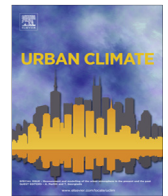


Contents lists available at [ScienceDirect](http://ScienceDirect.com)

Urban Climate

journal homepage: www.elsevier.com/locate/uclim

Institutionalizing the urban governance of climate change adaptation: Results of an international survey



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ARTICLE INFO

Article history:

Received 14 January 2015

Revised 10 June 2015

Accepted 24 June 2015

Keywords:

Cities

Adaptation

Governance

Local government

Climate change

ABSTRACT

Three hundred and fifty municipalities across five continents participated in the Urban Climate Change Governance Survey (UCGS). Conducted at MIT in partnership with ICLEI – Local Governments for Sustainability, the UCGS provides a first of its kind look at the governance networks that municipalities are creating to address climate change.

Drawing from these results, this paper analyses the institutional governance structures that surround local government work on climate change adaptation. Results show an integration of adaptation and mitigation planning, and a mainstreaming of adaptation planning into other long-range and sectoral plans. Seventy-three percent of respondents stated that their local government's are engaging with both adaptation and mitigation, and 75% are integrating adaptation into long-range or sectoral plans. However, many critical municipal agencies – including those responsible for water, waste water, health, and building codes – remain on the margins of urban adaptation efforts.

Internal institutional networks of governance are inextricably linked to efforts to address a problem like adaptation, which does not fit neatly into individual institutional silos. The results of the UCGS show where these networks have so far been made, how they have been created, and which local government actors have yet to be effectively engaged.

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1. Introduction

Urban responses to climate change are entering their third decade. In the face of the prolonged failure to produce a coordinated international response to climate change, the urban scale continues to show that concrete action is possible. But this success is only relative. Aside from inspiring examples from charismatic innovators like Vancouver, Copenhagen, or Durban, research shows that action at the local level has so far done little to reduce global anthropogenic greenhouse gas emissions, or adapt urban systems to face the impacts of a changing climate (Aylett, 2014; Carmin et al., 2012b).

But urban responses to climate change continue to evolve. Some of the most important shifts underway have do with the poorly understood processes of institutionalizing climate change planning within municipal agencies, and building effective internal networks of climate change governance. Initially narrow efforts focused on energy efficiency and mitigation are becoming increasingly ambitious, and have expanded to include adaptation. Simultaneously, cities are moving climate change out of a narrowly environmental silo and attempting to mainstream it across the municipal bureaucracy (Bloomberg and Aggarwala, 2008; Rosenzweig et al., 2011; Aylett, 2014).

To explore how this is happening, this paper seeks to clearly describe the institutional networks of governance that local governments are creating to carry out their work on climate change adaptation. It will identify the key institutional actors

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<http://dx.doi.org/10.1016/j.uclim.2015.06.005>

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driving climate adaptation work, and examine efforts to integrate adaptation planning within municipal agencies and processes.

The existing work on the institutionalization and mainstreaming of urban adaptation to climate change is largely based on case studies and policy analysis of local adaptive responses in single cities, or small groups of cities (Carbonell and Meffert, 2007; Carmin et al., 2009; Tanner et al., 2009; Wolf et al., 2010; Carter, 2011). But work has begun to create a broader picture. The 2011 Urban Climate Adaptation Survey conducted by JoAnn Carmin at MIT in collaboration with ICLEI (Carmin et al., 2012b) was an important milestone in this process. This survey provided the first global overview of the status or urban adaptation planning and action. Subsequent to this Isabelle Anguelovski, working with JoAnn Carmin and Eric Chu, produced a matrix of indicators allowing for a more robust comparison of individual case studies of local adaptation planning processes (Anguelovski et al., 2014). This paper represents a continuation of these efforts.

The data discussed below was collected as part of the MIT-ICLEI Urban Climate Change Governance Survey (UCGS), which builds on Carmin's (2011) survey while incorporating some of the finer grained detail that also became the basis for the indicators matrix. This allows for a more detailed discussion of how local governments are institutionalizing adaptation planning and action and negotiating the multiple interconnections and constraints that affect local adaptive responses. This research focuses not on the "what" of adaptive responses (in terms of specific techniques for "climate-proofing" urban infrastructure, for example) but on the "how": the ways in which local governments are building adaptation into their structures and practices.

The body of this article is organized into five sections. The first provides a short overview of the way that networks of governance are defined for the purposes of this article. The second describes the methodology used to design and implement the survey. The third explores the existing literature on urban adaptation and environmental governance. The fourth covers key adaptation related findings across six key subthemes (covering general global trends and more specific regional observations). The last section discusses the implications of these findings in more detail.

2. Networks of governance: a note on terminology

The term "governance" implies a focus on how authority and resources are allocated to make possible control and coordinated action (Rhodes, 1996). Rather than contrasting "governance" to "government", this paper focuses on governance *within* government. It uses a definition of governance that positions local government actors within a spectrum of activity and authority that spans multiple scales (local, regional, national, inter-municipal, global) and kinds of actors (governmental, civil-society, and private sector) (Bulkeley, 2005). From this starting point, this paper adopts an even more specific focus on the networks of governance that develop within local governments.

As we will see, urban climate policies requires feats of internal network building and coordination every bit as delicate and contested as the external relationships between state, community, and private sector actors that are the focus of traditional studies of governance (see also Rutland and Aylett, 2008; Burch, 2009; Aylett, 2011a,b,c). Previous research on climate change networks has focused on the transnational and intermunicipal networks (Bulkeley et al., 2003; Betsill and Bulkeley, 2004). This paper focuses on the networks within individual local governments that link together elected and bureaucratic actors through formal and informal pathways.

