability. *Urban Climate*, *6*, 98–113. doi:10.1016/j.uclim.2013.09.002

Gadgil, M., Berks, F., & Folke, C. (2003). Exploring the role of local ecological knowledge for ecosystem management: Three case studies. In F. Berks, J. Colding, & C. Folke (Eds.), *Navigating social-ecological systems: Building resilience for complexity and change* (pp. 189–209). Cambridge: Cambridge University Press.

Garschagen, M. (2011). Resilience and organisational institutionalism from a cross-cultural perspective: an exploration based on urban climate change adaptation in Vietnam. *Nat Hazards*, 1–22. doi:10.1007/s11069-011-9753-4

Goldstein, E.B. (Ed.). (2009). *Collaborative resilience: Moving through crisis to opportunity*. Cambridge, MA: MIT Press.

Henceroth, J., Friend, R., Reed, S., Janprasart, S., Thinphanga, P., Jarvie, J., … Singh, D. (2013). *Actions on urban climate change resilience*. Boulder, CO: Institute for Social and Environmental Transition-International.

ISET. (2011). *Catalyzing urban climate resilience: Applying concepts to planning practice in the ACCCRN Program* (*2009–2011*). Bangkok: ISET-Boulder.

Leach, M., Bloom, G., Ely, A., Nightingale, P., Scoones, I., Shah, E., & Smith, A. (2007). *Understanding governance: Pathways to sustainability*. Brighton: STEPS Centre.

Lebel, L., Anderies, J.M., Campbell, B., Folke, C., Hatfield-Dodds, S., Hughes, T.P., & Wilson, J. (2006). Governance and the capacity to manage resilience in regional social-ecological systems. *Ecology and Society*, *11*(1), 19. Retrieved from http://www.ecologyandsociety.org/vol11/iss1/art19/

Loftus, A.C., Howe, C., Anton, B., Philip, R., & Morchain, D. (2011). *Adapting urban water systems to climate change: A handbook for decision makers at the local level*. Freiburg: ICLEI European Secretariat GmbH.

McCormick, S. (2007). Democratizing science movements: A new framework for mobilization and contestation. *Social Studies of Science*, *37*(4), 609–623.

Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive comanagement for building resilience in socio-ecological systems. *Environmental Management*, *34*(1), 75–90.

Olsson, P., Gunderson, L.H., Carpenter, S.R., Ryan, P., Lebel, L., Folke, C., & Holling, C.S. (2006). Shooting the rapids: Navigating transitions to adaptive governance of social-ecological systems. *Ecology and Society*, *11*(1), 18.

Opitz-Stapleton, S. (2011). Only death is certain, yet you still get out of bed in the morning: Communicating climate information in adaptation and resilience practice. In S. Tyler, M. Moench, & J. Lage (Eds.), *Catalyzing urban climate resilience: Applying concepts to planning practice in the ACCCRN program (2009–2011)* (pp. 71–122). Bangkok: ISET-Boulder.

Pelling, M., High, C., Dearing, J., & Smith, D. (2008). Shadow spaces for social learning: A relational understanding of adaptive capacity to climate change within organizations. *Environment and Planning*, *40*, 867–884.

Phong, T.V.G. (2013). *Lessons from Typhoon Nari: Storm resistant housing shown to be effective*. Hanoi: Institute for Social and Environmental Transition- International.

Pickett, S.T.A., Cadenasso, M.L., & Grove, J.M. (2004). Resilient cities: Meaning, models, and metaphor for integrating the ecological, socio-economic, and planning realms. *Landscape and Urban Planning*, *69*, 369–384.

Pieterse, E. (2009). *City futures: Confronting the crisis of urban development*. Capetown: UCT Press.

Rayner, S. (2006). *Wicked problems: Clumsy solutions – diagnoses and prescriptions for environmental ills. Jack Beal Memorial Lecture on Global Environment*. Sydney, Australia: ANSW Sydney.

Reed, S.O., Vu, C.T., Thinpanga, P., & Friend, R. (2012). *New risk and risk transfer: Climate and urban development case studies from Vietnam and Thailand*. Proceedings of Vietnam Urban Conference October 2012: Vietnam Cities Tomorrow Action Today, Hanoi.

Reed, S.O., Friend, R., Toan, V.C., Thinphanga, P., Sutarto, R., & Singh, D. (2013). Shared learning" for building urban climate

resilience – experiences from Asian cities. *Environment and Urbanization*, *25*(2), 1–20.
Rittel, H., & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*, 155–169.
Rondinelli, D.A. (1982). The Dilemma of development administration: Complexity and uncertainty in control-oriented bureaucracies. *World Politics*, *35*(1), 43–72.
Rondinelli, D.A. (1983). Projects as instruments of development administration: A qualified defence and suggestions for improvement. *Public Administration and Development*, *3*, 307–327.
Schipper, E.L.F. (2007). *Climate change adaptation and development: Exploring the linkages*. Norwich: Tyndall Centre for Climate Change Research.
Shapiro, M.H. (1988). Introduction: Judicial selection and the design of clumsy institutions. *Southern California Law Review*, *61*, 1555–1569.
Tschakert, P., & Dietrich, K.A. (2010). Anticipatory learning for climate change adaptation and resilience. *Ecology and Society*, *15*(2), 11. Retrieved from http://www.ecologyandsociety.org/vol15/iss2/art11/.
Tyler, S., & Moench, M. (2012). A framework for urban climate resilience. *Climate and Development*, *4*(4), 311–326. doi:10.1080/17565529.2012.745389
UN-Habitat. (2011). *Cities and climate change: Global report on human settlements*. Nairobi: United Nations Human Settlements Program.
UN Habitat and International Institute for Environment and Development. (2012). *Developing local climate change plans: A guide for cities in developing countries. Cities and climate change initiative*. Nairobi: Author
UNISDR. (2012). *How to make cities more resilient: A handbook for local government leaders*. Geneva: Author.
Verweij, M., & Thompson, M. (Eds.). (2006). *Clumsy solutions for a complex world: Governance, politics, and plural perceptions*. Palgrave Macmillan. Retrieved from http://www.palgraveconnect.com/pc/polintstud2006/browse/inside/9780230624887.html#page=0
Wardekker, A., de Jong, A., Knoop, J.M., & van der Sluijs, J. (2010). Operationalising a resilience approach to adapting an urban delta to uncertain climate changes. *Technological Forecasting & Social Change*, *77*, 987–998.
Wilkinson, C. (2012). Social-ecological resilience: Insights and issues for planning theory. *Planning Theory*, *17*, 1–22.
World Bank Group. (2011). *Guide to climate change adaptation in cities*. Washington, DC: World Bank.
Wright, S., & Shore, C. (Ed.). (1997). *Anthropology of policy: Critical perspectives on governance and power*. London: Routledge.