

Cross-scale barriers to climate change adaptation in local government, Australia

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CROSS-SCALE BARRIERS TO CLIMATE CHANGE ADAPTATION IN LOCAL GOVERNMENT, AUSTRALIA

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About the authors

The Institute for Sustainable Futures (ISF) was established by the University of Technology, Sydney in 1996 to work with industry, government and the community to develop sustainable futures through research and consultancy. Our mission is to create change toward sustainable futures that protect and enhance the environment, human well-being and social equity. We seek to adopt an inter-disciplinary approach to our work and engage our partner organisations in a collaborative process that emphasises strategic decision-making.

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CONTENTS

ABSTRACT	1
EXECUTIVE SUMMARY.....	3
1 INTRODUCTION	9
1.1 Study aims	10
1.2 Report structure	11
2 BACKGROUND TO AND REVIEW OF COMMON CROSS-SCALE BARRIERS	12
2.1 Defining climate change adaptation	12
2.2 Cross-scale barriers	13
3 THEORY AND CONCEPTUAL FRAMEWORK FOR THIS STUDY	16
3.1 Multi-level governance for supporting adaptation within local government	16
3.2 A diagnostic framework for identifying barriers to adaptation	18
3.3 Legal framework for local government climate change adaptation	21
3.4 Initiatives supporting local government adaptation	24
3.5 Mapping the cross-scale linkages	27
4 END-USER ENGAGEMENT METHODS AND ACTIVITIES	29
4.1 Stakeholder engagement	30
4.2 Case examples	35
5 RESULTS AND OUTPUTS OF STAKEHOLDER ENGAGEMENT	36
5.1 Cross-scale barriers and the underlying causes	39
5.2 Research findings in the context of current literature	45
5.3 Enabling actions for a preferred future	47
6 FUTURE RESEARCH DIRECTIONS	55
7 SUMMARY AND CONCLUSIONS	56
8 REFERENCES	61
APPENDIX A: STAKEHOLDER INTERVIEW QUESTIONS	67
APPENDIX B: FULL LIST OF BARRIERS	71
APPENDIX C: FULL LIST OF UNDERLYING CAUSES	75
APPENDIX D: FULL LIST OF ENABLING ACTIONS FOR CONSIDERATION	77
APPENDIX E: FIVE CASE EXAMPLES	79
APPENDIX F: ROLES AND RESPONSIBILITIES FOR CLIMATE CHANGE ADAPTATION	93
APPENDIX G: PARTICIPANT FEEDBACK FROM WORKSHOPS	95

FIGURES AND TABLES

Figures

1	Conceptual framework for examining cross-scale barriers	20
2	Cross-scale linkages (NSW)	28
3	Study activities	29
4	Location of case examples	35

Tables

1	Key problem areas of Earth System Governance perspectives	18
2	Participating stakeholders and their involvement, arranged by sector	30
3	Summarised barriers and causes against the four stages of the adaptation process	37
4	Summary of case examples in comparison to the cross-scale barriers	38

ABSTRACT

This report documents a study aimed at identifying cross-scale barriers to planned adaptation within the context of local government in Australia, and the development of enabling actions to overcome these barriers. Many of the impacts of climate change and variability have been, or will be, experienced at the local level. As a result, local governments in Australia (and overseas) have initiated plans to adapt to these impacts. However, the pathway to planning and implementation of adaptation is not a barrier-free process. Local governments are embedded in a larger governance context that has the potential to limit the effectiveness of planned adaptation initiatives on the ground. Identifying barriers or constraints to adaptation is an important process in supporting successful adaptation planning, particularly where reworking the path-dependent institutional structures, organisational cultures and policy-making procedures is required.

The report outlines the theoretical and conceptual framework underpinning the research, and explains the methodology and activities undertaken to gather data throughout the project. The study used a mixed-methods social research approach, drawing on interviews, case examples and stakeholder workshops, and including participants from within local government and also located in other government agencies and industry groups.

A literature review provides background to the regulatory context as well as the types of adaptation funds and programs that have supported local government in adaptation planning to date in Australia. The common barriers to adaptation within the local government context in Australia and internationally are synthesised.