3. Methodology

In the spring of 2013, a survey was sent to communities around the world that were currently members of ICLEI – Local Governments for Sustainability.¹ The survey's 69 questions were divided into 6 sections: (1) basic characteristics of local government climate change initiatives; (2) institutional structures for addressing climate change; (3) the mainstreaming of climate change across municipal agencies; (4) challenges to planning and implementation; (5) engagement of non-governmental and non-local groups with planning and action, and; (6) location characteristics.

The survey instrument was designed to access a high level of detail surrounding the institutional structures and networks of governance that surround urban climate change planning, and to collect information on both adaptation and mitigation (see Aylett, 2014 for an overview of the complete findings). ICLEI staff members in Europe, Africa, and Asia, and urban climate change researchers in North America and Europe reviewed the survey questionnaire for content and clarity.

ICLEI members around the world were then invited to participate in the survey. These invitations were sent to ICLEI's primary contact person in each local government – generally these are the staff member most directly involved with the climate-planning portfolio. All direct communication with respondents was conducted by e-mail, with supporting publicity for the survey included in ICLEI's iNews newsletter. First contact was initiated with an introductory e-mail explaining the aims of the research and containing a link to the on-line survey. This e-mail also offered respondents the opportunity to receive the survey as a document, and to opt-out of future e-mails. Non-respondents, or respondents who had only completed a portion of the survey, were sent reminder e-mails at two-week intervals, as well as 72 and 24 h before the

¹ ICLEI is dedicated to supporting local action on environmental sustainability. Active since the early 1990s, it works principally with local governments, and maintains the world's largest and oldest inter-municipal sustainability network.

on-line survey closed. As an additional incentive to complete the survey, respondents were entered into a draw for one of three tablet computers.

The survey questionnaire and all e-mails were translated into French, Spanish, and Korean. These languages were chosen, in consultation with ICLEI staff, in order to reach the largest number of ICLEI members who would not have been comfortable responding to the survey in English.

After correcting for inaccurate contact information and removing ICLEI members who were not representative of local governments (such as regional associations), 736 local governments received an invitation to participate in the survey. In total, 350 (48%) of those contacted responded to the survey, and 264 (36%) completed the entire survey. Cities in the United States (US) account for the largest number of survey responses (reflecting ICLEI's large membership there); they were followed by cities in Europe, Australia and New Zealand, Asia, Latin America, Canada, and Africa (see [Table 1](#)). Response rates were highest in Canada, followed by Latin America, Australia and New Zealand, the US, Europe, Asia, and Africa.² For purposes of analysis, respondents were grouped into geographical regions, with the exception of North American cities. Given the large number of US respondents, U.S. cities were treated separately, as were Canadian respondents: Mexican cities were grouped with other Latin American respondents. Participants generally took between 45 min to one hour to complete the survey.

A descriptive statistical analysis was then conducted to identify key characteristics of local responses to climate change at both the global and regional level ([Aylett, 2014](#)). This analysis was conducted for adaptation, mitigation, and general climate change planning (that is to say both adaptation and mitigation). The survey material and analysis covered in this article focuses on key results related to adaptation planning and related findings that have to do with climate change planning more generally (see [Aylett, 2015](#) for a discussion of specifically mitigation related findings).

4. Perspectives on urban adaptation and institutionalizing adaptation governance

Adaptation to climate change is a nexus, not a single isolated issue. Its boundaries are not defined by any single type of intervention, area of action, or group of actors – quite the opposite. Strong adaptation measures require crosscutting action across multiple sectors of urban life carried out by a variety of actors. There are well developed literatures that explore the importance of integrating adaptation measures in specific sectors such as spatial planning ([Hamin and Gurran, 2009](#); [Carter et al., 2015](#)), energy ([Neumann and Price, 2009](#); [Williamson et al., 2009](#); [Hammer et al., 2011](#)), transportation ([Trilling, 2002](#); [Mehrotra et al., 2011b](#)), water ([Muller, 2007](#); [O'Hara and Georgakakos, 2008](#)), equity ([Dodman and Satterthwaite, 2008](#); [Hardoy and Pandiella, 2009](#)), and health ([Patz et al., 2005](#); [Haines et al., 2006](#); [Ebi and Semenza, 2008](#)). More holistic assessments point to the fact that the cross-system impacts of both climate change itself and adaptation strategies also require us to coordinate policy responses across multiple sectors ([Kirshen et al., 2008](#); [Dovers and Hezri, 2010](#); [Lawrence et al., 2013](#)). In other words, we are faced with the challenge of mainstreaming responses to climate change both *within* and *across* existing urban systems.

The links between local climate change policies and other key urban sectors can be enabling and problematic. This challenging duality has been explored in some detail in the literature on climate change and sustainable development ([Gibbs, 2000](#); [Wilbanks and Kates, 2003](#); [Swart et al., 2003](#); [Pielke, 2005](#); [Robinson et al., 2006](#); [Van Asselt et al., 2005](#)). On the one hand, it has been argued that these interconnections create possible synergies where climate policies can contribute to achieving other local development goals, for example in areas such as health, housing, employment, or access to basic services. This is technically and politically effective. So-called “no regrets” actions (actions that address climate change at no cost or even to the benefit of achieving other development priorities, see [Pielke, 2005](#)) efficiently use scarce resources to achieve multiple goals. In so doing, they allow policy to effectively negotiate conflicts between long-term and short-term goals, and between environmental and socio-economic priorities (see also [Wilbanks, 2003](#)). In this way, attention to synergies and mainstreaming helps to strengthen the position of adaptation programs within the complex political economy of competing local priorities.

