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Studying local climate adaptation: A heuristic research framework for comparative policy analysis

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ABSTRACT

Climate change poses a significant risk for communities, and local governments around the world have begun responding by developing climate adaptation policies. Scholarship on local adaptation policy has proliferated in recent years, but insufficient attention has been paid to operationalization of the unit of analysis, and methods employed are typically inadequate to draw inferences about variation across cases. This article seeks to contribute to the conceptual and methodological foundations of a research agenda for comparative analysis of local adaptation policies and policy-making. Synthesizing insights from policy studies literature and existing adaptation research, the article identifies and operationalizes two aspects of public policy—policy *content* and policy *process*—which are salient objects of comparative analysis that typically vary from one community to another. The article also addresses research design, outlining a comparative case study methodology that incorporates various qualitative analytical techniques as the vehicle to examine these policy elements in empirical settings.

1. Introduction

Climate change poses significant risks for cities and communities. Global changes in temperature and precipitation are projected to result in a range of negative local impacts, such as flooding due to overwhelmed drainage infrastructure, water supply deficits and greater wildfire activity caused by extended dry periods, and the longer-term risk of sea-level rise, which will exacerbate flooding and storm surge in coastal areas (IPCC, 2012, 2014a; McBean, 2004). Moreover, climate hazards such as extreme heat and severe storms are serious threats to human health and safety.

Governments around the world have begun responding to these risks through *climate adaptation policies*—courses of action designed to reduce the vulnerability of populations, assets, and operations to climate-related risk (Susskind, 2010; Henstra, 2012). Much of this policy development has taken place at the local level, and analysts have identified emerging local policy initiatives in both developed and developing countries (Carmin and Zhang, 2009; Satterthwaite et al., 2009; Hunt and Watkiss, 2011). Over the past decade, there has been a proliferation of studies documenting various aspects of local adaptation policy development, including the enabling conditions that facilitate action, and challenges for local policy-makers (IPCC, 2014b).

However, adaptation is a nascent policy field. Our knowledge remains limited concerning the scope and substance of adaptation policies, as well as the processes by which policies are developed and implemented in this domain. This is attributable in part to research design: much of the policy analysis to date has been in the form of individual case studies, which are instructive, but generally do not lend themselves to comparison and knowledge cumulation (George and Bennett, 2005: 68). Moreover, though some studies have attempted to compare adaptation policy across jurisdictions, operationalization of the unit of analysis has received insufficient attention, and methods employed are typically inadequate to draw inferences about variation in policies and policy-making across cases (Dupuis and Biesbroek, 2013). Murtinho and Hayes (2012) assert that "by providing greater methodological clarity and purposefully working towards comparative studies, fieldwork scholars can provide an empirical foundation so that scholars, practitioners, and communities can learn and benefit from the diverse adaptation processes occurring in communities around the world" (p. 519).

This article aims to contribute to the conceptual and methodological foundations of a research agenda for comparative analysis of local adaptation policy. To this end, the article synthesizes insights from policy studies literature and contemporary adaptation

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research in order to identify and operationalize two salient objects for comparative adaptation policy analysis: policy content and policy process. Throughout the paper, the findings of existing case studies are used to illustrate variation in these policy-related research objects in order to illuminate the diversity of adaptation policy choices and processes in different local contexts. The final section addresses research design, focusing on a comparative case study methodology that combines qualitative research techniques as the vehicle to examine the content and process of adaptation policy-making in empirical settings.

2. Comparative policy analysis

Public policy is a course of action chosen by public authorities to address a problem (Pal, 2014: 2). Policy-making is assumed to be a purposive activity spearheaded by governments, which involves choices about whether and how public authority and resources will be used to address problems. One choice relates to *scope*: how much responsibility should the state assume, and how much should be borne by individuals, households, firms, and social groups? Governments choose to position themselves along a spectrum of intervention, ranging from little or no action at one extreme, and active, aggressive involvement at the other. A second choice relates to *means.* Governments have many tools to achieve policy objectives—exhortation, regulation, spending, and so on—but choosing among these instruments is one of the most contentious aspects of policy design (Salamon, 2002). Public policy is the cumulative result of these choices, which can be inferred from tangible outputs, such as decisions, expenditures, programmes, and pronouncements.

Policy analysis is a process of inquiry aimed at developing and critically assessing information to understand and improve public policies (Dunn, 2012: 2; Pal, 2014: 15). There is no universally recognized methodology for policy analysis. It can involve deductive methods—the application of general concepts, principles, and theoretical propositions to observed phenomena—as well as inductive analysis, in which generalizations are drawn from careful observations of empirical phenomena, which are then tested against other cases (Howlett et al., 2009: 20).

Comparative policy analysis refers to the systematic study and comparison of public policies and policy-making in different jurisdictions to better understand the factors and processes that underpin similarities and differences in policy choices (Schmitt, 2013). From an empirical perspective, comparing the policy responses of different governments to a common problem can be used to draw inferences about determinants of variation, and this serves as a foundation for theory-building (Gupta, 2012). Focused comparison also has instrumental value, in that it allows policy-makers faced with novel problems to draw lessons from the experiences of other jurisdictions, which can be used to design parallel domestic programmes (Rose, 2005). Although most policy studies in the comparative tradition have focused on similarities and differences at the national level, comparative analysis is also useful for studying local government policies (e.g., Lazar and Leuprecht, 2007).

