October, 2015

Climbing the Adaptation Planning Ladder: Barriers and Enablers in Municipal Planning

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Please Cite as:
Hamin, E.M. and N. Gurran (forthcoming 2015). "Climbing the Adaptation Planning Ladder: Barriers and Enablers in Municipal Planning" in W. Leal Filho, ed. *Handbook of Climate Change Adaptation*. London: Springer.

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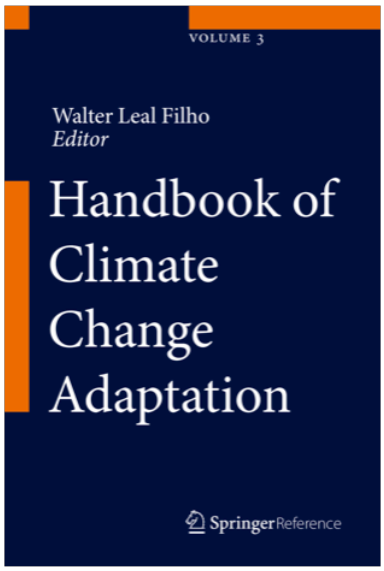

Abstract

Local municipal governments have a crucial role in helping communities adapt to climate change. Recognizing different levels of climate preparedness, this chapter analyzes what steps communities tend to follow when they move forward on climate adaptation, including prerequisites for planning and the selection of policies. Drawing on content analyses of local climate adaptation plans from the United States (US) and Australia, as well as interviews with municipal planners in both nations, the chapter

explores the adaptation policy choices communities are making and explains the range of strategies local governments have used to move forward on a 'ladder' of climate adaptation, proceeding from awareness and constituency building activities through formal risk analyses and strategic planning for climate adaptation, through implementation through specific changes to land use planning and infrastructure investment. Factors found to support or hinder these efforts relate to political will, staff resources, technical information, and training in potential policy responses. Significant barriers include issues of property rights and sunk investment in vulnerable locations (particularly along the coast), as well as shifting community and political views about the reality of climate change. Overall, progress in municipal climate adaptation planning is patchy, and affected by wider policy frameworks and access to state or national level support. However, this chapter highlights opportunities for municipalities to move forward on climate adaption planning, despite local barriers to action.

Key words

Municipal responses, adaptation barriers, local planning

Introduction

Climate change represents particular challenges for spatial planners, particularly at the local level. However, urban policy frameworks and technical expertise amongst planning practitioners remain in a state of evolution, two decades since the passage of the United Nations Framework Convention on Climate Change (1992). Early urban policy action focused on reducing greenhouse gas emissions through policies to limit sprawl and reliance on private automobiles, and to shift patterns of energy use in the built environment – termed 'mitigation planning.' 'Adaptation' approaches have the goal of reducing the vulnerability of communities and the built and natural environment to the impacts of now-unavoidable climate change. Appropriately, in developed countries the first attention went to mitigation, and only recently has there been much uptake of local policies for adaptation. Research on climate change adaptation (CCA) planning emphasizes a number of barriers impeding local response, such as insufficient data on potential climate risks, a lack of political will to change, and a lack of state or national level mandate for action. Nevertheless, some communities have made important progress in addressing climate risk within their local planning frameworks.

Organized local action on climate change really commenced with the implementation of *Local Agenda* 21 (LA21), a set of commitments for local engagement in sustainability planning, agreed by municipalities from throughout the world, at the 1992 United Nations meeting just described. At the subsequent 2002 World Summit held in Johannesburg, emphasis moved more explicitly to local sustainability 'action'. Since this time, climate change has become an increasing theme in local environmental initiatives. The Cities for Climate Protection (CCP) campaign, spearheaded by ICLEI has resourced and encouraged many of the municipal actions around greenhouse gas reduction, with more than 1000 cities, towns, counties, and associations' worldwide members of ICLEI by 2013 (ICLEI: Local Governments for Sustainability, 2013) . However, overall, municipal actions have related to climate change mitigation, rather than adaptation (Measham et al., 2011, Castán Broto and Bulkeley, 2013).

Many of the world's global cities, particularly within the developed world – have demonstrated significant leadership, with cities such as London, New York, Amsterdam and Sydney all developing landmark plans and programs across a spectrum of carbon reduction and climate adaption approaches, particularly in relation to energy, water, waste, and increasingly, risk reduction planning (EEA, 2012). However, smaller municipalities and those in the global south have made more varied progress, particularly in relation to considering potential increased climate risk within their land use planning framework (Baker et al., 2012, Carmin et al., 2012, Romero-Lankao, 2012, Bierbaum et al., 2013) . Given that the effects of climate change seem to be consistently 'ahead of schedule' (Betts et al., 2011, McKibben, 2011) and the long time horizon for built form to change in response to changes in policies and plans, this is a significant problem.

To give a sense of what sorts of actions are possible at the municipal level, the chapter begins by identifying the policies and practices that first-adopter communities are undertaking. Following that, the chapter focuses in on the process that these communities are using to reach those policies, and the conditions and actions that enable or disable progress particularly in relation to land use planning for climate adaptation. The empirical data suggests that the steps undertaken by communities lie along an adaptation 'ladder'. In conclusion, policy interventions and other forms of support needed to help local communities move forward on the adaptation ladder, are proposed.