However, the same network of interconnections that makes these synergies possible also creates significant governance challenges, as they can require traditionally siloed local government agencies to collaborate in an emerging policy domain where few have established capacities or tools ([McCarney et al., 2011](#)).

In response to the crosscutting nature of the adaptation portfolio, increasing attention is being placed on ways in which local governments can integrate adaptation planning and action into the established functions of local government agencies ([Carmin et al., 2012a,b](#); [Groven et al., 2012](#); [van den Berg and Coenen, 2012](#)). This mainstreaming is intended to increase the efficiency and effectiveness of adaptive responses, reduce contradictions between policies, and avoid competition between adaptation and other policy priorities by maximizing synergies and co-benefits between policy objectives ([Kok and De Coninck, 2007](#)).

At the same time, adaptation planning must also contend with a variety of other constraints. As [Anguelovski et al. \(2014\)](#) effectively synthesize, local efforts to design and implement climate adaptation can be constrained by a variety of economic, institutional, political, and developmental issues. These range from strictly siloed local government agencies that hinder coordinated action, to the institutional weakness of environmental agencies, and competition for resources from other

² This global participation rate is similar to that from the survey conducted by [Carmin et al. \(2012b\)](#) (which recorded a 43% overall response rate). Regional response rates were also similar, with the exception of Asia, Europe and Australia and New Zealand. In these areas response rates for the 2013 survey were between 14% and 21% higher than those recorded in 2011.

Table 1
Number of survey responses and response rates by region.

	Contacts	Responses	Response rate (%)
Canada	26	17	65
Latin America	41	22	54
Australia and New Zealand	87	45	52
USA	292	141	48
Europe	152	69	45
Asia	97	42	43
Africa	41	14	34
Global	736	350	48

developmental priorities (such as infrastructure, housing, or economic development) (Urwin and Jordan, 2008; Chuku, 2010; Mees et al., 2013; Carmin et al., 2012a,b; Simon, 2012; Anguelovski et al., 2014).

The degree to which local governments succeed at mainstreaming adaptation planning (and climate change planning more generally) has in large part to do with the institutional structures that they create to drive adaptation work forward. But the diversity of approaches that cities adopt makes this a challenging area for research. Even within the same region or country, there is no single model for the institutionalization of local climate adaptation planning. In some cases, adaptation planning has been integrated into sectoral plans with collaboration across sectors coordinated by a dedicated climate planning team and a city-wide adaptation strategy. In others, planning and action proceed in a limited and isolated fashion. Other cities have yet to clearly assign responsibility for adaptation planning and depend heavily on private consultants or the support of international non-profits and networks (Carmin et al., 2012a,b; Aylett, 2014).

The literature summarized above outlines the shape of the policy space for urban adaptation planning and action. It is a space defined by four key elements:

1. A policy object that is a nexus, existing at the overlap of multiple different organizational, institutional, and physical systems. These interconnections can either enable (through synergies) or impede (through organizational complexity) effective action.
2. A broader context of economic, institutional, political, and developmental constraints.
3. A focus on integrating and mainstreaming adaptation planning (and climate change planning more generally) to address these interconnections and constraints.
4. And finally, nascent and varied efforts to effectively institutionalize adaptation planning (and climate change planning more generally).

5. Survey results

The UCGS covered a broad range of issues related to the institutional context that currently surrounds climate change planning. The results covered in this section draw from those parts of the UCGS that specifically focused on adaptation, as well as those that covered climate change planning in general (i.e., both adaptation and mitigation) more generally. Results will be presented looking at: (1) the relationship between adaptation and mitigation planning, (2) the integration of adaptation planning, (3) the institutional structures being created to carry adaptation work forward, (4) tactics being employed to mainstream climate change planning and action, (5) internal support for climate change policies and programs, and (6) key barriers to action. The implications of these results will then be explored in more detail in the discussion section.

5.1. Adaptation and mitigation planning

The first key finding is that adaptation planning has rapidly established itself in a policy space previously dominated by mitigation planning. In total, 73% of respondents stated that their local government's engagement with climate change focuses on both adaptation and mitigation. Twenty-four percent (24%) reported that they focus solely on mitigation, and 3% reported that their focus is solely on adaptation (see Fig. 1). Of cities that are addressing both adaptation and mitigation, 92% reported that they are treating the issues in an integrated way that takes into account the synergies and conflicts that exist between planning in each area.

These results are generally stable geographically, with one striking exception: municipalities in the US report the lowest rate of engaging with both adaptation and mitigation (at 58%) and the highest percentage of cities conducting only mitigation planning (41%).

5.2. Integration of adaptation planning

To better understand how adaptation planning and adaptation plans are situated within the context of other municipal plans, respondents were asked whether they had stand-alone adaptation plans, stand-alone climate change plans that

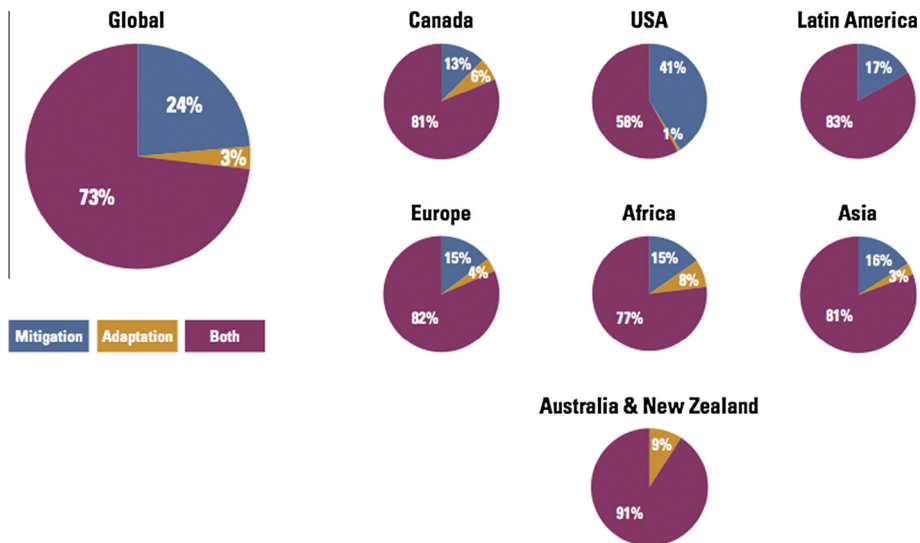


Fig. 1. Focus of climate change planning and action.