3. Comparing local adaptation policy

Climate adaptation policy assumes that despite even the most ambitious efforts to reduce greenhouse gas emissions, some degree of climate change is inevitable, so impacts must be anticipated (Wigley, 2005; Hare and Meinshausen, 2006). It also acknowledges that climate variability already exerts stress on physical, social, and economic systems, which has not been sufficiently addressed (Ford, 2008). Analysts define adaptation in various ways, but a common thread is that it involves "adjustments"—purposive changes to practices, processes, and structures to better cope with climate change and its impacts (IPCC, 2007). The central goals of adaptation policy are to reduce *vulnerability*—susceptibility to negative climate-related impacts—and to increase *adaptive capacity*, meaning the ability to adjust to climate change in order to moderate damages or cope with consequences (Smit and Pilifosova, 2003; Smit and Wandel, 2006).

In recent years, analysts have increasingly turned their attention to documenting the adaptation actions that are taking place around the world (e.g., Berrang-Ford et al., 2011; Ford et al., 2011). Some of this work has been comparative, seeking to describe and explain similarities and differences in policy outputs, but the predominate research focus has been the national scale (Biesbroek et al., 2010; Ford et al., 2013; Berrang-Ford et al., 2014). Given the place-based nature of climate adaptation, a similar programme of research that analyses and compares adaptation policies and policy-making at the local level is warranted.

For various reasons, the local level is argued to be the appropriate locus for adaptation policy development (Bizikova et al., 2008; Richardson, 2012). Local officials play a key role in public functions that are central to climate adaptation, such as land use regulation, building inspection, critical infrastructure protection, and emergency planning (Wakeford and McGillivray, 2006; Auld and Maclver, 2007). Close proximity to stakeholders and the public gives local policy-makers access to knowledge about place-based exposure and sensitivity to climate risks, which enables them to design strategies tailored to community needs (Larsson, 2003; Corfee-Morlot et al., 2011). Public engagement and mobilization in support of adaptation are more effective at the local level, because specific community risks tangibly demonstrate the importance of taking adaptive actions (Hunt and Watkiss, 2011). The local level is also an optimal site for policy experimentation, in that innovative practices can be tested on a smaller scale and then replicated in other communities.

However, local officials face significant challenges in developing adaptation policies. Both the public and policy-makers have difficulty grappling with the long-term nature of climate change, which requires measures to be implemented in anticipation of uncertain future threats (Wagner and Zeckhauser, 2012). Although citizens abstractly perceive climate change as a problem, the issue appears to lack sufficient salience and urgency to prompt sustained demands for government intervention, giving elected officials little political incentive to commit resources to adaptation (Lorenzoni and Pidgeon, 2006; Corfee-Morlot et al., 2011). Moreover, whereas the costs of adaptation are visible and immediate, the benefits are largely intangible and will accrue mainly in the future. In the face of more immediate priorities and a lack of public demand, decision-makers typically focus on the most pressing agenda items and invest in proposals that will generate short term returns (Reisinger et al., 2011; Simonsson et al., 2011). Finally, many communities lack the capacity to effectively formulate and implement adaptation policies (Crabbé and Robin, 2006; Measham et al., 2011). In light of the urgent need to adapt communities to a changing climate, understanding whether and how local policy-makers surmount these numerous obstacles is crucial.

Furthermore, local adaptation does not take place in isolation, but is rather embedded within a broader multilevel governance context, whereby institutional structures and procedures are shaped by rules and decisions made by other levels of government, and policy choices are influenced by non-governmental actors (Urwin and Jordan, 2008; Mukheibir et al., 2013). Adaptation is a responsibility shared by all levels of government, but the appropriate scale of action and division of tasks among local, regional, and national governments remain unclear (Gupta, 2007). Divided jurisdiction constrains local policy choices, in that specific adaptation options (e.g., raising the height of a levee or dyke) are

subject to legal and regulatory rules enforced by higher levels of government (Ekstrom and Moser, 2013). More broadly, articulating a clear and consistent intergovernmental vision for adaptation and coordinating efforts at various levels have proven difficult, in part because policy priorities and governance issues differ depending on the scale at which the climate change problem is viewed (Adger et al., 2009). Whereas local governments in some countries are guided by a legal or policy mandate issued by a higher level of government (e.g., National Adaptation Strategy), others lack the protection of a uniform national or regional policy, which weakens the impetus and support for local adaptation initiatives that face resistance from affected interests (Swart et al., 2009; Westerhoff et al., 2010; Reisinger et al., 2011). Understanding the complex, multi-scalar context of local adaptation policy-making, and the ways in which non-local forces influence the adaptation policy choices of local governments, is an important priority for research in this field.

Although they are constrained by scarce resources, lack of capacity, and the limited authority delegated by higher-level governments, all local governments have some scope for autonomous policy choices, and these choices are ripe for comparative analysis (McEvoy et al., 2010). Comparative analysis is important for a number of reasons (Burnham et al., 2008). First, it contextualizes knowledge about local adaptation, by considering how policy choices are made in different social and political environments. This comparative examination provides the basis for classification to illuminate the diversity of public responses to climate change. The comparative method also enables the formulation, refinement, and testing of hypothesized relationships between variables, as a basis for explaining differences in chosen courses of action. Finally, empirical findings from comparative analysis of local adaptation policies and policy-making enable predictions about how other communities might respond to the climate change challenge.