Research Method

Three empirical studies of adaptation practice by the authors, plus insights from the research and practice literature, inform this chapter. Hamin and Gurran (2011) examined the small number of climate change adaptation plans that had been prepared by communities as early as 2010. The study compares practice in two nations – the US and Australia, which both have similar governance and land use planning systems. Both nations have three tier federal, state, and local governments, with planning law defined by the states but implemented by municipalities who show varying levels of heterogeneity in their policy approaches and priorities. This means that even when strong state policy exists, very different local planning frameworks and outcomes are typical in both nations. Stand-alone climate adaptation plans, and separate adaptation chapters in wider

municipal documents that recommended specific policy choices were identified, using the American Planning Association's (APA) list of cities and towns (APA's Green Communities Research Center, 2010) that had undertaken climate planning, and Australia's local government data bases Commonwealth Government's Local Adaptation Pathways Program (which provided financial support for local adaptation between 2009-2011). Despite this wide net, only eight municipalities were identified to have full adaptation plans in place or exhibited drafts with specific spatial or land use policies as of November 2010. Each climate plan was analyzed in relation to climate threats and impacts; key goals and recommendations and the relationship between the adaptation plan and other local climate change mitigation strategies or plans. The analysis provided a suite of local options for addressing climate change in municipal planning, as discussed below.

The next phase of our work sought to understand the issues and barriers facing other municipalities, and steps they are taking to move forward. Primary research was carried out in Australian coastal councils between 2010/11 (Gurran et al., 2012a) and in coastal Massachusetts of the US between 2011/12 (Hamin and Gurran, 2013). The focus on coastal locations reflects the particular issues arising from climate risk in coastal areas, and the likelihood that community sentiment towards climate risk is heightened in these contexts, thus providing an important political impetus for action. For Gurran Norman et al (2012), fifty-five local government areas (just under 10 per cent of Australia's total local municipalities) were surveyed, representing coastal areas with identified common issues arising from population growth and change, inadequate or declining infrastructure, and economic instability. The companion study undertaken in coastal Massachusetts in the US involved 15 interviews with 15 cities and towns, conducted in 2011. The results presented below represent a synthesis of the findings of these studies as well as the broader literature.

Climate change, spatial planning, and municipal action

Planning Processes

The impacts of climate change are already being observed many parts of the world, as documented elsewhere in this book. Rising temperatures, more frequent and intense heatwaves, water shortages, rain events, and changes in the spatial range of bushfire risk all have implications for the siting and design of new development and for the ongoing utility of existing homes and infrastructure. Global sea level rise represents a particular threat to coastal ecosystems and settlements. Social and economic implications of increased climate changes are also significant, and will vary across geographic areas and community groups. In the major cities, hotter temperatures and more frequent storms or flooding, cause major disruption due to the density of people and major infrastructure affected. However, in many regional areas, drought, inundation and storm events can ravage the economic base of small settlements, while providing or restoring services and infrastructure to rural and isolated communities can be much more difficult (IPCC, 2012).

Although future impacts of climate change are uncertain, decisions regarding settlement patterns and building design will have lasting impacts – with most buildings and infrastructure designed to a 50-70 year life span. Current planning frameworks must neither exacerbate contributions to greenhouse gas emissions nor increase community exposure to climate threats (Hamin, 2011). Rather, strategic planning decisions should actively facilitate climate change mitigation and adaptation opportunities. Overall then, climate change represents multi-faceted challenges for spatial planning – the decision making framework governing the location and design of development and infrastructure. Given that climate impacts will differ markedly between places, local planning is particularly important.

The following principles have been identified to guide local planners in developing adaptation responses to climate change for their communities:.

1. Adaptation energies should complement strategies for greenhouse gas reduction. Climate change mitigation should be seen as long range adaptation, and adaptation approaches that might increase carbon pollution or have other negative environmental effects should be avoided.

2. Secondly, because decisions about the built environment will have lasting impacts, planners must be ready now to prevent further risks associated with climate change and to support rapid adoption of new approaches if and when required (Gurran et al., 2008).
3. Social equity considerations in climate change adaptation are also important, and planners must recognise that vulnerability is not evenly spread across a community. Poorer and minority constituents are more likely to be located in geographically vulnerable areas to start with. As harms occur, less-resourced groups will tend to be disadvantaged by costs needed to cope with increased climate volatility, and have less capacity to enact dwelling modifications for climate safety or comfort.
4. In deciding whether or not to move forward, it is worth prioritising actions with multiple benefits for the environment or community (like enhancing natural ecosystems to improve resilience to climate impacts, or providing more opportunities for non motorised transport) (Gurran et al., 2012a).

It is important to recognise that the techniques and processes of planning practice must also respond to new pressures and challenges associated with climate change. Traditional planning practice draws heavily on research and data based on past trends, and generally assumes a stable framework of a predictable future. However, unpredictability is one of the major challenges associated with climate change. Faced with uncertainty as to the timing, nature and magnitude of risks, planning needs to include adaptive management, where decision and response frameworks are designed to adjust to changing circumstances and information. Such approaches can be designed into statutory planning documents through controls that are triggered when a particular 'threshold' is reached, or when new information comes to light (Folke, 2006, Abunaser et al., 2013). A second approach is that of scenario building, whereby potential story lines about the future are developed as a way of exploring or testing different possible approaches in a more creative way (Wilson, 2009).