covered both adaptation and mitigation, or had included adaptation within other sectoral, long range, or sustainable development plans. Given that adaptation planning is not necessarily restricted to a single plan or administrative unit, respondents were able to signal all areas where they were conducting adaptation planning.

Responses show that, rather than creating stand-alone adaptation or climate change plans, it is more common for local governments to integrate adaptation planning into other types of plans. Forty-three percent (43%) reported integrating adaptation into their long-range plans (i.e. Integrated Development Plan, Official Community Plan, long-term development plan, etc.); 32% into broader sustainable development plans, and 32% into existing sectoral plans (i.e. spatial development, transportation, or economic development plans). In contrast, 39% of respondents report having a stand-alone plan specifically focused on both adaptation and mitigation, and 28% report having a plan focused solely on adaptation (see Fig. 2).

Looked at by regional and national sub-groups, Canadian cities are the most likely to report that they have a plan specifically focused on adaptation and that they are integrating adaptation into municipal long-range planning (at 57% for each). They are also by far the least likely to report having a plan that focuses on both adaptation and mitigation (14%). African (11%) and US (17%) respondents are the least likely to report having plans specifically focused on adaptation. While African respondents are also the most likely to report having plans focused on both adaptation and mitigation (67%), and having included adaptation within a plan focused on sustainable development more generally (56%). Many local governments report addressing adaptation in multiple locations within local planning processes, and respondents report an average of, at minimum, 1.7 plans that address adaptation.³

Overall, these adaptation related findings closely match the answers given in the sections of the survey that addressed mitigation planning. There are however two areas where results diverged significantly. First, 35% of local governments report having plans specifically focused on mitigation (compared to 28% for adaptation). Second, cities are including mitigation more frequently than adaptation across the different types of planning processes conducted by local governments. Respondents report an average of (at minimum) 2.2 mitigation related plans (compared to 1.7 for adaptation).

5.3. Institutional structures

The responses discussed above point to a mainstreaming of adaptation planning within local government structures. To understand these dynamics in more detail, respondents were asked to describe the agency principally responsible for climate change planning (covering both adaptation and mitigation), and then to rank the engagement of various other municipal agencies with the issue of climate change.

Globally, 40% of cities report that they have a small team of 1 to 5 employees in charge of their climate planning efforts. Twenty-three percent (23%) report having a single staff member (i.e. a sustainability coordinator), and 15% report that responsibility for the climate-planning portfolio had yet to be clearly assigned. Less common (8%) are cities that report having a large team (of 6 or more full time employees), or distinct teams for adaptation and mitigation (4%). The size of climate

³ This average represent the minimum number of adaptation-related plans reported by UCGS respondents. Respondents were asked about integration into types of planning processes, such as whether they were "included in existing sectoral plans (i.e. spatial development, transportation, or economic development plans)." As a result, answering positively to this option indicates that a city has integrated adaptation planning into at least one – but potentially more – sectoral plans.

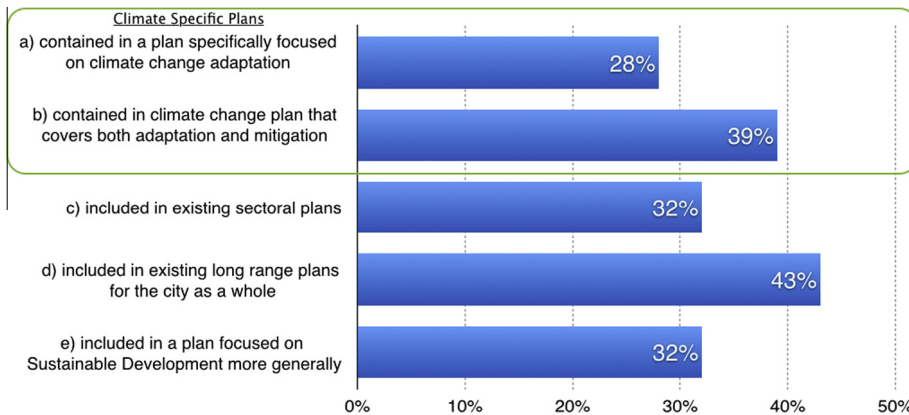


Fig. 2. Integration of adaptation planning within local government plans.

planning teams does not appear to be linked to the overall size or population of participating cities. Cities reporting large climate planning teams, for example, include towns with populations ranging from roughly 900 to cities of over 4 million people.

The institutional home for climate change staff also varies, with the most common location for staff tasked with the climate portfolio being the bureau or department responsible for environmental issues. The one significant exception to this comes from the 12 cities that report having a distinct team responsible for adaptation planning. In these cases, 33% report that adaptation staff is based in the bureau or department responsible for planning, and 25% report that they are based in the agency responsible for environmental issues.