4. Objects of comparative local adaptation policy analysis

A critical element of comparative research design is the specification of what is to be compared. As Dupuis and Biesbroek (2013) point out, the meaning of "adaptation policy" has been poorly defined and conceptualized in existing studies, creating inconsistency in measurement and limiting progress towards explanation. They argue that greater precision is required in operationalizing the "dependent variable" in comparative research.

Scholars who engage in comparative policy analysis typically focus on one of several aspects of public policy. Studies that target the policy *process* seek to compare how a problem is conceptualized and brought to the attention of decision-makers, and how public authorities formulate, select, and implement policy solutions (Adolino and Blake, 2011: 8–29). Policy *content*—the specific courses of action chosen by governments, and the means by which these are implemented—can vary considerably between jurisdictions, so this is another common focus of comparative analysis (Froman, 1968). Comparing policy *quality* involves scoring and/or ranking policies based on evaluative criteria, such as coherence and durability (Tang et al., 2012). Policy *change* is a fourth object of comparative policy analysis, which describes and explains evolution in policy goals and means over time, usually through longitudinal research that compares new or amended policies to an earlier baseline (Bauer and Knill, 2014). Finally, comparative analysis can focus on policy *outcomes*, focusing on the consequences of policy decisions to identify ineffective actions as well as promising strategies that might be replicated elsewhere (Schmitt, 2013).

Since adaptation policy is in its infancy, there is considerable disagreement about the appropriate metrics of policy quality. Moreover, it is arguably too early to evaluate adaptation policy change or outcomes, given that these will be determined over time. Therefore, a high priority for comparative adaptation research must be to generate knowledge about the *content* of climate adaptation policies, which provides a baseline for subsequent research on policy change. Similarly, developing comparative knowledge of the adaptation policy *process* can offer valuable insights on policy quality, as well as the conditions that enable or constrain policy development and implementation. These two policy objects are described and elaborated in Sections 5 and 6 below, and existing studies are used to illustrate the diversity in these elements across different local contexts.

5. Policy content

All public policies incorporate fundamental elements that can be analyzed and compared, including goals, targets, instruments, and agents (Schneider and Ingram, 1990; Howlett, 2011). *Goals* set out what the policy aims to achieve, including both broad, normative statements about ultimate desired ends, as well as precise, operational objectives concerning specific behaviours or conditions that must be altered in order to address a problem. In addition to instrumental goals—those oriented towards solving the identified problem—policies often embody other public objectives, such as efficiency, equity, and security (Stone, 2002: 37). Policy documents often contain a statement of the problem to be solved and the intended consequences of the policy intervention, but goals must sometimes be inferred from statements or pronouncements, or through dialogue with policy officials (Pal, 2014: 8–9).

The central goals of adaptation policy are to reduce vulnerability to the effects of climate change, and to increase adaptive capacity to moderate damages or cope with consequences (Burton et al., 2002; Smit and Wandel, 2006). However, this leaves a wide scope for policy-makers to develop and adopt specific objectives to address particular local risks and priorities. For instance, local adaptation policy might prioritize preservation of the status quo, or might aspire to a new state of affairs that is more compatible with a climate-changed world (Adger et al., 2009). The policy goals might be narrow and constrained, such as protection from specific climate-related hazards, or broad and progressive, such as the improvement of system resilience to shocks, of which climate change is only one.

The goals and objectives chosen by local governments to address climate change is one area of variation in adaptation policy content. For example, comparing eight Norwegian municipalities, Dannevig et al. (2012) found that five communities focused largely on protecting development from hazards such as coastal and riverine flooding, avalanche, and erosion, one prioritized water management to cope with extreme precipitation, one focused primarily on agriculture, and one had no clearly discernible policy objectives. In an analysis of seven municipal adaptation plans in Southeast Queensland, Australia, Baker et al. (2012) reported that fewer than half contained explicit policy goals, and none articulated quantifiable objectives related to specific climate risks. Comparative analysis of policy goals in different communities is necessary to build contextual knowledge about local adaptation objectives and how they influence choices about the other elements of policy content.

Targets refer to actors and populations whose behaviour is linked to the achievement of policy goals, such as individuals, households, groups, and business firms (Schneider and Ingram, 1990: 84–85). In some cases, targeting is narrow and precise, limited to one or a few specific actors, and in others it is broad and diffuse, implicating a wide range of actors and behaviours. Existing

adaptation literature identifies many different targets of local adaptation policies. For example, Wilson (2006) noted the importance of incorporating adaptation into the work of municipal planners. Gifford et al. (2011) analyzed psychological interventions that could be used to target individual and household behavioural change in service of climate policy objectives. Hasegawa (2004) focused on builders, developers, and property owners as targets of adaptation policy, in light of the need to adapt the built environment to climate change stresses. Choices about which actors and behaviours to target are a source of substantive differences in policy content between jurisdictions, and explaining these choices is an important objective for comparative analysis.