The research revealed that the cross-scale barriers faced by local government in relation to climate change adaptation are not unique to the field of climate change adaptation in Australia. It also showed that many of the barriers are faced by councils around Australia, and can be considered to fall into four main thematic areas: (1) poor understanding of the risks of limited access to and the uncertainty of climate change impact-related information; (2) inconsistent governance structures, coordination, communications and leadership between the vertical tiers and horizontal levels of government; (3) inconsistent problem definition and appropriate climate change adaptation frameworks to use for planning; and (4) competing priorities in planning and implementing responses due to limited operational resourcing, in areas such as staffing and funding.

In addressing these challenges, the following key enabling actions were identified by the research participants:

1. Build community consensus on a shared understanding of the seriousness of climate change risks and the need to act.
2. Allocate and agree upon priorities, roles and responsibilities at the three levels of government.
3. Improve the national climate change adaptation framework.
4. Utilise effective regional mechanisms and initiatives.
5. Develop a consistent risk-planning and business case framework.
6. Establish a central data-management and sharing mechanism.
7. Make more effective use of existing and new government funds.

ABBREVIATIONS

ACELG	Australian Centre for Excellence in Local Government
ALGA	Australian Local Government Association
AGO	Australian Greenhouse Office
CBA	Community-based adaptation
CCA	Climate change adaptation
COAG	Council of Australian Governments
CRC	Community Resilience Committee
CCP	Cities for Climate Protection
DEC	Department of Environment and Conservation (NSW)
DoPI	Department of Planning and Infrastructure
DRR	Disaster risk reduction
DSE	Department of Sustainability and the Environment (Victoria)
EPA	Environment Protection Authority Victoria
ICA	Insurance Council of Australia
ICLEI	International Council for Local Environmental Initiatives
IPCC	Intergovernmental Panel on Climate Change
ISF	Institute for Sustainable Futures
LGAs	Local government areas
MAV	Municipal Association of Victoria
NCCARF	National Climate Change Adaptation Research Facility
NELGN	North East Local Government Network
NFID	National Flood Information Database
OEH	Office of Environment and Heritage
RDV	Regional Development Victoria
SCCC	Select Council on Climate Change (COAG)
VCCCAR	Victorian Centre for Climate Change Adaptation Research

EXECUTIVE SUMMARY

Given their location at the regional and community level, local governments play a vital role in climate change adaptation through information provision, regulation, and the direct provision of infrastructure and community services. Councils around Australia are at different stages in their fulfilment of this role, since they are faced with challenges to climate change adaptation – both within and outside of their own organisations. This study focuses on the barriers that exist beyond the boundaries of local government itself, considering the interactions with industry, community and other spheres of government that specifically impede local government from carrying out its climate change adaptation responsibilities, or reduce the opportunity for local government to confidently engage with its role in adaptation.

Barriers that are ‘cross scale’ can be understood and categorised in a number of ways. For the purposes of this study, we considered barriers as they arose at each stage of the climate change adaptation process – understanding, planning, implementation, monitoring and management – drawing on the work of Moser and Ekstrom (2010). Additionally, the study considered the structural elements that helped contribute to establishing the barriers, and explored points of possible intervention, or ‘enabling actions’, that could help overcome one or more barriers.

The research ran over a period of six months and used a mixed-methods social research approach, drawing on interviews, case examples and stakeholder workshops, and engaging with participants from within local government as well as those from other government agencies, academia and industry groups. The research had a national focus and involved participants from 42 organisations, with representation from each state and territory, as well as each tier of government.

The research revealed that the cross-scale barriers faced by local government in relation to climate change adaptation are not unique to the field of climate change adaptation in Australia. That is, they face similar barriers in other areas of their work as well. It also revealed that many of the barriers faced are experienced by councils around Australia, but that each barrier is not faced equally by each council. This is largely due to the contextual landscape in which distinct processes are at play (e.g. regulatory frameworks, values and perceptions among different agencies and actors, geographical location, resource management arrangements). The findings also suggest that an array of preconditions and co-conditions need to exist before we can start to measure success in adaptation programs.

The key barriers identified by the research can be considered to fall into four main thematic areas:

1. a poor understanding of the risks, limited access to and the uncertainty of climate change impact related information
2. an inconsistent governance structure, coordination, communication and leadership between both the vertical tiers and horizontal levels of government
3. an inconsistent problem definition and appropriate climate change adaptation framework to use for planning, and
4. competing priorities due to limited operational resourcing, such as staffing and funding, to plan and implement responses.