Regionally, cities in Canada and the U.S. report an almost equal percentage of having either a small team or a single employee (roughly one third of respondents in each case). This makes North American cities the most likely to report that they only have a single staff member working on climate change. In all other regions, with the exception of Africa, the most common arrangement is for cities to have a small team. Having a large climate change planning team is most common in Latin America (21%), Asia (19%), and Canada (13%). At 21%, Latin American cities are also the most likely to report that responsibility for climate change planning is not clearly assigned. For African cities, the four most common responses were having a small team, having two teams, not having clearly assigned responsibility for climate planning, or employing a consultant to lead their climate change planning efforts (each at 18%). This makes Africa the only region where a significant percentage of cities report that the climate planning is being led by a consultant (the next closest, the US, reports 4% of cities in this situation).

A small numbers of cities ($n = 11$) report establishing their mitigation teams or coordinators prior to the year 2000. The majority of cities created their mitigation positions more recently. Just over three quarters of mitigation teams have been established since 2005, and just over 80% of sustainability coordinator-type positions were established during the same period. These results are generally stable across all the regions. While the survey did not ask when cities started their adaptation planning, given that adaptation planning entered the policy discourse after mitigation and that only a small percentage of cities report having distinct staff working on adaptation, we can infer that staff working on adaptation are a very recent addition to local government agencies.

The inclusion of climate change as a variable into different sectoral and long-range plans (discussed earlier) shows that other local government agencies are also involved with crafting and implementing responses to climate change. To understand this institutional context in more detail, respondents were asked to rank the degree to which specific agencies contributed to designing and/or implementing climate change adaptation and mitigation plans. Respondents were asked to rank each agency from 0 “no contribution” to 4 “contributes heavily.” Fig. 3 shows the percentage of cities ranking each agency as having contributed significantly (ranking them either a 3 or a 4), with results displayed separately for their contributions to adaptation and to mitigation.

The agencies that were most frequently ranked as significant contributors to adaptation planning were those responsible for environmental planning and land-use planning (reported to have contributed significantly by 75% and 63% of respondents, respectively). A second tier of participation formed around the agencies responsible for water (49%), wastewater (43%), and solid waste management (43%). Those that contributed the least were the locally operated electrical utility (where these existed, 16%), and the agencies responsible for economic development (28%), building codes (32%), and health (35%). These rankings were generally aligned with those reported for engagement with mitigation, with the exception of solid waste, transportation, and locally operated utilities (which were more frequently ranked as significant contributors to mitigation), and water and health (which contributed more to adaptation).

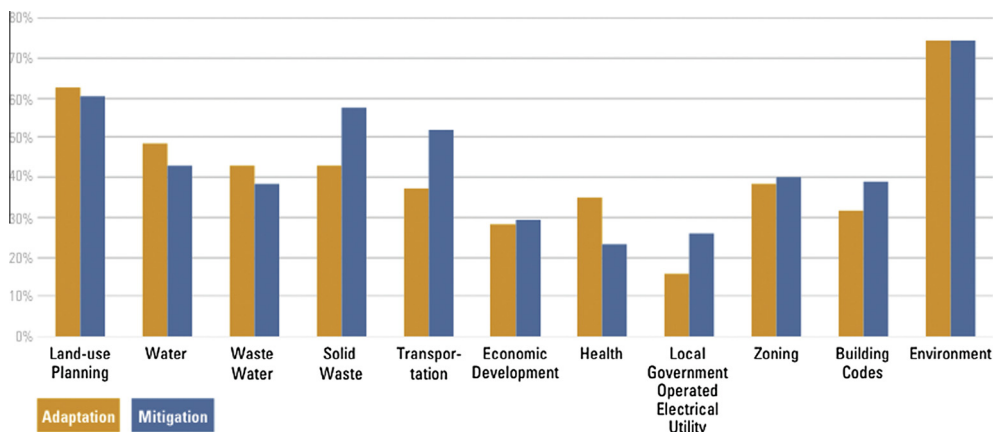


Fig. 3. Contributions of municipal agencies to climate planning and implementation.

5.4. Tactics for mainstreaming climate change

Respondents were presented with a list of fourteen commonly employed strategies for encouraging the mainstreaming of climate change and the participation of multiple departments in the planning and implementation of policies, projects, and programs. These strategies covered internal educational programs, network building, and formal institutional reforms and interventions. Participants were then asked to identify the strategies that their local governments had employed, and to rate their effectiveness on a scale from 0 “not effective” to 4 “highly effective”. Fig. 4 shows these strategies ranked according to the percentage of cities that ranked them either a 3 or a 4.

The top five strategies are dominated by tactics that aim to build internal networks between departments. These include both formal and informal interventions. The top two strategies were “creating informal channels of communication” and “cultivating personal contacts and trust” between the person or team responsible for climate planning and staff within other local government agencies (ranked 3 or 4 by 64% and 62% of respondents respectively). Also included in the top five are more formal strategies such as creating climate policies and programs that also help meet the existing (non-climate related) priorities, goals, and core mandates of local government agencies (55%), creating interdepartmental climate change working groups (55%), and directly bridging municipal agencies by hiring or designating staff within local government agencies to coordinate that department or agency’s engagement with climate responses (54%).

Formal climate education and training programs were ranked as relatively ineffective. By far the least effective strategies were those that sought to formally integrate climate related metrics into either budgeting procedures or performance management contracts at various levels within local government agencies. Overall, only 22% of respondents ranked these types of interventions as effective. Ratings for these strategies were not strongly negative, but were rather clustered at the midpoint of the ratings scale or just below it. It is also noteworthy that an average of 47% of respondents reported that they had not attempted these types of formal mechanisms for institutionalizing climate change planning. This makes them by far the least common options employed by local governments.

