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Thomas G. Measham,
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Russell Gorddard

Socio-Economics and the Environment in Discussion
CSIRO Working Paper Series 2010-05

December 2010
ISSN: 1834-5638

Further information: Bev Rose - bev.rose@csiro.au

CSIRO Ecosystem Sciences
GPO Box 284, Canberra ACT 2601
Australia
www.csiro.au

Adapting to Climate Change Through Local Municipal Planning: Barriers and Opportunities

Thomas G. Measham[1], Benjamin L. Preston[2], Cassandra Brooke[3], Tim F. Smith[4], Craig Morrison[5], Geoff Withycombe[5] and Russell Gorddard[1]

ABSTRACT

Municipal planning represents a major avenue for achieving adaptation at local and regional scales, however significant constraints need to be acknowledged and addressed if adaptation is likely to advance through this mechanism. This paper considers the role of municipal (local government) planning and in particular the key constraints which currently limit this avenue for adaptation. The paper reviews the constraints recognised in the adaptation literature including lack of information, institutional limitations and lack of resources. We further identify additional constraints which affect local government planning drawing on the field of community-based environmental planning. In relating these constraints to practical attempts towards adaptation, the paper considers planning based on a case study of three municipalities in Sydney, Australia. In doing so, we draw attention to factors thus far under-acknowledged in the climate adaptation literature. These include leadership, institutional context and competing planning agendas. These factors can serve as constraints or enabling mechanisms for achieving climate adaptation depending upon how they are exploited in any given situation. The paper concludes that, through addressing these issues, local, place-based planning can play a greater role in achieving climate adaptation.

Keywords: institutional capacity, place-based planning, community engagement

[1] Social and Economic Sciences Program, CSIRO Ecosystem Sciences, GPO Box 284, Canberra ACT 2601, Australia
[2] Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge TN 37831, Tennessee, USA
[3] WWF-Australia, PO Box 528, Sydney NSW 2001, Australia
[4] University of the Sunshine Coast, Locked Bag 4, Maroochydore DC QLD 4558, Australia
[5] Sydney Coastal Council Group, GPO Box 1591, Sydney NSW 2001, Australia

INTRODUCTION

Spatial variability in climate impacts emphasises the need for 'place-based' approaches to climate vulnerability analysis and adaption (Turner et al., 2003; Cutter et al., 2000). The term 'place-based' refers to a spatially distinct group of bio-physical and social conditions, which can in principle occur at any scale but tends to focus at local and regional scales where global and local drivers manifest themselves in particular ways (Turner et al., 2003; Walker et al., 2002). At this scale, municipalities (also known as local governments) represent a core institutional unit, but do not operate in isolation, so much as in association with higher levels of government and other institutions.

Planning is a crucial aspect of adaptation. Out of five adaptation strategies identified by Tompkins and Adger (2004), some form of planning is central to three, namely urban planning to avoid the impacts of climate related hazards such as floods and heat stress, planning for demographic and consumption transition, and plans for ecosystem conservation. Local, or municipal, planning represents a particularly important pathway for adaptation. In part due to its more direct interface with the public, and in part due to the 'subsidiarity principle', i.e. which argues for the smallest relevant scale of responding to a given challenge, local government has been argued to be the 'most salient political actor' when responding to the locally specific manifestations of climate impacts, such as sea level rise or heat waves affecting any given community (Crabbé and Robin, 2006). Moreover it has been argued that local institutions have three critical roles in climate adaptation, namely 1) structuring responses to local impacts 2) mediating between individual and collective responses to vulnerability and 3) governing the delivery of resources to facilitate adaptation (Agrawal, 2008).