Instruments are the tools that governments use to achieve policy objectives. For instance, financial instruments are deployed to encourage desirable behaviour by providing economic incentives. In some states, higher-level governments have provided grants to subsidize local adaptation policy development (Aall et al., 2007) or have attached conditional funding to the fulfilment of climate policy development mandates as means of incentivizing adaptation at the local scale (Nova Scotia, 2011). Information-based instruments, such as hazard maps and flood forecasts, are intended to inform target audiences in hopes of influencing them to pursue adaptive behaviours. Other instruments rely on legal authority, such as the regulation adopted by the Tokyo Metropolitan Government, which requires "green" roofs on all new buildings with a footprint of greater than 1000 m^2, as a means to combat the urban heat island effect (Shaw et al., 2007).

The instruments selected by local governments to implement adaptation objectives vary from one community to another. For example, comparing adaptation to flood risks in two Swedish municipalities, Storbjörk (2007) observed that one local government opted for technological, engineered measures based on a closed process of expert consultation, while the other chose non-structural adaptive responses, such as planned flooding, after a more inclusive process involving stakeholder engagement and public consultation. In another study comparing 10 local governments in Denmark, Lund et al. (2012) found consistency in municipal goals for storm water management, but observed variance in the chosen policy instruments. Whereas 60 percent of municipalities opted for investing in infrastructure expansion, the other 40 percent focused on establishing and expanding wetlands, a naturalized, ecological approach to flood abatement. Officials in three Australian municipalities studied by Measham et al. (2011) expressed varying preferences for local adaptation instruments, which ranged from public demonstration projects to financial levies for protective capital works to the purchase of properties at future risk of flood inundation. The different policy instruments selected by local governments, and the rationales for choosing among them, are aspects of policy content that must be better documented and explained through comparative policy analysis.

Agents are the officials and organizations who employ the instruments to implement policy objectives. Policies are most often implemented by public employees, but outside the formal bureaucracy, there are various arms-length agencies, boards, and commissions that deliver public services and regulate behaviour, and these units also serve as policy agents. Agency through partnerships with non-profit organizations or private firms is increasingly common, particularly when the implementation strategy calls for infrastructure construction or public education and training (Girard et al., 2009; Harman et al., 2015).

Local adaptation policies differ with respect to the assignment of implementation agents. For example, professional planners are often implicated, due to their role in setting out a strategic vision for development and their use of tools such as official plans, zoning regulations, and development permits, which can ensure land use decisions minimize climate-related risks (Measham et al., 2011; Richardson and Otero, 2012). Those who manage public infrastructure assets such as roads, bridges, and buildings, are often identified as having a key role to play in implementing adaptation policy objectives, by ensuring these critical systems are resilient in the face of climate-related stress (Auld et al., 2007; Terrain Group, 2007). Water managers are regarded as increasingly important agents of local adaptation policy, due to changes in the volume, availability, and quality of water that are expected as a result of climate change (Muller, 2007; Miller and Belton, 2014). The rationale for choosing particular agents, and the implications of this choice, has been little explored in existing research, and it is an aspect of local adaptation policy that must be better understood through comparative analysis.

As this section has demonstrated, policy content can be conceptually divided into several components—goals, targets, instruments, and agents—which serves to better operationalize "adaptation policy" as a unit of analysis, and allows for finer-grained description and comparison of the scope and means of local adaptation policy. Existing case studies indicate that these elements vary from one jurisdiction to another. Focused, comparative policy analysis is required to document similarities and differences in adaptation policy cases. The four elements of policy content we have described here provide an analytic framework for developing grounded theoretical propositions about the determinants of local adaptation policy choices, which in turn may help to draw lessons that can guide ongoing adaptation policy development.

6. Policy process

Analysts commonly disaggregate the policy process into a number of conceptual stages, including *agenda-setting*, in which problems come to be defined as important, brought to the attention of public authorities, and prioritized for action; *policy formulation*, whereby policy-makers design policy options and recommend a course of action; *decision-making*, which involves the selection of a policy option; *implementation*, where policies are put into effect; and *evaluation*, which refers to monitoring and measuring the performance of the policy, often leading to amendment or redesign (Jann and Wegrich, 2007). The stages model provides a general framework for analysis and calls attention to the constellation of actors, ideas, and institutions that influence policy choices at various temporal points, but it artificially portrays the policy process as orderly and sequential (Howlett and Giest, 2013). In reality, policy actors enter and exit at various stages of the process, and the elements of policy-making often occur concurrently, rather than consecutively (Dovers, 2005: 67).

In light of this, Wu et al. (2010) reframed the five stages as "general policy-making functions" and elucidated the skills and tasks that each requires of public managers, irrespective of the order in which they occur. For example, public officials are instrumental in setting the policy agenda, because they are uniquely positioned to identify emerging policy problems, screen demands for attention to particular issues, and sustain public and political attention to policy issues over time. Similarly, they have an important role in defining priorities, formulating and evaluating policy options, engaging stakeholders, and marshalling resources. This perspective is useful for comparative analysis of the policy process in different jurisdictions, because it focuses attention on policy-making activities that are virtually universal. The sections below analyze seven key adaptation policy-making functions, drawing on existing case studies to illustrate how these functions have been carried out in different local contexts.

6.1. Setting the agenda

Constrained by scarce time and resources, local decision-makers necessarily focus their attention on a limited slate of policy issues at any particular time. Problems typically secure space on this agenda in one of two ways (Cobb et al., 1976). In an "outside initiation" pattern, organized interests draw attention to a problem and cultivate support for a proposed solution, in hopes that this will stimulate active consideration by public officials. The converse is "inside initiation", whereby a unit within government identifies a problem, engages key stakeholders to formulate a workable solution, and then puts the proposal to decision-makers for endorsement.