These results were generally stable across the different regions and countries covered by the survey. The exception were African and Asian respondents, who report greater success from formal climate education and training programs, with an average of 65% of African cities and 66% of Asian cities ranking these as effective strategies for encouraging different departments or bureaus to engage with climate change. Asian cities also distinguished themselves by being more likely to report higher levels of effectiveness for integrating climate related metrics into: the performance management contracts of senior local government officials (reported as effective by 33% of Asian cities), the budgeting procedures of local government agencies (42%), and the procedures that local government agencies use for budgeting infrastructure spending (38%).

5.5. Internal support for climate change policies and programs

The level of internal support for climate change related work can have an important impact on efforts to design and implement adaptation policies and programs. Respondents were asked to rate support for climate change action from elected officials, employees and management within their local government structures on a scale from 0 “actively opposes climate change policies” to 4 “actively supports climate change policies”. Globally, respondents report high levels of support. Mayors are ranked as being most supportive (ranked either 3 or 4 by 78% of respondents), followed by senior management (66%), local government staff (66%), and other elected officials (65%). Only small percentages of respondents (between 3% and 7%) report that any of these groups oppose or actively oppose climate policies.



Fig. 4. Tactics for encouraging engagement with climate change within local governments.

There are some important differences at the regional and national level. Cities in Canada, Australia and New Zealand are significantly less likely to report high levels of support from both elected officials and local government staff than cities in other countries. Their responses in this area are as much as 28% points lower than the global average.

5.6. Barriers to action

A variety of different challenges can affect a local government's ability to design and implement adaptation and mitigation strategies. Respondents were asked to rate the importance of 27 different challenges in four key areas:

- resource related challenges,
- institutional challenges,
- leadership challenges, and
- challenges related to information and awareness.

Respondents were asked to rate how each challenge impacted their climate change planning and implementation (including both adaptation and mitigation) on a scale from 0 "not a challenge" to 4 "a major challenge." From the four areas, five challenges were identified as important challenges (ranked 3 or 4) by 60% or more of respondents (see Fig. 5): a lack of funding for implementation (78%); competing priorities, such as health, housing, sanitation, and economic growth (76%); a lack of funding to hire sufficient staff (67%); a lack of staff time (66%); and difficulty factoring climate change into infrastructure budgeting procedures (60%).

Beyond these top challenges, all of the challenges covered by this section of the questionnaire were ranked as significant by at least 20% of respondents. These responses paint a picture of multiple, varied, and significant challenges that are dominated by a core group of hurdles affecting cities worldwide.

Outside of the top five, several other challenges linked to institutionalization, mainstreaming, and governance were also identified by a significant number of respondents. These include: a lack of local government jurisdiction over key policy areas (48%), difficulty mainstreaming climate change into existing departmental functions (47%), difficulty implementing policies that require collaboration between siloed local government agencies (38%), and senior management hesitant or unwilling to depart from established job descriptions and departmental mandates (36%).

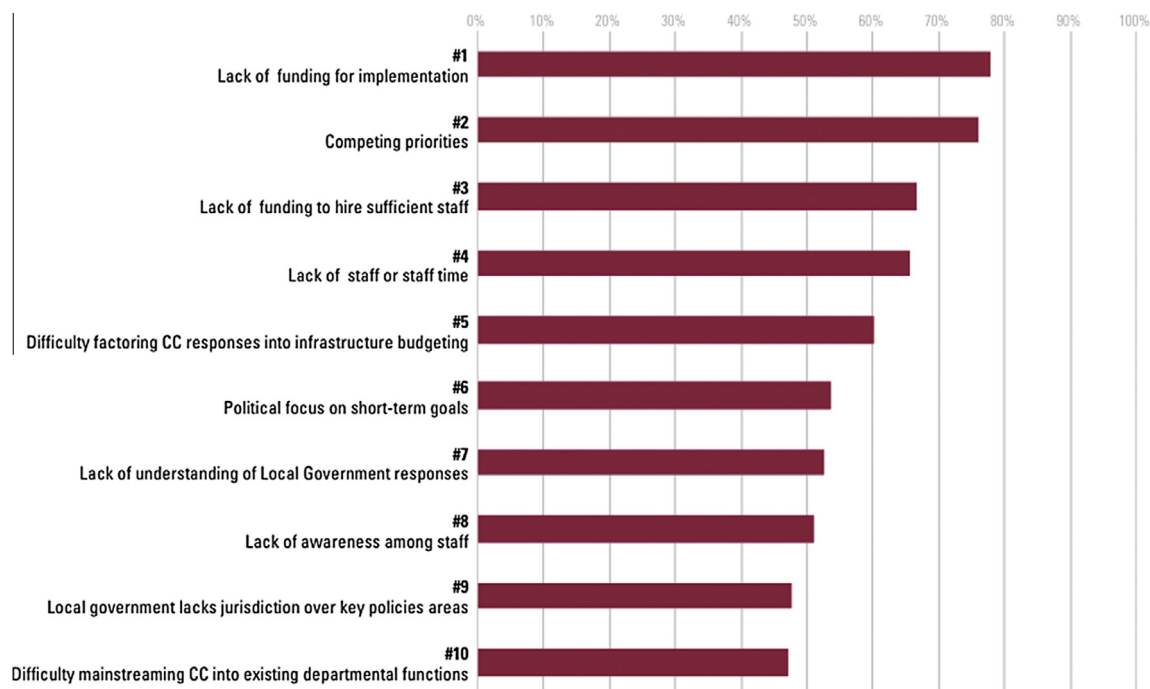


Fig. 5. Top 10 challenges to climate change planning & implementation.