This article focuses on local adaptation, yet acknowledges that adaptation does not occur at the local level independent of other scales. Local adaptation is linked, such that municipal policies are part of a broader institutional context (Adger, 2003). The role of local institutions is pivotal in terms of determining the distribution of vulnerability and the implementation of adaptation initiatives (Naess et al., 2005). Nominally, this role could provide local institutions with the discretion to tailor adaptation to local conditions. In practice, local authorities frequently fulfil the role of implementing agents for higher levels of government. In Norway for example, it is reported that local institutions have few incentives for pro-active management. However, even within the role of an implementation agent, local institutions still have 'room to manoeuvre' and take decisions quickly when opportunities (or threats) arise (Critchley and Scott, 2005; Naess et al., 2005). Local scale risk assessments are starting to become more common (Dessai et al., 2005; Næss et al., 2006; Preston and Kay, 2010). Yet despite the importance of the local level for planning and its intrinsic links to multiple scales, to date, the focus of adaptation planning has been overwhelmingly at the national scale, such as through National Adaptation Plans of Action (Agrawal, 2008; Tompkins, 2005).

Despite the relevance of local government as an actor for responding to climate change impacts, this role remains some distance from practical implementation, particularly in terms of policy implications (Boydell, 2010; Dovers and Hezri, 2010). Certainly, this was observed in the case study presented in this paper, and has been noted in other contexts, where climate change appears 'distant and cloudy' amongst an already crowded agenda of demands from concerned citizens (Crabbé and Robin, 2006). Even in a single locality, the mandate of municipalities frequently extends from aesthetics to infrastructure, from parking to

waste management (Wild River, 2006; Pini et al., 2007). Furthermore, the mandate of local government is expanding, due to the shifting of responsibility from higher levels of authority to lower levels of authority, particularly from state and provincial authorities (Ivey et al., 2004).

It is also important to note that placed-based planning (not only for adaptation) occurs in two distinct modes. The first is strategic planning process, which is important but not unique to local governments (Selman, 1999). At the local scale it fosters community vision, aspirational goals and place-making, along with defining pathways to achieve these goals. The second form is land-use planning, and is focused on the allocation of space to balance economic prosperity with acceptable living standards and the conservation of natural resources (Selman, 1996). Although these two types of planning are quite different in practice, and in many cases are managed by different departments, we propose that both are highly important to climate change adaptation, and can contribute to achieving adaptation at the local scale.

The main argument of the paper is that significant constraints need to be acknowledged and addressed in order to address climate adaptation through planning at the local scale. In the next section we outline the constraints on planning as a mechanism for adaptation that have been recognised in the climate change literature. In the following section we turn to a different body of literature concerned with community-based environmental planning in order to demonstrate a wider set of constraints that are known to affect planning processes when incorporating community involvement. We subsequently present an empirical study of the constraints on planning for climate adaptation as identified by local government

participants, and discuss the findings focusing on the political nature of local planning in practice.

CONSTRAINTS RECOGNISED BY ADAPTATION LITERATURE

Practical experience of climate adaptation through local planning has a relatively short history in the adaptation literature. Thus it is not surprising that in the climate change literature, the constraints on local adaptation planning have tended to be conceptualised in a relatively straight-forward, mechanical way, emphasising the importance of inadequate information, institutional limitations, lack of resources and a culture of reactive management. These are summarised in turn.

Lack of Information

Access to information pertaining to the vulnerability of municipalities to climate impacts has been reportedly scarce in both urban and rural locations (Mukheibir and Ziervogel, 2007; Crabbé and Robin, 2006). This information is needed to identify current and future vulnerabilities based on projected climate scenarios. Furthermore it needs to be pertinent to politicians, planners and managers, at a relevant scale and timeframe for taking action, so that local governments can determine what it is they have to plan for (Amundsen et al., 2010).

Institutional Limitations

Another recognised constraint on the ability of local institutions to adapt to climate change through planning concerns their institutional context. The policy framework in which local government operates is largely imposed by higher levels of governance, such as provincial, state and national policies. Indeed, in many cases, municipal authorities have no constitutional standing of their own. Rather they are the delegated agents of a higher power such as a state in Australia (Wild River,

2006) or a province in the case of Canada (Ivey et al., 2004). Hence for example in Sydney, a key planning mechanism known as Local Environmental Plans, prepared by individual councils, are a provision of the New South Wales Environmental Planning and Assessment Act 1979 (s53), and the State Minister for Planning is not bound by these plans, for example when considering State infrastructure projects.