One of the major differences between local climate mitigation strategies and the commencement of adaptation efforts is the need to understand potential local climate change risk. Climate vulnerability assessments generally provide the basis for informing

strategic land use planning decisions on levels of risk in relation to an entire local area, site, or development proposal (National Research Council, 2010). In drafting planning instruments and criteria for development assessment, existing information used to support land use planning decisions – including floodplain and bushfire protection thresholds or models may need updating or reconsideration over time as new data becomes available, particularly in relation to likely increases in the intensity or frequency of these events and projected new geographical range. It may be necessary to reorient natural hazard assessment methodologies from historical events to forecasted impacts associated with climate change scenarios.

Policy Responses

There are quite a variety of possible policies to respond to climate change at the municipal level. As noted above, all policies should seek to achieve dual goals to adapt to climate change impacts, and promote long-term mitigation (reductions) of greenhouse gas emissions. Infrastructure examples include establishing new, decentralised energy, water, or waste management plants that reduce the carbon impact of settlements while contributing to resilience of the entire network in case of natural hazards. Self provision of distributed and smaller-scale key infrastructure services – like energy, water, waste management, through technologies for micro energy generation, water retention, reduction technologies, and waste minimisation, reuse, and recycling – tends to create a more disaster-resilient community. Part of resilience is assuring that new facilities can be retrofitted for more sustainable technologies as they become financially feasible. For instance, solar access should be protected to ensure future capacity for onsite solar generation. Regulatory burdens to require proposals for renewable energy infrastructure should be minimised, and where possible, the planning policy should be shifted to favour renewable energy projects (Department of Communities and Local Government (DCLG), 2007).

Similarly, there are a number of basic approaches to reducing the carbon impact of transportation systems, and improving resilience to future climate impacts and potential oil scarcity. New and existing settlements should be designed or reconfigured to reduce trip generation, and to encourage public transport use and active transportation

such as walking and cycling. Safe, naturally vegetated walkways and cycle paths should connect residential, retail, employment and recreational areas. Proposals for new development should include travel plans which include a range of sustainable transport options – walking, cycling, public transport, and only lastly, the private motor car (Newman et al., 2009).

Urban design guidelines and building codes for public and private buildings should be designed for future climate scenarios. While much has been written about sea level rise, addressing potential urban heat island affects arising from hotter temperature and heatwaves is also an important consideration when preparing urban design guidelines and assessing public and private buildings in built up areas (Stone, 2012). Requirements for urban vegetation, 'green' (planted) roofs, specific colours for building and paving materials can be considered. Public space designs must anticipate more severe local climatic conditions, with shading, shelter, and appropriate vegetation to cool areas of open space and walkways or cycle paths, as well as designing public amenities for safety and storage during disaster events.

In planning for areas where risk is found to be high, decisions fall roughly into three categories: to protect infrastructure through engineered fortification, such as a sea wall; to accommodate threat through planning and design modifications; or, to retreat, by relocating infrastructure and activities. Such decisions often need to be made at a local scale, responding and adapting to specific circumstances as they unfold (de Vries and Wolsink, 2009). In planning for new settlements, or for new development within existing areas, it is important to reserve space for emergency access, congregation, shelter and evacuation. In particularly vulnerable areas, locations for intermediate post-emergency recovery, such as temporary housing, should be identified. Long term planning ensures that intermediate land use decisions do not compromise future opportunities (Meck and Schwab, 2005).

Climate adaptation plans – policies actually chosen

The literature described above outlines potential policies for CCA. But what steps are communities actually choosing? Table 1 identifies the actions taken by eight early-adopting communities in Australia and the US who prepared specific plans for adaptation.

As shown in the table, the full suite of potential policy responses are being attempted across the plans reviewed, although not necessarily within the one local area. The most comprehensive adaptation planning frameworks (for instance, plans for Keene, Olympia and King County in the US, and Brisbane, the Gold and Sunshine coasts in Australia) cover land use allocation, development and design controls, infrastructure provision, urban transport, and even the ongoing resilience of food supplies. By contrast, more targeted frameworks focus more on direct climate risks (eg. Chicago, Hornsby, Melbourne, Mandurah).

Local authority	Plan Name	State	Population Category	Location	Key Land Use Planning Actions
Keene	Adapting To Climate Change: Planning A Resilient Community 2007	New Hampshire	0-50K	Inland	Scientific staff to provide climate change information to policy makers for consideration in regulation and decisions; review comprehensive plan; hazard mitigation; and relevant building ordinances / design standards in light of potential climate change impacts; create flood control zone; protect and rehabilitate historic and cultural resources to reduce vulnerability; code and plan revisions for water quality protection.
Olympia	Olympia's Response to the Challenge of Climate Change 2007	Washington	0 - 50K	Inland	Develop new sustainability design standards (green building materials, energy conservation principles); design standards for greater resilience to severe weather, floodplain identification; identify alternative route options for movements of goods and people; sustainable transportation mode choices; promote locally generated; secure energy sources; increase protection of existing / future wetlands to enhance resilience of ecology and hydrology; increase water-storage capacity; increase food security – identifying and protecting prime agricultural soils.
Berkeley	Berkeley Climate Action Plan 2009	California	50-300k	Coastal	Encourage water efficiency; expand and diversify water supply; increase urban tree cover.
Chicago	Chicago Climate Action Plan 2008, Especially Chapter 5: Adaptation	Illinois	1-3M	Inland	Refers to previous efforts in encouraging denser less car dependent development; introduction of stormwater regulations.
King County	King County Climate	Washington	1-3M	Inland	Update heat response plan – research into