Leadership (another key facet of institutionalization and governance) is the area where the fewest number of respondents report significant challenges. Nonetheless, 54% report significant challenges resulting from a political focus on short-term goals. A lack of strong regional or national leadership significantly affected 41% of respondents, and a lack of leadership from senior management, the mayor, and other elected officials were identified as significant challenges by roughly one third of respondents (at 33% and 30% respectively).

In the area of information and awareness, the most significant challenge is a lack of understanding of how local governments can address the issue of climate change (53%). Following this, 51% report significant challenges arising from a lack of understanding among staff of the local impacts and relevance of the issue, 40% report that a lack of information on the likely local impacts of climate change is a significant challenge (compared to a related question on mitigation, where 27% who report being challenged by a lack of information on GHG emissions), and 36% report significant challenges from lack of awareness among staff about the significance of the issue in general.

African cities report the highest levels of difficulty across all types of information and awareness challenges covered by the survey. The areas where African cities experience notably more difficulties than their peers are:

- Lack of awareness among staff about the issue in general (70%),
- Lack of information about local greenhouse gas emissions (60%), and
- Lack of information about the likely local impacts of climate change (70%).

In each of these areas, the number of African cities reporting significant difficulties is at least 12% points higher than their next closest regional counterpart.

6. Discussion

The first finding of the UCGS is the speed with which adaptation has established itself in the urban climate policy space that was, until recently, focused on mitigation. Early urban responses to climate change, such as those supported by programs like ICLEI's Cities for Climate Protection (CCP), focused on mitigation. The CCP – the leading international program to support local government mitigation efforts – was founded in 1993. ICLEI's work on adaptation, in contrast, started in 2010 with the release of ICLEI-USA's *Climate Resilient Cities* program, and then the creation of ICLEI's annual *Resilient Cities* World Congress. The fact that three years later 73% of survey respondents⁴ report addressing both mitigation and adaptation shows how quickly adaptation has been integrated into urban approaches to climate change. This may in part be thanks to cities like Durban (SA), who have long prioritized adaptation and who are now playing a key leadership role in the area (see for

⁴ This is a slight increase from 2011 when 68% of cities reported that they were pursuing adaptation planning (Carmin et al., 2012b).

example the Durban Adaptation Charter). One troubling finding is the exceptional lack of engagement of U.S. cities with adaptation work. This issue is discussed in more detail by [Shi et al. \(in press\)](#).

That 92% of cities are approaching adaptation and mitigation in an integrated fashion points to an awareness that there is a need to maximize policy coherence and minimize conflicts between these two areas. But as other research has shown, this balance is not easy to achieve ([Dang et al., 2003](#); [McEvoy et al., 2006](#); [Swart and Raes, 2007](#); [Hamin and Gurran, 2009](#); [Laukkonen et al., 2009](#); [Moser, 2012](#); [Vigué and Hallegatte, 2012](#); [Berry et al., 2015](#)). This issue could be a productive focus for the development of future program to support local government efforts.

Looking at the institutional structures that are being put in place to address climate change planning, it is clear that staff tasked with the climate portfolio are working from a marginal position within local governments. Adaptation and mitigation planning is being driven by individuals or small, newly formed units that have been in existence for under a decade. The majority of climate planning teams are located in environmental agencies that, typically, have fewer resources and more limited jurisdictions than large capital bureaus such as planning, transportation, water, or solid waste. These results confirm observations elsewhere in the literature that climate change planning is working from a position of relative institutional weakness ([Carmin et al., 2012a,b](#); [Aylett, 2013](#)).

These findings underscore the important role of strong political leadership to give institutional legitimacy and clout to climate change related work. They also emphasize the importance of efforts to mainstream climate change planning and action into the operations of major capital departments. Given their more direct control over the creation and maintenance of core urban systems these larger departments can more directly influence a city's emissions and vulnerabilities.

This mainstreaming is occurring, but in a highly uneven fashion. The strong contributions to adaptation planning from environmental and spatial planning agencies is not surprising. But there is a significant gap between engagement from these first two sectors and engagement from other of local government agencies. Environmental and planning agencies are the only agencies that a majority of respondents identify as being actively involved with adaptation planning and implementation. For all other sectors covered by the survey significant contributions to adaptation planning were reported by less than 50% of respondents.

Without the participation of agencies in key areas such as water, wastewater, transportation, economic development, or health, local adaptation efforts will contain critical weaknesses and fail to identify and address vulnerabilities in many urban systems. The causes of disengagement with adaptation in these areas need to be identified. This is also a possible focus for future support programs to build capacity and provide necessary resources to enable adaptation planning among agencies that are currently on the sidelines.

Some answers to these questions may come from the data collected on the techniques used so far by local governments to encourage the participation of multiple departments in climate change planning and implementation. The importance of initiatives that build internal networks between local government agencies (and, specifically, those that encourage informal relationships of trust) confirms the key role that personal ties play in creating the conditions necessary for shifts in policy direction within complex urban systems (see [Campbell, 2012](#); [Aylett, 2014](#)).

But care needs to be taken in how these results are interpreted. As just discussed, many critical agencies remain on the margins of adaptation work. This calls into question the "success" of such network building strategies. Initiatives centered on education and training, or the formal integration of climate relevant metrics into budgeting procedures or employee evaluations and contracts, were identified by respondents as much less effective – but these formal approaches to institutionalization were also by far the least commonly attempted (with an average of 47% of respondents reporting that they had not attempted this category intervention). Their relatively low success rate may therefore be linked to a lack of overall knowledge or best practices in this area.