The research identified a keen interest among participants to move beyond problem identification and to venture into solutions. To do this, the final stages of the research considered the possibilities for interventions that would be cross scale in focus and that would either help enable councils to navigate or overcome barriers, or reduce the impact of the barriers on their work.

It was not the intention of this study to develop action plans or allocate specific responsibilities to any agency, but rather to gain an understanding of the potential strategies that would enable local governments to overcome the cross-scale challenges facing them under a changing climate. Many of the strategies proposed are not unique to adapting to climate change impacts, but lessons from other sectors and programs can be drawn upon to overcome the cross-scale challenges. While the enabling actions are based on the opinions of the participants, their contributions provide valuable insights. The key enabling strategies identified include the following:

1. Build community consensus on a shared understanding of the seriousness of climate change risks and the need to act, through training and the delivery of a consistent message from all tiers of government.

The first stage of the adaptation process – *understanding* – requires that the community is adequately informed of climate change risks. The potential exists to undermine community consensus on the seriousness of these risks through inconsistent messages from the various agencies and organisations with vested interests. A number of stakeholders concurred with the published literature (see Measham et al. 2011) that the poorly and inconsistently articulated problem of climate change by the various tiers of government was a key barrier to effective adaptation response planning and overcoming the deeply held values, beliefs and scepticism faced by local government planners. The case examples and workshop presentations revealed that framing the adaptation response as a risk-reduction and management approach attracted less resistance to adaptation planning and implementation.

It is generally accepted that local governments are best placed to communicate the relevant climate-induced impacts to the community in their area. But having consistent and accepted data and information to draw upon would help to develop community consensus on the potential threats to the region. This could be achieved through support from federal and state governments in providing a consistent message based on sound and accepted data and information. Allowing public access to this single source of information would reduce the level of misinformation and misunderstanding.

2. Allocate and agree upon priorities, roles and responsibilities at the three levels of government for addressing climate induced risks for improved co-operative governance, co-ordination and communication.

The poor clarity of roles and responsibilities for climate change adaptation, including the responsibility for managing risks of climate change, has been identified by both the study participants and the published literature, and is best illustrated in the areas of land use planning and emergency management (Productivity Commission 2012). This inconsistency between the policies of different departments within a jurisdiction is best illustrated by the case for land use planning, which at the state level is assumed to be a stable climate, and thus precluded attempts to incorporate adaptation into local government planning (Pillora 2010; Measham et al. 2011).

Adaptation at the local government level is generally considered to be a ‘shared responsibility’ which must be supported through collaborative efforts across the three tiers of government (Withycombe 2009; Productivity Commission 2012), and hence the roles and responsibilities between state and Northern Territory governments and local governments should be clarified. The recent discussion

document released in May this year by COAG (2012b), which outlines the responsibilities of state and local governments, is an attempt to address this vacuum. In addition, a draft recommendation by the Productivity Commission (2012) is that a comprehensive and up-to-date list of laws that delegate regulatory roles to local governments should be published to assist state, territory and local governments to assess whether local governments have the capacity to effectively discharge their roles.

3. Improve the national climate change adaptation framework to guide complementary state and national level policy and legislation.

The lack of consistency in the current planning and regulatory frameworks, which are in part driven by the inconsistent definition of the climate change adaptation issue, has resulted in an uncertainty about the legal liability of local governments (Funfgeld 2010; Mustelin 2011; Productivity Commission 2012). Participants in the study suggested that linking climate adaptation to sustainability and risk management would allow for a more consistent approach to policy and legislation at all levels of government. This would encourage the mainstreaming of adaptation into currently established planning and risk management processes. The current variation in the state-level policies will need to be overcome to achieve this goal. State and Northern Territory governments should therefore clarify the legal liability of local governments regarding climate change adaptation matters and the processes required to manage that liability (Productivity Commission 2012). The obvious place to coordinate this would be through COAG; however, the urgency of addressing this policy and regulatory challenge will need to be communicated by local government through state government.

4. Utilise effective regional mechanisms/groups and initiatives to deliver regional priorities for climate change adaptation and establish new ones where necessary.