	Plan 2007, Especially Section 6B On Adaptation				urban heat island effect; encouragements for innovative cooling / energy efficiency in properties; "Green Urban Design Plan" (permeable pavements; rooftop gardens; green alleys; onsite mechanisms to prevent flooding); amendment of landscape ordinance for climate tolerant plants.
Hornsby	Climate Change Adaptation Strategic Plan 2009	New South Wales	50-300K	Coastal	Review planning controls to strengthen requirements in locations of increased vulnerability.
Gold Coast	Gold Coast Climate Strategy 2009	Queensland	300K – 1M	Coastal	Designate climate sinks in local planning scheme; scope local food production opportunities and requirements; implement coastal planning measures.
Sunshine Coast	Sunshine Coast Climate Change and Peak Oil Strategy 2010	Queensland	300K – 1M	Coastal	Revised sea level rise projections; planning controls to improve resilience of natural systems; risk assessments in planning decisions; planning controls to encourage localisation.
Brisbane	Brisbane's Plan for Action on Climate Change and Energy 2007	Queensland	1 – 3M	Inland	Planning controls to prevent flood / storm surge exposure; shade & weather protection; Transit Oriented Development to reduce emissions; reducing barriers to urban food production; improve resilience of natural systems – no net loss of natural vegetation.
Darebin	Climate Change and Peak Oil Adaptation Plan 2009	Victoria	0-50K	Inland	Zoning flexibility – provision for local food production; assessing planning controls to remove impediments to resilience strategies; appropriate development in areas subject to climate risks.
Melbourne	Climate Change Adaptation Strategy 2009	Victoria	0-50K	Coastal	Revised planning controls for sea level rise; new building standards to manage heat island effect.

City of Port Phillip	Draft Climate Adaptation Plan 2010	Victoria	0-50K	Coastal	Revise planning controls to restrict building in areas of coastal vulnerability; require climate adaptive building design and vulnerability to be considered in planning decisions; amend planning controls and permit requirements accordingly.
Mandurah	Coastal Zone Climate Change Risk Assessment and Adaptation Plan 2009	Western Australia	0-50K	Coastal	Modifying planning process; amending standards; reviewing information requirements for decision making.

Table 1: Policies recommended in climate adaptation plans, USA & Australia (Adapted from Hamin and Gurran 2011)

Climbing the adaptation ladder

As the literature has progressed, a general perspective on the process of adaptation has emerged. Moser and Eckstrom (Moser and Ekstrom 2010) suggest that adaptation occurs in these phases:

- Understanding the problem (detect the problem, gather and use information, re/define problem);
- Planning phase (develop options, assess options);
- Managing stage (implement options, monitor outcomes and environment, evaluate effectiveness of option); see also Arnell and Delaney 2006; National Research Council 2010).

This of course mirrors the general comprehensive planning process. One key difference is that built into the 'understanding the problem' phase are forecasts of climate change, and analysis of who and where is most vulnerable to those changes.

More precisely, our empirical research suggests a continuum of stages in developing climate adaptation responses within local areas, beginning with risk analysis moving through the preparation of an adaptation strategy to changing planning controls. This pattern is consistent with previous research identifying a climate risk analysis as a precondition for further adaptation action in Australian public and private sector organisations (Gardner, Parsons, and Paxton 2010). This risk analysis informs the development of a framework for strategic adaptation action across the many responsibilities of local government, and might include actions ranging from community education through to developing applications for external funding and resources.

With a risk analysis in place, communities' next typical step was to change the planning and regulatory framework governing future development, so that such development enhances resilience to climate risks, rather than furthering exposure. Subsequent actions involve rethinking the ways in which local infrastructure (both public and private) is designed and delivered, before finally establishing a funding strategy to resource ongoing intervention. These last two stages have as yet been undertaken by only

a few of the municipalities or councils involved in our study, but the vast majority of responding agencies indicated that they intended to commence such work in the near future. In doing so, a strong evidence base will be needed with detailed local level information, including costings on necessary adaptation expenses over time). Strategic assistance to help councils overcome barriers to the adoption of more resilient forms of infrastructure design and delivery, will also be needed. Note that the actions above are being taken in regard to new development permits and infrastructure. The literature may suggest substantial changes to existing property such as retreat, but that is much harder to accomplish for obvious reasons. Absent a major loss or disaster, our survey respondents were not attempting to force change to existing properties.

Taken together, these series of actions suggest a ladder of adaptation that communities are tending to follow, at least in coastal Australia (Figure 1).