Taken together, these findings show that we need a clearer understanding of the uneven success of internal network building, and of the limited application and success of formal approaches to institutionalization. They also suggest a third area of inquiry into ways in which formal and informal approaches to networking and institutionalization can support one another.

These challenges to the mainstreaming and integration of adaptation policies exist in a context of high levels of general support for climate change policies and programs. Both elected officials and municipal employees at senior and lower levels are highly supportive of climate change planning and policies generally. But as results elsewhere in the survey show, department heads, staff, and elected officials are still hesitant to engage themselves actively in planning or implementation.

Besides this hesitancy, a variety of barriers block the way of adaptation initiatives. Three of the top five barriers to climate change planning and implementation reported by respondents are directly related to insufficient financial and institutional resources. A fourth (competing priorities) may initially appear to be related to strained resources, but is in fact slightly more complex. Competition can be for the resources necessary to achieve a given objective (i.e. competition between an adaptation policy and a housing strategy for the funding necessary for implementation). But competition can also be of a more fundamental nature, where the objectives themselves (such as maximizing short-term property values and tax revenues through increased coastal development) are fundamentally at odds with objectives in the area adaptation.

A second cluster of challenges faced by urban adaptation efforts centers around the issue of institutional path-dependency, a subject of research in its own right. Researchers in fields ranging from management, to sociology, and human geography have explored different reasons why complex organizations fail to effectively adapt established practices to face changing circumstances ([March and Olsen, 1989](#); [Schoenberger, 1997](#); [Peters, 2005](#); [Aylett, 2013](#)). Different cultural, institutional, and technical factors, often interlinked and self-reinforcing, can all play a role. In the survey,

some of the highest ranked obstacles in this area have to do with technical changes to established practices, such as integrating climate change into infrastructure budgeting procedures; and a more general difficulty mainstreaming climate change into existing departmental functions. Two further challenges, coordination across municipal silos and senior management hesitant to depart from established job descriptions and departmental mandates sit at the overlap between technical and cultural considerations.

That a majority of cities report that political short-termism poses a significant issue confirms a factor often mentioned in the literature (While et al., 2004; Betsill and Bulkeley, 2005; Carter et al., 2015). This focus on the short-term highlights the importance of creating adaptive responses that support more immediate local priorities in policy areas such as health, economic development, equity, or quality of life. A park that can also serve as a cooling station or storm water retention basin, for example, provides rapid and visible accomplishments while also filling an important role in a longer term adaptation strategy.

Access to relevant information was the final area where respondents reported barriers to adaptation planning and action. When access to mitigation and adaptation related information are compared, a significantly higher number of cities report significant challenges accessing information on the local impacts of climate change – a crucial factor in adaptation planning. It is clear that for mitigation planning, a longer history and more established methodologies have made relevant information more readily available.

More generally, a pattern of escalating severity emerges as one moves from challenges of general information and awareness to those dealing with more concrete local knowledge and an understanding of possible actions. Access to information on GHG emissions is ranked as comparatively less challenging, general awareness among staff occupies a middle ground, while a more specific understanding of the specific local impacts and relevance of the issue and how it can be addressed are rated as the most significant challenges by over half of respondents. This points to the need to focus not only on providing more and better scientific data, but also on providing support for the processes through which this data is transformed into knowledge and action. The significantly greater challenges reported in this area by African cities highlight the need to provide greater support for building local capacity within African cities to create, collect, interpret, and disseminate locally relevant information about climate change and climate change response strategies.

7. Conclusion

Results of the UCGS show an integration of adaptation and mitigation planning, and a mainstreaming of adaptation planning into other long-range and sectoral plans within local governments. However, the level of participation in adaptation planning and implementation varies greatly across different municipal agencies. Survey results also show that some regions are much further advanced than others in their efforts to mainstream climate adaptation planning.

It is encouraging to see that, even though adaptation planning efforts are still at an early stage in most cities, local governments are already aiming to integrate them with earlier mitigation related work, and existing municipal planning processes more generally. This is a significant difference from early mitigation efforts, which were more narrowly defined. Having learned from the initial limitations of this approach, adaptation planning seems to have leap-frogged quite rapidly into a more holistic and integrated approach to planning and implementation.

However, the success of these efforts to mainstream and integrate adaptation within municipal structures has been highly uneven. Only environmental and planning agencies were cited by a majority of respondents as being actively engaged with adaptation planning. Critical local government agencies such as those responsible for water, wastewater, health, and building codes are still largely at the margins of urban adaptation efforts.

The most effective tactics for mainstreaming engagement with adaptation planning are those that focus on building collaborative networks between multiple municipal agencies. But it is unclear whether doubling down on network building efforts would yield greater success, or if we are instead looking at the limits of what network building can accomplish without greater institutional reforms.

Given that these institutional arrangements may have a determining influence on adaptive responses going forward (as new practices inevitably become routine and subsequently inflexible and resistant to change) there is much to be gained by understanding their shape, strengths, and weaknesses now while the process of local innovation around adaptive planning is, for most cities, still in its early days.

Beyond their value as the first quantitative data on urban adaptation governance, these results also emphasize the need for theories of governance that are able to clearly account for the internal dynamics within and across local government agencies. Internal institutional networks of governance are inextricably linked to efforts to address a problem, like adaptation, which does not fit neatly into individual institutional silos. The results of the UCGS help to make clearer where these networks have so far been made, how they have been created, and which local government actors have yet to be effectively engaged in adaptive responses to climate change.

Acknowledgments

I am grateful to Dr. JoAnn Carmin (1957–2014) for her guidance and support during the process of carrying out the UCGS project. She will be deeply missed. I would also like to acknowledge the support of the SSHRC Banting Postdoctoral Fellowship program. Infographics by Christopher Rhie.

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