Resource Constraints

Municipalities are frequently highly constrained in terms of their financial capacity (Pini et al., 2007). In part this stems from the wide range of activities in which they are engaged. It is also due to the lack of their institutional autonomy already described. This lack of resources has been linked to reactive management of facilities and infrastructure. Municipal authorities are frequently tasked with managing state or province infrastructure, in addition to local infrastructure, yet their lack of authority and stressed resources inhibits effective life-cycle planning (Brackertz and Kenley, 2002). These resource constraints can lead to self-perpetuating short term technical fixes rather than long terms integrated approaches to addressing problems (Crabbé and Robin, 2006).

LESSONS FOR LOCAL ADAPTATION FROM COMMUNITY-BASED ENVIRONMENTAL PLANNING

While the history of local adaptation planning is relatively short, there is a much longer history of local planning on which to draw lessons. Community-based environmental planning (CBEP) presents a much more nuanced set of challenges affecting planning at the local and regional scale (Measham and Lane, 2010). This field has long had a focus on ‘place-based’ environmental management, focusing attention on the unique suite of characteristics that constitute a problem context for planning, in a similar way to that proposed by Turner et al. (2003). A number of

advantages and disadvantages of this type of planning have been recognized, and are relevant to current debates on climate adaptation.

Due to its focus on place, CBEP has been recognized as more sensitive to the local characteristics of a given environmental problem. Essentially, local, place-based communities are thought to be more familiar with their own particular challenges and thus better able to inform an appropriate planning process (Lane and MacDonald, 2005; Li, 2002). On the basis of developing local 'ownership' of problems, CBEP is thought to lead to more legitimate processes than top-down planning which can isolate some stakeholders due to externally generated interests (Scott, 1998). In principle this more sensitive and legitimate process leads to more effective outcomes (Measham and Lane, 2010). While the notion of locally sensitive place-based planning is sound in principle, there are multiple problems with this mode of planning in practice. The first of these is that, even for discrete and localized communities, the range of stakeholder interests is highly heterogeneous and does not lend itself to consensus (Agrawal and Gibson, 1999). The difficulty in reaching consensus is not only concerned with defining desired outcomes. Indeed, a major barrier to local environmental planning has been lack of community agreement over problem formation (Selman, 1999).

A major challenge with place-based planning stems from overly simplistic notions of community. Naïve conceptions of community imply a homogenous, spatially fixed social group that shares a consciousness of being. Yet planning theorists emphasise that a multiplicity of communities exist, differentiated (and frequently divided) by factors including gender, ethnicity, class, and age (Lane and Corbett, 2005). This complexity poses multiple challenges for adaptation planning,

in terms of what adaptation means for different groups, who benefits and loses from adaptation, and above all, how to define legitimate adaptation options.

A key aim of CBEP has been to enable the integration of local, experiential knowledge with scientific knowledge. However, in practice this has rarely been achieved due to differences in competing knowledges that may not be reconciled in a single planning process. Finally, CBEP has been criticized for the potential for parochial thinking to dominate, with the possibility that strategies which seem appropriate at one scale can have harmful effects at other scales (Lane and McDonald, 2005). This issue needs particular attention in the case of climate adaptation planning, because what may be considered reasonable adaptation for one community may have mal-adaptive effects for others (Adger et al., 2009).

ADAPTATION AND LOCAL PLANNING IN SYDNEY

Based on the recognised constraints noted in the adaptation planning literature, and the wider lessons from CBEP, the authors developed a research project with the aim of identifying how local governments experience these constraints and how they address them in practical terms.