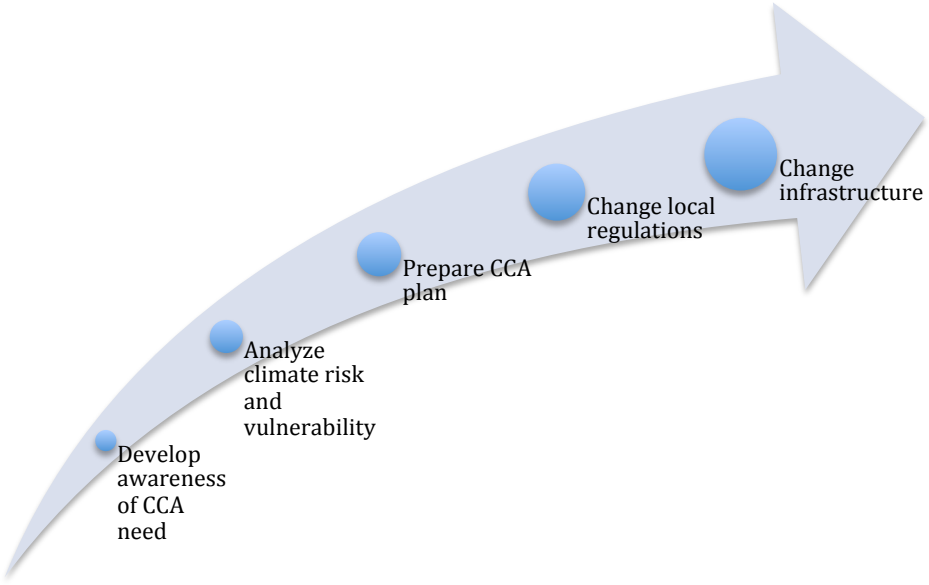

Fig. 1: Adaptation ladder, adapted from Gurran, Hamin and Norman 2012

The ladder begins with institutional awareness of climate change issues through to developing an information base (risk analysis), to preparing an umbrella framework for adaptation action. Subsequent implementation stages typically include amendments to land use planning controls, and finally, investment in infrastructure augmentation or change (see also Tompkins et al., 2010). Although regulatory change itself is time

consuming and costly, involving consultant studies, legal opinions, local politics and potentially, litigation, these costs are far less than those anticipated for key municipal infrastructure upgrade or relocation. Retrospective adaptation action for existing infrastructure will likely be delayed until the infrastructure requires replacement, resources are available, and/or, the risk becomes quite urgent.

Barriers to adaptation action

The sections above have identified what typical actions are, and the steps through which communities tend to move. In this section we discuss the process itself–what has enabled governments to move forward, what tends to slow them down, and the processes that are most appropriate.

Barriers can cover a wide range of issues, but, following Adger (2009), we note that they are socially constructed and thus not insurmountable. Moser and Ekstrom (2010), building from the wide range of research identifying barriers to adaptation planning (Mukheibir and Ziervogel, 2007, Amundsen et al., 2010, Nielsen and Reenberg, 2010, Measham et al., 2011, Mozumder et al., 2011, Rosenzweig et al., 2011), explain the necessary conditions for CCA as the following:

- *Leadership*, whether in the government or grass-roots level activism. Leadership is particularly essential when there is no regulatory mandate or local public demand for action.
- *Resources*, including technical information such as regional climate forecasts as well as staff time and expertise.
- *Communication* and information, which is particularly understood to be public participation and the flow of communication among those responsible for action; there is a sense in the article that this is a top-down flow of information from agencies to the public as well as cross-flow among members engaged in a CCA planning process. Note that in this formation, technical information needs are included in the resources category above.
- *Values and Beliefs*, especially regarding risk and how it should be managed and what concerns have standing. Although not explicit in the original

framework, for our purposes, belief (or lack thereof) in the anthropogenic causes of climate change would be categorized here (Moser and Ekstrom, 2010, Hamin and Gurran, 2013).

Adaptation barriers thus arise when deficiencies across any of these elements occur during any stage of the adaptation planning process. For instance, Arnell and Delaney (2006) characterize barriers in relation to *missing operators*, arising from lack of awareness by leadership of the need for adaptation, and *missing means* – that is, limited institutional capacity, budgetary constraints, lack of regulatory authority (see also Gupta et al., 2010, Berkhout, 2012). They also point to the problem of *unemployed means*, where because of mis-allocation of costs and benefits, actions are not taken. A relevant example would be homeowners not moving because low-priced nationally-subsidized flood insurance will reimburse their losses, or local government officials prioritizing other budgetary items – such as short term infrastructure upgrading (Measham et al., 2011).

Empirical studies generally support these theoretical frameworks. Among the most basic needs are climate change awareness and technical knowledge of how to proceed; Australian research has found that planners express uncertainty about how to begin CCA planning, despite evident awareness and conviction about the need for action (Measham et al., 2011, Baker et al., 2012, Gurran et al., 2012a). Consistently, if regulatory authority or mandates to support adaptation efforts are absent, it is much more difficult for planners overcome local barriers arising from insufficient information and capacity constraints (Few et al., 2007, Funfgeld, 2010, Tang et al., 2010). State mandates, while sometimes viewed by local officials as obtrusive and controlling without the benefit of additional funding, can provide both an alignment of values and the political cover needed when facing opposition from constituents (Bedsworth & Hanak, 2010; Dalton & Burby, 1994). Guidance from the state or region should present the best available science in order to influence beliefs while considering financial compensation to constituents adversely affected by the policies (Bedsworth & Hanak, 2010). By implication, a state mandate would overcome concerns about the legal basis for changing zones or ordinances in relation to climate adaptation. For other activities, such as

provision of water infrastructure, specific state regulations need to change for local authorities to modify their own systems.