Although both the public and politicians abstractly acknowledge climate change as a problem, issues perceived to be more pressing and solvable receive attention and priority. This is partly due to the long term, uncertain nature of climate change, which fails to mobilize organized interests to demand action on adaptation, as is typical of the "outside initiation" model (Lorenzoni and Pidgeon, 2006; Corfee-Morlot et al., 2011). Climate adaptation appears to approximate the characteristics of what May (1991) described as "policies without publics"—low-salience policies that attract little public attention, and that address problems with diffuse impacts, such that there are weak incentives for interests to mobilize. Unlike other issue areas, in which coalitions of interests compete to influence policy choices, policy design in the world of policies without publics is dominated by "technical experts acting on their sense of the public interest, not by interest groups or elected officials acting on behalf of public demands for improved policy" (Birkland, 1998: 67). Indeed, the predominant depiction of adaptation policy development in the existing literature is an "inside-initiated" process, whereby a champion recognizes the need for adaptation and works to assemble background information to attract the attention of decision-makers (e.g., Penney and Wieditz, 2007; Dannevig et al., 2013).

Scholars have long referred to "policy windows" as key moments when decision-makers are particularly receptive to proposed solutions (Kingdon, 2003: 166). Policy windows typically open after "focusing events"—relatively rare occurrences such as a crisis or disaster that suddenly and rapidly attract attention to a problem and signal the need for corrective action (Birkland, 1997). For adaptation policy, extreme weather events appear to have this focusing power, in that their negative impacts foreshadow potential future harms associated with climate change. In Toronto, Canada, for example, policy-makers used a severe summer storm in 2005 to focus attention on the need to adapt to climate risks (Henstra, 2012). Similar issue attention dynamics have been observed elsewhere in Canada, as well as in other states, such as Norway (Dannevig et al., 2013), Sweden (Keskitalo, 2010) and the United Kingdom (Penning-Rowsell et al., 2006). In Bergen, Norway, for example, a fatal landslide prompted public officials to propose new rules requiring a risk assessment and water management plan as preconditions for building permit approval, and these regulations were later reframed as adaptation after a change of political leadership (Groven et al., 2012). In Rotterdam, the Netherlands, adaptation emerged as an economic strategy to reassure hesitant business investors that the city was resilient to flood risks. Comparative analysis is required to understand the different ways in which adaptation makes its way onto the policy agenda, and how this affects the content and process of adaptation policy-making.

6.2. Framing the problem

Policy problems are complex and subject to multiple interpretations. The way in which a problem is framed—how it is perceived by the public and policy-makers—influences the sense of urgency to correct it, the interests that mobilize around it, and the type and range of solutions proposed (Dery, 1984; Spector and Kitsuse, 2001). Frames influence the priority that policy actors place on certain interests and goals and point them towards causal and normative judgements about appropriate courses of action (Bleich, 2002). Problem framing is also political, in that actors often deliberately frame problems in a way that advances their interpretation of their causes and effects and directs public authorities towards their preferred course of action (Stone, 1989).

Based on existing studies, it appears that climate adaptation is framed in at least four different ways (Dupuis and Knoepfel, 2013; McEvoy et al., 2013). A *hazard* frame emphasizes the future threat that climate change poses to people and property, in addition to natural variability, which must be addressed through disaster management programmes. A *risk* frame regards climate change as a source of potential but uncertain risk, which can be managed by estimating the probability and impact of various manifestations, such as extreme temperatures. A *vulnerability* frame regards climate change as one of many stresses on communities and focuses attention on reducing the core determinants of vulnerability, such as poverty, poor health, and inequality. A *resilience* frame emphasizes a community's capacity to absorb climate-related stresses, recover quickly from system failures, and learn from experiences by reflexively adjusting practices to reduce vulnerability. These different problem frames have implications for the goals and means of adaptation policy, which could target general vulnerability, short term climate variability, periodic climate extremes, or long term shifts in mean conditions.

Existing case studies suggest that framing has material impacts on policy development. For example, among the seven Australian municipalities they studied, Baker et al. (2012) found that all but one had framed climate change as solely an environmental issue, which impeded cross-sectoral integration of climate risk and biased instrument selection towards information-gathering and research. Similarly, in their study of three local governments in the Sydney region, Measham et al. (2011) reported that the framing of adaptation as an environmental issue had been a barrier to its integration into development and land use planning. In Prince George, Canada, Picketts et al. (2014) found a perception among policy-makers that climate change was predominately an environmental challenge, and this biased their preferences towards land use and transportation strategies, and away from economic and social development measures. Although the importance of framing has been acknowledged in some climate change research (e.g., Spence and Pidgeon, 2010; Morton et al., 2011), this crucial policy-making function and its implications deserve greater attention through comparative analysis.