Background

The research presented in this paper formed part of a broader project called ‘The Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises’ conducted from 2007-2009. This project was a partnership between the CSIRO Climate Adaptation Flagship, The University of the Sunshine Coast and the Sydney Coastal Councils Group. The latter represents the 15 coastal municipal councils in the Sydney region.

The project was developed in response to the need for practice-relevant research to build capacity in local governments to understand and address climate vulnerability at the local scale, in this case in Sydney Australia (Preston et al., 2009; Shaw et al., 2009; Moser, 2010). The project involved three components. The first was an extensive mapping process to help council staff and elected officials to visualise vulnerability (Preston et al., 2008). The second was a series of workshops to consider vulnerability relative to different council responsibilities and activities (Smith et al., 2008b). The third phase involved case studies focusing on key adaptation barriers identified through the workshops (Smith et al., 2008a). These barriers related to a) infrastructure b) community attitudes and c) planning processes. The latter is the subject of this paper.

Method

The data consist of in-depth interviews conducted in 2008 with staff from three municipal councils from across the Sydney region: Mosman, Leichardt and Sutherland (Figure 1). The three Councils were selected to reflect diversity in terms of their size, demographic profile and location within Sydney. A total of 33 participants from these three councils took part in the interviews: (12, 11 and 10 from each respectively). Rather than speak only to planners, the research design made a deliberate effort to invite participants from a cross-section of council roles and responsibilities including elected leaders, senior managers, town planners, environmental managers, engineers and social planners. The rationale for this wider selection of participants is that climate adaptation requires an integrated approach.

FIGURE 1 ABOUT HERE

The interview questions focused on the context, structure, process and outcomes of planning, in addition to some more general questions about the role of local government in relation to climate adaptation:

- What role does local government currently play in adapting to climate change?
- To what extent is climate change accepted as an issue for planning?
- Is climate change embedded in council plans and policies?
- How do you operationalize policies about climate change?
- How do you plan for uncertainty?
- How do you measure success in relation to planning for climate change?
- What are the signs of successful adaptation?
- Overall, what role should local government play in adapting to climate change?
- Overall, what would local councils need to do differently in order to effectively adapt to climate change?

The interviews were conducted and recorded by three researchers, each an author of this paper. All interviews took place on site at council offices and lasted between 30 minutes and 1 hour. The analysis involved grouping the responses into qualitative themes with the assistance of NVivo (QSR, 2010) software. Each researcher analysed all the data individually at first then compared their themes with those of the other researchers to reach a shared representation of the data. Not all of the interview themes were directly relevant to the focus of this paper, so some tangential themes have been removed. Further information on the methods and the full set of empirical results are presented in Smith et al. (2008a).

FINDINGS

Leadership

Most of the participants acknowledged that planning needs to address climate change in a local government context. However, the importance of climate adaptation, rather than mitigation, varied between councils. This was mostly due to the priority placed on climate change by the leaders of each council. For example, some participants saw it as an utmost priority

> It's really vital that our councillors want to be seen to be a leader in this area and would regard that our place-based planning needs to have a vision for the prospect of climate change.

Throughout the interviews it was clear that the opinions and value system of the Mayor in particular, as well as the CEO or General Manager, made a strong difference as to the opinions held by other participants. That said, there were several incidences where participants held contrasting positions to senior mangers or councillors which they were prepared to express in confidence. However, in some cases resistance was expressed to including climate change in the planning agenda:

> I don't know that that's really reflected in the planning that we're doing at the moment. I think there's still an element of hope it won't happen.

While it is important to note some residual resistance to acknowledging climate change in general, overall there was a pervasive recognition of climate change as at least relevant for planning processes to consider, and hence there was sufficient recognition of the issue for it to be pushed onto the planning agenda.

Competing Priorities

It was evident from interviews that adaptation represents only one area of priority amongst other competing interests for local government planning. This may account for some of the aforementioned reluctance to embrace the issue – such sentiments may not necessarily reflect outright scepticism, but rather feelings that the local government has more immediate issues with which to contend. These competing priorities arise from many sources, including the different perspectives and areas of operation among council staff and elected officials.