Previous research and policy development work has emphasized the importance of access to additional resources in helping local governments build capacity for climate change adaptation, particularly in local government areas already struggling with resource constraints (Baker et al., 2012, Bierbaum et al., 2013). This is similar to many topics -- a study of 100 cities in California's Central Valley found a link between the cities' fiscal means and the occurrence of sustainability policies (Lubell et al., 2009). In well-resourced communities, addressing barriers tends to be more an issue of facilitating effective use of resources rather than a need to create capacity per se (Burch, 2010). But this requires political leadership to push adaptation to the top of the priority list. As Measham et al. (2011) have suggested, because climate change adaptation is not embedded within local planning practice, it is easily displaced by the context of routine demands.

Case Study: Barriers to Action in Massachusetts Coastal Communities

To ground this discussion of barriers and enablers of CCA, it may be helpful to provide two case studies, one focusing on what prevents forward movement, and one on what enables it. These are of course closely interrelated, but not exact mirror opposites.

In Massachusetts, cities and towns update their master (comprehensive) plans when they wish to – there is no legal requirement for updates. There is no state or national mandate or funding for CCA; there are not even any accepted projections for climate change upon which towns can rely. Consequently, local CCA planning can only happen through very conscious effort to undergo dedicated CCA planning process, or if a town happens to be updating their master plan. Unsurprisingly, forward movement on adaptation at the local level has been quite slow. In reviewing all 351 cities and towns of the Commonwealth, only Boston had prepared a dedicated CCA plan as of 2012. One town is including a CCA chapter in their new master plan, which is now underway. Despite this, most of the planners in our 15 case study communities saw value in including CCA in their comprehensive or capital improvement plans. Many of the responses resonate with previous research: the three most common barriers to taking action reported were resources (staff and money), the sense that climate projections or

climate science remain uncertain, and concern over politics or lack of leadership (Hamin and Gurran, 2013).

Less reported previously is the impact of high private property values in motivating opposition to policy changes involving retreat options, and in stimulating pressure to enable hard shoreline defense. After this, a range of barriers are mentioned: challenges from existing land use patterns (which limit adaptation options), lack of public support or contrary local values, and the distant time frame of adaptive need. Various institutional constraints were occasionally mentioned: lack of regional planning in the state, the lack of federal or state mandates for action, and difficulty in finding a legal basis for including adaptation in regulations. Planners also reported political unwillingness to threaten property interests in expensive coastal land. In coastal Massachusetts as well as many beach areas, the residents most likely to be affected by sea change policies tend to be quite wealthy, and have the ability to concentrate resources to prevent change they consider undesirable (Hamin and Gurran, 2013). This is evident in the Australian case study as well, discussed below.

Case study: Planning, property values, and community "pushback" in Australia

Local values can provide an atmosphere of support for climate change adaptation, or alternately, can act as a barrier to that process (Wolf et al., 2013). The politics of risk are a major concern for Australian local governments. Councils that had reasonable success in making general plans for adaptation found it much harder to move to implementing regulatory policy (Gurran et al., 2012b). Vague comments regarding the need to adapt are one thing; plans and regulations that identify the affected properties are quite another. It did not seem to make much difference whether the property owner was a long-term owner or a 'wash-ashore' who was just thinking about buying land. Several participants described pressure from affluent newcomers who had purchased sites in vulnerable locations, and now sought to secure approval for new development, despite climate risk. These conflicting pressures arising from various stakeholder groups are a major concern for local councilors and professional staff. Respondents described a growing community 'pushback' against climate change, driven by concern that identifying areas of climate risk and imposing exposure-reducing development controls would lower private property values, has strong potential to erode local political support

for adaptation measures. Given that the benefits of adaptation occur in the distant and uncertain future, and that there is no obvious constituency for adaptation action, it has proven difficult even for local communities that started a solid CCA process with state funding to move into the implementation stage. The public – and often the planners- perceive climate change as part of the distant future, and it is difficult to care about that when there are pressing issues at hand.

Overcoming barriers through alternative processes

In general the literature and discussions on climate adaptation tend to propose two basic approaches to forward movement of CCA policies. The first is overt adaptation planning (Adger et al., 2005), in which the city or town prepares a comprehensive strategic framework based on climate forecasts and vulnerability analyses. The advantages here include the comprehensive nature of the method, which should assist in preventing maladaptation, the ability to include the public through regular participatory processes, and having as one product of the process an agreed-upon climate projection or set of scenarios (Preston et al., 2011). It appears that the comprehensive planning approach may overcome several barriers: it provides the ability to request resources for CCA, to develop an accepted climate projection for use in guiding policy, and to generate public support through participatory processes.

In figure 2 below, we reprise the ladder of adaptation as a planning process, with a focus on how it engages the public throughout many steps of the process, thereby bringing in better transparency and potentially building political support.