6.3. Engaging stakeholders and the public

Stakeholders are individuals, groups, and organizations who could be affected by policy objectives, or who have the power or resources to affect policy development and implementation (Bryson, 2004). It is commonly argued that stakeholder support influences the political feasibility and perceived legitimacy of policy options, and that neglecting the concerns of stakeholders can lead to poor policy performance and often policy failure (Van Horn et al., 2001; Wallner, 2008; McConnell, 2010). The policy-making process is also believed to be improved through public participation, because it educates people about issues, provides a means to assess the social acceptability of policy options, and enhances the democratic legitimacy of policy decisions (Walters et al., 2000; Irvin and Stansbury, 2004).

In the context of adaptation policy, stakeholder engagement involves collaborating with individuals and groups who will be

significantly affected by climate-related stress, or whose interests will be affected by adaptation policies (Conde and Lonsdale, 2004). Engagement is argued to be important because: (1) stakeholders possess specialized knowledge about climate change and offer valuable expertise; (2) it builds trust and strengthens the legitimacy of policy choices; and (3) stakeholder support expands the political salience of adaptation, providing an incentive for elected officials to devote attention to the issue (Tompkins et al., 2008; Sherman and Ford, 2014). Based on a Canadian case study of adaptation policy-making in Québec City, for example, Cloutier et al. (2015) concluded that engaging diverse stakeholders helped to improve policy development by facilitating a shared understanding of climate-related risks and fostering a collective shift in traditional practices. Similarly, Solecki (2012) asserted that engaging stakeholders in New York was critical to securing their "buy-in" to the adaptation planning process. Involving the public is also argued to be important, because it can increase awareness of climate-related risks, generate support for policy responses, and legitimize scarce resources allocated to adaptation planning (Few et al., 2007). For instance, in a case study of Greater Sudbury in Ontario, Canada, Vasseur (2010) described how public participation was an essential ingredient of the city's "community-based approach" to adaptation policy.

However, whether or not greater stakeholder engagement and public participation lead to better policy is an outstanding question (Swart et al., 2014), and these processes do not appear to be *necessary* in order to develop adaptation policy. In their study of Danish municipalities, for instance, Lund et al. (2012) found that only 42 percent of local governments had involved the public in adaptation planning, mainly because they perceived citizens as disinterested. Similarly, Aall et al. (2007) found little evidence of public participation and engagement in climate change policy and planning in most Norwegian municipalities. Whether stakeholder and public involvement are desirable, and under what conditions they are effective, must be further explored through comparative research.

6.4. Setting priorities

Faced with limited resources and many competing demands, local policy-makers necessarily prioritize which aspects of a problem to address, and in what sequence. There is no standard method for defining policy priorities, and techniques differ across policy domains. Moreover, priority-setting is a political activity, involving conflict over values and interests (Smith et al., 2014).

Experts frequently recommend risk management as a decision support framework to identify and prioritize climate-related risks and to select appropriate responses (Noble et al., 2005). Through the use of alternative scenarios and continuous communication with stakeholders, policy-makers can consider various outcomes, estimate their consequences, and propose solutions that are publicly and politically acceptable (van Aalst et al., 2008). For example, as part of a participatory case study of adaptation planning in the Canadian city of Prince George, British Columbia, Picketts et al. (2012) engaged stakeholders in setting adaptation policy priorities. This process involved: (1) presentations examining historical climate trends and future projections; (2) small focus groups to link the projections to specific local impacts; (3) collective evaluation of impacts in terms of risks to city operations (likelihood and consequences); and (4) discussion of potential adaptation actions and the individuals and groups who would need to be involved in their implementation. Some communities are also adopting other sophisticated measures, such as Bayesian inference, to evaluate the relative costs and benefits of adaptation interventions (Mathew et al., 2011). How and why local governments prioritize certain aspects of climate change, the relative priority they assign to adaptation versus other needs, and their methods of determining the relative priority of alternative interventions are subjects that warrant further investigation through comparative policy analysis.

6.5. Formulating policy options

Policy formulation involves generating plausible policy choices to address a problem and assessing their feasibility (Wu et al., 2010: 29). Public administrators are typically the key actors, working in interdepartmental committees or task forces to develop policy alternatives. Operating within the strictures of political imperatives and available economic resources, policy-makers employ techniques such as formal data analysis, stakeholder dialogue, and jurisdictional scans to identify potential courses of action and evaluate their relative workability and acceptability (Howlett et al., 2009: 111–113). Through this formulation process, choices are made concerning policy goals, targets, instruments, and agents.

Comparing the actors involved in formulating policy options, and the criteria used to evaluate courses of action, helps to understand differences in adaptation policies among communities. Existing case studies suggest that policy formulation is often undertaken by a relatively small, specialized working group, normally composed of public officials from various municipal departments, representatives from local utilities, and sometimes key stakeholders from the community (Penney and Wieditz, 2007; Henstra, 2012; Solecki, 2012). The composition of the group at the centre of policy formulation appears to influence the way in which options are generated and evaluated. In Denmark, for example, Lund et al. (2012) found that municipal adaptation decisions were dominated by sector professionals and were therefore based on technical considerations, with little regard for "economic, social, environmental, and legal aspects of adaptation measures" (p. 620). This policy function bears further investigation through comparative analysis.

6.6. Generating political support

Political will—the collective willingness to take a course of action—is critical to policy success, particularly among actors with the authority or capacity to approve, implement, and enforce public policies (Post et al., 2010). Political barriers to policy adoption and implementation often include ambiguous direction from elected officials and conflicting preferences concerning policy solutions (Wu et al., 2010). Assessing and building political support is therefore a key policy-making function, which can involve mapping supporters and opponents of policy options, evaluating the incentives and disincentives decision-makers face in adopting a particular option, and engaging stakeholders, implementation agents, and the broader policy community to generate buy-in for proposed courses of action (May, 2005).