> We're involved in everything from babies to bitumen and the request for more funding just comes in on a daily basis. We're not about to start throwing large sums of money at building extraordinary fortifications just in case the sea level rises.

The importance of climate adaptation also is probably influenced significantly by how the issue is framed. For example, to the extent that it is viewed as a public safety issue or a development issue, it may have greater resonance within local government. Generally, interview respondents reported climate change as being seen largely as one environmental issue alongside such topics as pollution and water quality. For example, one interviewee commented:

> …our environmental officers… have a better idea of what's going on with climate change and some other part of council like development assessment planners might not have as big an idea of what climate change issues are about because we're closer to [issues regarding] the people like developers. At present they don't really care about climate change.

This comment stands in contrast with the broader view that climate change and adaptation is in fact an important issue for planning. However, it also suggests that in some cases, knowledge and responsibility for tracking and responding to climate change is not evenly distributed across local government departments. In the case study councils, climate change was conceptualized as an environmental issue. For this reason, dealing with it was assigned to the environment department, along with waste management and pollution control. Exceptions to this tendency were found among council engineers, who in many cases mentioned sea level rise when discussing local climate and coastal hazard management.

Planning Process

Strategic Planning and Land-use Planning

Across all three case study councils, interview participants emphasised that climate change was part of their strategic plan in some form, either specifically or grouped as one of a suite of other environmental issues. This demonstrates that climate change is being considered in the guiding strategies of the three councils to varying degrees. However the focus was on mitigation, more so than adaptation. For example, as one interviewee stated,

> our strategic plan …[has]…a section…, 'reduced greenhouse gas emissions'. A lot of that was to do with climate change. That's from the community…. . as a council, we respond to this, it flows down into our management plan….

Beyond strategic plans, the extent to which climate change was incorporated into operational plans varied considerably. For example one council had a sustainability strategy which specified greenhouse reduction targets in different areas around council:

> … [We] have these targets that feed down from our strategic plan to our … Management Plan, so they can be monitored. So there's specific targets for greenhouse gas reductions.

While climate change had appeared on the planning agenda, it had made little impact on development control and zoning plans. For example, at the time of the interviews, there was a lack of attention to climate change (either adaptation or mitigation) in Local Environmental Plans which frustrated several participants. For example,

> I think council have accepted it as an issue for planning but we're still stuck… we need to…make this something that we have to adhere to. Like to put it in our LEP and actually make some guidelines…

An over-riding theme of the interviews was that councils were still in the process of coming to terms with climate change, still developing plans and a long way from implementing them. When asked about how they might apply their policies regarding climate adaptation, the most common response was that participants simply didn't know how to go about it.

> I don't know… how do you operate policy? I suppose, if I look at sea-level rises, I suppose we're trying to deal with that through our …planning study…. But… operationalised policies is a bit of a different thing. I don't know how far advanced a lot of other organisations are with respect to that.

This quote draws attention to the fact that these challenges are not only faced by local governments, but by a broader range of organisations.

Information Constraints

Participants identified a lack of useful, credible and relevant information about the nature of the climate risk to which they must adapt to be a key barrier for planning for climate change. This issue is captured in the following quote:

> I guess there are some gaps in the knowledge – there are some issues that I'm not exactly aware of. We do talk about rise in sea levels and things like that but we're not really mapping those types of issues and I think we could respond to some of those issues a bit better, getting out a bit more data and research…

As such, a key process to incorporate climate change into planning process is to improve the information base for key climate adaptation issues. Increased intensity in storm events and the potential for increased sea-level rise and storm surge were noted as potential concerns for some councils. One council had made significant progress in this regard, in the form of a two-dimensional flood study and an estuary water level study. At the time of the interviews, engineers were undertaking a two-dimensional flood-level modelling study to calculate revised storm surge levels by incorporating a margin to allow for predictions of sea-level rise and more intense storm events:

> We're also doing a estuary planning level study... which is working out storm surge levels around the foreshore based on a

> modelling of the whole harbour…it just recommends levels to build above and it has a built-in climate change factor…

The study involved working closely with climate scientists to provide access to the best available science, which was then applied to generate locally-relevant estimates of potential inundation.