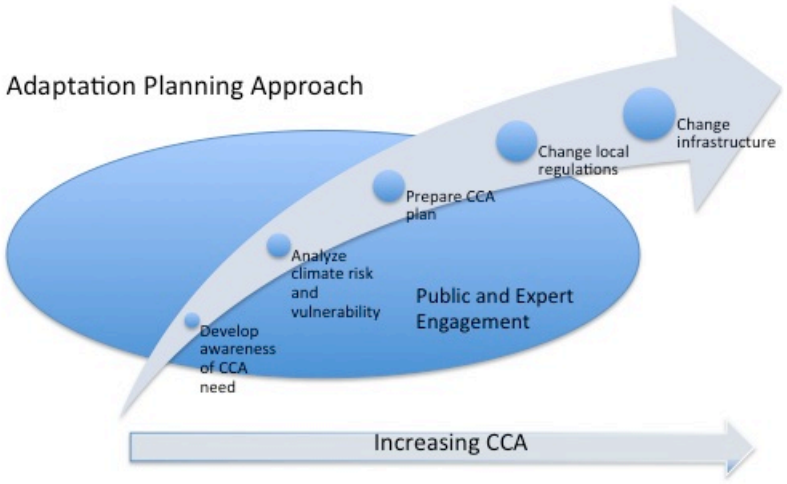

Fig. 2: CCA planning approach

The second approach is often termed 'mainstreaming', and implies moving directly from climate forecast to changing technical specifications and regulations without going through a full, stand-alone climate planning process (Klein et al., 2005, Sharma and Tomar, 2010). In this approach, officials can avoid discussion with the public or formal planning processes, and instead focus on changing regulations and technical specifications and including future climate as a normal variable in municipal management decisions—i.e., mainstreaming CCA. For example, at the urging of their regional planning body, several Massachusetts towns are including climate change projections in the vulnerability analyses for new, mandatory Multi-Hazard Mitigation plans.

The advantages here include speed, as climate becomes a normal part of the municipal processes quite directly; implementation, as the goal is to bypass a long planning process and go directly to changing policy; and integration, as climate adaptation is situated within existing cross sectoral plans and activities. The disadvantage is that there is little ability to engage the public, and minimal ability to coordinate policies or undertake a proper risk analysis. Given this, mainstreaming may lead to more maladaptation over time, as there is little chance to consider action in its fuller environment or compare actions to assure they work together. But it does allow quicker forward movement, and may be a good response when the issues are primarily

technical, when upper-level political support is weak but department-level support is strong, or when too much publicity is likely to lead to community push-back. The general steps are demonstrated in the figure below.

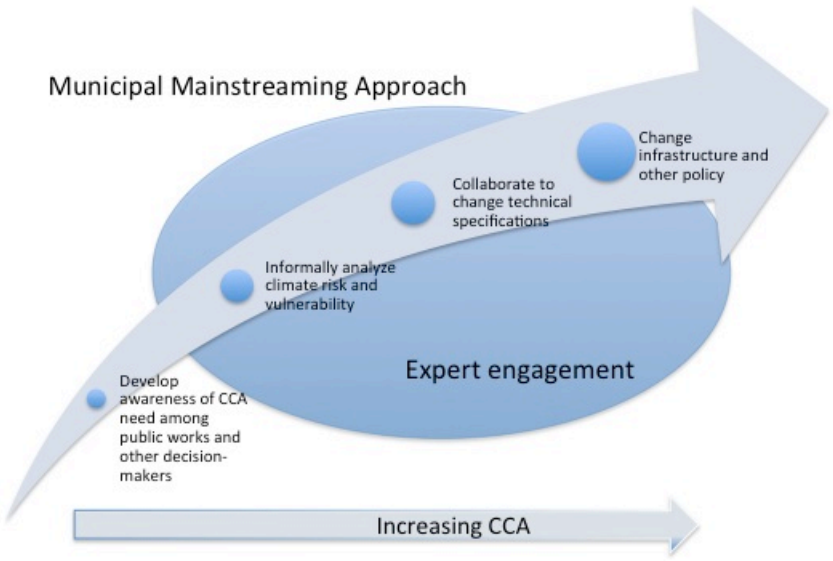

Fig. 3: Municipal mainstreaming approach

There is in addition a third potential approach which can be thought of as 'Stealth,' but might be less controversially be described as the 'no regrets + co-benefits, no discussion' approach. The idea here is to achieve some climate adaptation goals without identifying the actions as adaptation. Instead, the focus is on the other or 'co-benefits' of a policy (United Nations Human Settlements Programme (UN-Habitat), 2011). Indeed, research suggests that at the national level at least, climate change is rarely the primary or stated motivation for adaptive action (Berrang-Ford et al., 2011), but the extent of incorporation of climate adaptation measures within other policy frameworks is largely unknown. With anticipated increases in sea level, floods and stormwater intrusion (Frumhoff et al., 2007), most planners know there is pressing need for policy, but remain largely unable to publically frame the problem as one of climate change (Ruth and Coelho, 2007). It may even be that adaptation actions situated within established policy areas, such as natural hazards frameworks, are more likely to endure changing political cycles (Gurran et al., 2012a). This approach had been used in the

Australian context, with some local council professionals addressing skepticism by using a language of climate "variability" rather than climate "change", which they felt helped counteract the growing political pushback against climate change. Even more so than mainstreaming, this approach lacks the advantages that a public process can bring, and cannot achieve the perspective of a planning process. It works hit-or-miss. But in the hardest situations, it may be the way to start. Illustrative steps are identified in the figure below.