Political will is regarded as an essential enabling condition for local adaptation policy development (Wilson, 2006; Ford and King, 2013). But due to weak public interest, immediate costs but long-term, uncertain benefits, unclear policy jurisdiction, and many competing demands for resources, local elected officials are unlikely to perceive climate adaptation as a pressing priority (Juhola et al., 2012; Hjerpe et al., 2015). Respondents in the seven Australian municipalities analyzed by Baker et al. (2012), for example, cited a lack of political support as a significant barrier to adaptation policy development, reporting that some elected officials denied the importance of climate change and were more concerned with short-term, visible priorities (p. 134). Measham et al. (2011) found similar evidence of weak political support in the three Australian municipalities they studied, and observed that

the mayor had particular influence on the salience of climate change and adaptation. Examining adaptation planning in New York City, Solecki (2012) reported that political support of the mayor was instrumental in driving the local agenda, and this confirms the findings of Burch (2010), who identified mayoral leadership as a key resource for overcoming barriers to local policy development in municipalities in British Columbia, Canada.

In Norway, Aall (2012) found that demonstrating the co-benefits of specific adaptation actions to decision-makers gives them wider appeal and generates buy-in from diverse stakeholders required for prioritization and implementation. Henstra (2012) found that policy-makers in two Canadian municipalities successfully generated political support by associating adaptation with other popular community values, such as sustainability and livability. However, there remains limited research evidence about the strategies that local officials use to generate political support for climate adaptation, and this is an important subject for comparative analysis.

6.7. Policy integration

In policy studies literature, implementation typically refers to specific actions taken to put policy objectives into effect. However, implementation can also involve efforts to entrench a particular social value as an overarching lens through which subsequent proposed laws, policies, and programmes are evaluated, a process commonly referred to as 'mainstreaming'. A related concept is policy integration, which appears most notably in the context of environmental policy, referring to the principle that environmental, social, and economic policies must be integrated in order to achieve sustainable development (Lafferty and Hovden, 2003).

It has been argued that to be robust and durable over time, adaptation principles and objectives must be integrated into day-to-day planning and decision-making processes (Bouwer and Aerts, 2006). This mainstreaming institutionalizes climate adaptation as a social lens for decision-making in order to enhance policy coherence by minimizing duplication and ensuring policies are not working at cross-purposes (Kok and de Coninck, 2007). For example, at the local level, adaptation principles are sometimes integrated into official community documents such as vision statements, strategic plans, development guidelines, sustainability strategies, by-laws, regulations, and infrastructure asset management plans (e.g., Baynham and Stevens, 2014; Measham et al., 2011). Since climate change presents risks for many municipal services—water, public health, emergency services, energy, parks and recreation, and so on—mainstreaming is also achieved by integrating adaptation into the job descriptions and performance evaluations of the agents responsible for these sectors (Burch, 2010). Institutional mechanisms to facilitate mainstreaming include the creation of a dedicated administrative unit, a staff position specifically devoted to shepherding climate change initiatives, or an interdepartmental steering committee tasked with integrating adaptation into existing policies and programmes (Penney and Wieditz, 2007; Krause, 2012).

However, policy integration is hampered by institutional constraints—particularly the functional fragmentation of modern governments and poor vertical coordination between levels of government—as well as political barriers, including weak leadership and ideological resistance (Jordan and Lenschow, 2010). As such, mainstreaming adaptation policy is an ideal that appears difficult to implement in practice (Pasquini et al., 2013; Wyborn and Dovers, 2014). Moreover, the integration of adaptation with other policy fields appears to vary from one jurisdiction to another (Groven et al., 2012), which emphasizes the need for comparative research that can build contextual knowledge about whether and how adaptation is mainstreamed into broader governance processes.

Public policy-making is a complex and fluid activity involving many different actors and activities. In this section, we have analyzed seven key adaptation policy-making functions that vary from one case to another, and that must be better understood and explained through comparative policy analysis. Cumulating the results of focused, comparative research on the local adaptation policy process is important for drawing lessons about the enabling conditions for effective policy development. This evidence will also provide a foundation to develop grounded theoretical propositions concerning the factors that influence local adaptation policy choices and the processual influences on policy outputs and outcomes. The next section briefly outlines research methods for comparative analysis of local adaptation policy.

7. Methods for comparative local adaptation policy analysis

In light of the recurring message in adaptation literature that policy choices are influenced by the context in which they are made, a promising research method is comparative case studies, which can be used both deductively (to test theoretical propositions) and inductively (to generate testable propositions). A detailed blueprint for comparative case study analysis is beyond the scope of this paper, so our intention here is to point out the potential that it offers, to identify relevant sources of information, and to provide examples of studies that have employed these methods in analyzing local adaptation.