The more that information was specific, the more powerful this became in terms of making a case for adaptation through planning. Again, sea-level rise represents an example where the impacts of climate change can be mapped and provide an argument for adaptation:

> …we put…various reports to council – and sea-level rise is one of the best ones because we had a number that we could go with. We mapped that number and it just showed on a map exactly what the potential impacts of that were. So they could see in an instant what it was…

Of particular note was the desire for so called ‘concrete’ information, such as identifying tangible hazards in the form of particular parks or residential areas. This leads to another process issue for planning for climate change in the form of getting specific about the nature of planning challenges and how to respond to them.

Institutional Constraints

In the Sydney coastal council region, councils have a legislated responsibility for incorporating hazard management into planning, for hazards such as flooding and bushfires. However, the institutions underpinning this responsibility are largely developed and maintained by the State Government, which at the time of the interviews, did recognize a changing climate but had not translated this recognition

into updated policies or processes relating to local planning. This was particularly noted by participants when discussing sea level rise. Councils had the option of voluntarily including a margin for sea level rise, however this was hard to justify to competing planning interests without endorsement from a higher authority. As one participant explained:

> …in terms of adapting to climate change we feel that we can only take it so far and we can't take it any further….We acknowledge the problem… but until there is a federal or state [decision]… to come out and say plan on a 50 year or a 100 year time horizon based on this degree of impact, we can't get off first base with flooding.

So, in principle, councils can be more conservative in their planning than they are required to by state flood policy guidelines. However without the legal basis for adjusting local environmental planning in terms of climate change, it is difficult to do so in the face of competing planning interests.

DISCUSSION

In theory and in practice, local government is identified as the closest level of government to community action. It is the scale at which the majority of development applications are processed, where most waste is managed and the health of the population is monitored (Brown, 1997). However this proximity presents key challenges for local governments. The councils presented in this research saw themselves as educators and implementers of adaptation, yet were mindful to avoid pushing their communities too far.

The three main barriers recognised in the adaptation literature – lack of information, lack of resources and institutional limitations – were clearly evident in the case study councils. The manner in which councils addressed these existing concerns is insightful for other locations. In terms of lack of information, it is important to emphasise that the need for information varies not only due to the threat at hand but also due to the specific response from councils. Our findings show that, in the case of sea-level rise and storm surge implications for planning, the information needs are quite specific and can be addressed through detailed hazard mapping in partnership with external technical support to provide best available estimates. In other instances, such as the effect of climate change on bushfire risk, councils did not need further detailed information. A workshop on this topic was sufficient for them to recognise that the frequency and intensity of this hazard may increase, but their information needs remain essentially unchanged (Smith et al., 2008b). An important implication of this research is to promote policy interventions which enable local governments to distinguish between the information needs of different types of climate hazards, so that they can prioritise their needs effectively.

The case study provides additional insights into the recognised constraint of institutional limitations. Two distinct sources of institutional limitations were evident in this study: those stemming from council internal structures and those occurring at higher levels of government. The most acute internal limitation, noted across each of the three case study councils, was a strong tendency to assign climate adaptation (along with mitigation) to the environment section of the council. This stems from a legacy of thinking of climate change as an environmental issue. The challenge for local government is to recognise climate adaptation as a cross-sectoral issue. This was starting to occur in some of the case study councils between the environment

and water sections, with engineers considering the implications of flood and storm surge events. Institutional 'silos' are a historic problem, and climate adaptation is a renewed reason to address the challenge of cross-sectoral integration within councils (Critchley and Scott, 2005).