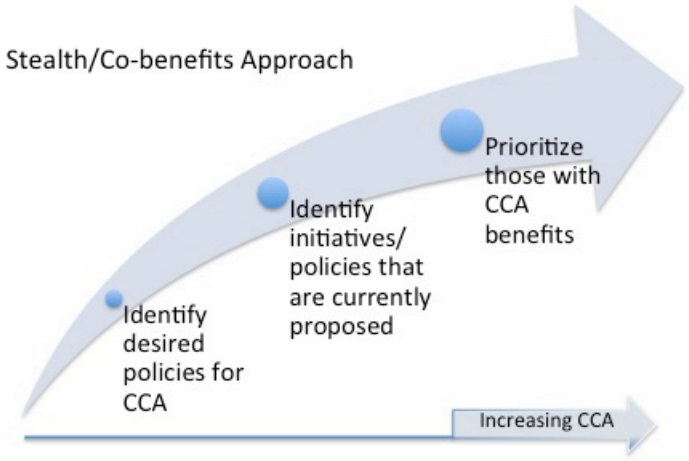

Figure 4: Stealth approach

Choosing your approach/Overcoming Barriers and Engaging Enablers

The short story is, not surprisingly, that undertaking a proper plan enables engaging the public and thus can build political support and create long-lasting credibility. A plan can also assist in requests for funding, and enables a more comprehensive view that may help in overcoming limits from lack of information and technical knowledge. Both the quality of the plan (clarity of goals, policies and regulation (Brody et al., 2005, Neuman, 1998) and the quality of the process (participation, community education, and support (Baer 1997, Laurien at al. 2004, Burby 2003), are important, and the plan can provide a bottom-up, participatory approach. Mainstreaming, in contrast, encourages the technical uptake and integration of CCA into a range of municipal decision-making, which can address important infrastructure issues

such as how high a bridge should be, or how large a water reservoir may be needed under changed climate. But mainstreaming is unlikely to build political support. Both mainstreaming and stealth may be efficient in getting movement quickly – for instance, in assembling data and undertaking basic changes to local strategies, guidelines, and perhaps, regulations, without inflaming climate change debate. However, stealth is unlikely to be able to move CCA very far along given the need to gain political support for increased expenditure, when actions need implementing, or for the exercise of unpopular decisions, both of which depend on leadership and community endorsed policy (Rosenzweig 2011, Brody and Highfield 2005).

A logical approach then could engage all three: beginning with overt CCA builds constituency, mainstreaming achieves integration, and stealth is an option if political change threatens policy commitment. If politics are an initial barrier, start with a stealth approach, seeking co-benefits policies first while laying political ground work for a comprehensive CCA planning process and mainstreaming into a range of policies. Further work is needed to know whether, in the case of climate adaptation, an explicit process, including community engagement, delivers better outcomes (in which case actions by stealth are best used as a last resort), and whether explicit climate adaptation strategies are more, or less, effective than those incorporated within other frameworks ('mainstreaming'), over the long term. Then there are the questions of ethics and process, which we conveniently ignore here but must be part of the considerations when actually selecting actions.

Conclusions: Connecting the dots between barriers and approaches

CCA action in the communities we studied is at too early a phase for strong conclusions. But some strategies for overcoming typical barriers nevertheless emerge. Even without a strong legal framework, local governments have the potential to embed climate change considerations across all aspects of strategic planning and development assessment, as well as their wider operational, environmental management, and natural hazard activities, as outlined in this chapter. The strategies for low carbon development,

which emphasise local and decentralised approaches to food, energy, water, waste, and transportation, and preserving and enhancing biodiversity and natural processes, provide a blueprint for the wider sustainable community agenda, emphasising resilience not only to future climate impacts but also to many of the other economic and social challenges likely to arise during the 21st Century.

Adaptation, by improving resilience to extreme events as well as the increasing hardships of climate, provides local benefits. But getting that message across requires overcoming the typically short time frame of politics and budgets, and considering instead a longer investment that matches investments and built form to the climate that is to come, rather than climates past. Some cities and towns have taken a leadership role and undergone adaptation planning without significant support from upper government levels. However, having state support through an existing state level adaptation plan appears a far more reliable way to encourage local governments to make local adaptation plans.

Ultimately, this analysis of early generation local adaptation planning suggests that more sophisticated and detailed policy and practice innovation is needed to allow municipalities to translate climate vulnerabilities into a concrete response framework, particularly in relation to land use planning. That adaptation actions are arising within the context of larger mitigation planning efforts suggests strong potential for synergistic solutions to be devised. Nevertheless, when new information about likely sea levels, flooding, and fire risks comes to light, difficult decisions regarding land based adaptation measures will be needed, potentially including identifying new areas as no-build zones. This implies a need for specific planning tools – such as planned retreat and transferrable development rights (enabling historical development entitlement to shift to more appropriate locations) – to provide a basis for offsetting some of the inevitable costs to individuals associated with such decisions. Vulnerability analyses need to become more common to assure that the least resourced are not the most affected. There is also a danger that in failing to clearly connect mitigation and adaptation decisions in new generation plans, mis-alignment may seep into the ellipsis. But as more examples, technical/policy guidance, and non-governmental support become available, in part building from the experiences of these early adopters, it appears reasonable to expect

adaptation planning to spread, particularly with more explicit state and federal encouragement.

Overall, there is an urgent need to move beyond vulnerability analysis and into implementation of adaptation action. While 'global' cities have been able to move forward, smaller cities are falling behind. Aid agencies have tended to prioritize rapid mainstreaming, while planners and policymakers want a comprehensive analysis of the adaptation situation. The frameworks presented here could encourage a more place-sensitive approach that matches barriers to approaches, encourages a more *real-politic* awareness of the local challenges of adaptation implementation, and thereby assists smaller cities in making on-the-ground progress in implementation.

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