7.1. Comparative case studies

Case studies investigate a phenomenon and its contextual conditions, guided by theoretical propositions and relying on multiple sources of evidence to triangulate data (Yin, 2003: 14–15). As a research method, the case study is particularly well-suited for the intensive study of a small set of units for the purpose of understanding a larger class of similar units (Gerring, 2004). The case study's strength lies in its ability to incorporate evidence from a variety of sources, including archival records, documents, interviews, and observations, providing for rich, thick description and analytic generalization. This is particularly true of a multiple-case, comparative research design, which employs within-case and cross-case analysis to test theoretical propositions using a "replication logic" (Yin, 2003: 47). The various elements of policy content and the many policy-making activities that comprise the policy process offer analysts a rich context in which to investigate hypothesized relationships between variables.

Comparative case studies also contribute to theory-building, whereby emergent patterns of relationships among constructs within and across cases are used to induce testable propositions (Eisenhardt and Graebner, 2007). Eisenhardt (1989) laid out a clear roadmap for building theory from comparative case studies, offering a step-by-step guide to question refinement, construct development, case selection, data collection and analysis, shaping hypotheses, and iterating between emergent theory and data.

The comparative method is well-suited for studying emerging policy fields like climate adaptation, because analysts begin with only tentative constructs and potentially important variables before purposively selecting cases that are likely to replicate, contradict, or elaborate the emergent theoretical propositions. The key strength of this comparative, case-based theory-building approach is that it produces measurable constructs, falsifiable hypotheses, and an empirically valid theory, because the propositions are intimately tied to empirical evidence (Eisenhardt, 1989).

7.2. Data sources

For both the deductive and inductive approach, there are many potential sources of evidence. For instance, content analysis—the systematic classification, organization, and examination of a body of text to interpret meaning and make inferences about patterns—is a rigorous method to study and compare written policy content, such as plans and strategies (Bowen and Bowen, 2008). Employing content analysis to compare municipal official community plans in the Canadian province of British Columbia, for example, Baynham and Stevens (2014) found that most contained relatively clear policy goals, but few included means for implementation.

Official policy documents, meeting transcripts, council minutes, reports of special-purpose bodies, committee papers, internal memoranda, consultants' briefs, archival records, and media reports provide rich sources of evidence, which help to document aspects of the policy process. Data obtained through documentary analysis is typically buttressed by semi-structured interviews with proximate policy-makers and policy agents, such as local environment officials, planners, emergency managers, and infrastructure administrators, as well as officials with broader responsibilities, such as elected officials and senior officers. In Norway, for example, Dannevig et al. (2012) used a mixed-methods approach that combined evidence from documentary analysis, a survey, and elite interviews, noting significant variation in the scope and substance of adaptation policy among the communities. In their case studies of Australian municipalities, Measham et al. (2011) interviewed a range of informants, including "elected leaders, senior managers, town planners, environmental managers, engineers, and social planners" (p. 896).

When used in combination with other research techniques, focus groups can also add research depth and breadth to the comparative, qualitative study of climate adaptation policy, providing insights into the norms, beliefs, values, and interests of policy-makers and stakeholders (Short, 2006). Convening agents and facilitating group conversations (Morgan, 2004) can help to further explore contextual influences on adaptation policy choices, and the factors that enable and constrain policy development (Ekstrom and Moser, 2013). In British Columbia, Canada, for instance, Picketts et al. (2013) brought together city staff and community stakeholders to study downscaled climate scenarios, prioritize impacts, and determine local adaptation priorities. This action-oriented approach gave the researchers first-hand experience in working through the barriers and challenges local governments face in developing adaptation policies (Picketts et al., 2012).

In sum, comparative case studies are a promising method to investigate factors that are believed to influence local adaptation policy choices and processes, and to induce theoretical propositions regarding variables that determine similarities and differences across jurisdictions. There are many sources of information to support comparative case studies, and there are various research tools that can be employed to collect evidence. Research designs that combine these techniques are better able to triangulate evidence and produce valid and reliable findings (Maxwell, 2004).

8. Conclusion

Local governments are key actors in the formulation and implementation of climate adaptation policies, and case studies of local adaptation policy-making have proliferated in recent years. However, insufficient attention has been devoted to operationalizing "adaptation policy" as a unit of analysis, and the research methods employed have constrained limited valid comparison of policies and policy-making across cases. In this article, we have advocated comparative adaptation policy analysis as the next step towards knowledge generation and cumulation, and have sought to contribute to the conceptual and methodological foundations of this research agenda. First, we have synthesized insights from public policy scholarship and adaptation research to operationalize two salient objects of comparative policy analysis—policy content and policy process—and to identify sub-components that can be studied and compared across cases. Second, we have used the findings of existing case studies to demonstrate variation in these policy elements across local jurisdictions. Finally, we have outlined methodological tools that can be employed in service of adaptation policy analysis, with an emphasis on comparative case studies and qualitative research techniques, and we have offered examples of existing adaptation studies that demonstrate these methods in practice.

Comparative case study analysis has the potential to build both knowledge and theory about local adaptation policies and policy-making. The rich, thick description and analytic generalization characteristic of this method promises to provide new insights on adaptation governance, meaning the "decisions, actors, processes, institutional structures and mechanisms. . .involved in determining a course of action" (Moser, 2009: 315). Compiling evidence from multiple sources helps to better understand the contextual nature of adaptation policy choices, and the factors that enable local officials to surmount the plethora of barriers commonly cited in adaptation literature. The broader value of these empirical findings lies in their potential to inform subsequent policy development and provide guidance for other jurisdictions facing similar risks and challenges associated with adapting to climate change.

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