The second type of institutional problem is much harder to address, namely the institutional context in which councils function. As Naess et al. (2005) demonstrate councils frequently fulfil the role of implementing actions defined at higher scales, with little room to manoeuvre. However, by identifying and specifying the limitations of higher level institutional arrangements, it is possible to argue a basis for change. This process moves from adaptation science to the political domain, as happened following the empirical research presented here. One of the partners in the research, namely the Sydney Coastal Councils Group, lobbied state government to change the planning laws by which local governments operate in order to recognise sea level rise in the planning system. Without attributing causality either to this research or the political lobbying of SCCG, it is important to note that the planning framework was amended by the State Government following this project to recognise sea level rise and guidelines were developed for integrating sea level rise into municipal planning frameworks (NSW, 2009). What this demonstrates is that a scientifically sound research combined with local political lobbying can lead to change at higher scales.

The case study also draws attention to the complicated nature of place-based planning which was raised in the literature on CBEP. This literature emphasises the multiplicity of intersecting communities which contest each other (Lane and McDonald, 2005). In the case study presented here, this manifested itself as competing planning priorities. What our findings show of relevance to other locations

is that, in any given local authority, the planning agenda is usually already full. Presenting the need for climate adaptation competes for space amongst other needs which can seem more pressing for local councils such as road maintenance and child care facilities. This issue of competing priorities is inherently tied to the issue of resources (Critchley and Scott, 2005). Even if the need for climate adaptation is acknowledged in the conceptual realm of strategic planning, it may be under-represented when it comes to allocating scarce resources.

The political nature of local government means that all decisions, including climate adaptation, are affected by political interests and competing preferences vying for support at the municipal scale (Keen et al., 2006). Our findings emphasise the role of leadership support for adaptation in the propensity to respond to climate change through local planning. Brown (2005) notes that leadership on sustainability matters in local government can come from a wide range of levels – from junior staff to senior executives and elected representatives. Therefore, climate adaptation can be driven from within the ranks. However, it is important to recognise that allocating adequate resources and setting goals is strongly tied to the platforms of elected officials, which means that the support, or lack of it, from political leaders can enable or stifle climate adaptation at the local scale. In some ways we are seeing at the local scale an echo of the international political debates held amongst national leaders and scientific communities such as the IPCC. Some local leaders are pushing for action whilst others are stalling based on claims of inadequate information, or denying the need for local adaptation in the face of other interests. Where local leaders considered climate change to be a pressing issue, resources were available and information needs were addressed. Above all, support from senior leaders is necessary to develop a coordinated approach to climate adaptation

through implementing relevant tools and processes across internal divisions (Critchley and Scott, 2005).

CONCLUSION

Due to the competing interests associated with local place-based planning and the politicised nature of local government, it can not be assumed that addressing the surface constraints alone (such as lack of information and resources) will significantly enable local adaptation in the face of political resistance. It has taken local government a long time to embed climate mitigation into policy and practice, so it is not unsurprising that movement towards climate adaptation has been slow. The need for climate adaptation was being taken up, to varying degrees, by strategic planners in each of the case study municipalities, but not by land-use planners at the time of data collection. Moreover, a key flaw in the planning frameworks in use was that they assumed a stable climate, with no mechanisms established to facilitate adaptation. Following this research and political lobbying for a better policy platform on behalf of project partners, the planning framework has been altered in New South Wales to recognise sea level rise. This demonstrates that institutional context for achieving climate change through local planning can be improved when research is used as a basis by local governments to lobby higher levels of government. Only by gaining acceptance in the local political arena can climate adaptation gain traction on the planning agenda. Finally, local leadership is crucial. It is through supporting local leadership that the constraints identified in this paper can be addressed and adaptation can be achieved through local, place-based planning.

ACKNOWLEDGEMENTS

This research was funded by the CSIRO Climate Adaptation Flagship and the Australian Government Department of Climate Change. Thanks to the staff and councillors of Leichardt, Mosman and Sutherland Councils who participated in this research.

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Figure 1. Location of participating councils