In addition to cross-scale responses to the challenges identified in this study, the case examples have demonstrated that *cross-level* collaboration in the form of regional approaches is a viable mechanism to deliver collaborative outcomes. Integrated assessments and responses conducted at the *regional scale* have advantages over national and local approaches, since in the first instance more reliable data is available locally, system complexity is better understood and communication is usually better. Regional groups could be organised around various climate impacts such as flooding, bushfires, drought and storm surges. Coordination of these initiatives is necessary to ensure a coherent approach to enhancing resilience.

Greater coordination and collaboration among local governments could also address some of the capacity and resource constraints they face – such as undertaking common activities, or joint activities through resource sharing (Productivity Commission 2012). However, in some cases the establishment of these networks/forums would require some form of state recognition and support.

5. Develop a consistent business case framework to support local government to prepare their own adaptation investment plans and to improve the evidence to support business/ investment decisions.

A standardised approach to assessing the costs and benefits of proposed responses to projected climate-induced impacts would provide the necessary rigour and confidence in investment decisions made by all tiers of government. This is

especially necessary when considering the future uncertainty of the projected impacts. While there are risk-assessment frameworks that are used by local government, the use of cost-benefit methodologies in this context has not been described fully. This would include processes for multi-criteria decision analysis for considering non-monetised benefits and costs, as well as the setting of boundaries.

While guides for general risk management exist (such as AS/NZS 4360:1999), having a standardised guide for assessing and planning for climate-induced risks by setting out the type, minimum resolution and possible sources of information and data needed to make credible business and investment decisions would be useful for both state and local governments.

The use of such a guide would ensure that local governments across Australia approach the issue in a consistent way to produce outputs that are usable and defensible in business case preparation. State departments would have a transparent tool for assessing local government climate adaptation plans. The development of such a planning framework is a collaborative exercise between all tiers of government. Federal government's role would be to ensure consistency across the country, and it could provide the resources to develop the framework.

6. Establish a central mechanism for data management and sharing.

It has been argued that before adequate adaptation planning can be undertaken, the likely impacts at a local level due to projected climate change need to be both made available and understood (Booth 2012; Productivity Commission 2012). However, participants in this study suggested that the challenge with regard to obtaining this information is less about the lack of data and knowledge and more about the challenges associated with understanding what information is needed, where to find it and how to effectively use it. This notion is supported by the COAG Select Council on Climate Change (SCCC), which notes that those parties with a clear understanding of their climate change risks will better be placed to identify the actions necessary to manage the risks (COAG 2012b).

Current information and guidance do not meet the requirements of some local governments, since the climate change-related data collection and analysis are ad hoc (Productivity Commission 2012). Furthermore, the inconsistent use of terminology, data-collection techniques and perceived lack of locally appropriate information have been put forward as challenges. Climate projections are currently only relevant at the national and to some extent regional levels. The scale of the problem has not been made relevant at the local government level; however, efforts are underway in NSW to develop fine-scale climate projections to address this information gap (OEH 2012).

A national repository – hosted, for example, by Geoscience Australia or the Bureau of Meteorology – has been suggested for climate impact-related data to be stored and made available to state and local governments, with the ability for local governments and other agencies to upload and download data and information, such as audited or peer-reviewed data sets for flood mapping, sea level rise, etc. An intergovernmental committee would determine the terms of reference of such a facility and the types of information to be made available. Such dependable and peer-reviewed data and information would underpin investment decisions and support the internal business cases for sustainable infrastructure discussed in the previous point.

7. Make more effective use of existing government funds and develop new funds for adaptation, to ensure continuity in the implementation of the plans.

A consistent theme across all international and local literature, as well as being a key challenge raised by the study participants, is one of constrained resources (financial and staff) faced by local governments in all states and territories, together with competing priorities within their diverse portfolio of responsibilities (Pillora et al. 2009; LGSA-NSW 2010; Pillora 2010; Measham et al. 2011). However, many of these barriers are likely to be more significant in smaller and more isolated local councils, in comparison with larger urban councils. Areas with small and remote populations, together with vast infrastructure networks, are likely to find it difficult to resource adaptation activities.

The current funding approach at the federal level was viewed by participants as being piecemeal, without any systematic follow through. Large long-term adaptation projects that aren't available within local governments' own discretionary income should be federally funded on a priority basis. Further, investment in successful existing programs should be prioritised to carry them through to completion, and to avoid abandoning projects after the initial planning phase. In addition, grant funding should be used to build capacity among end-users who will be implementing outcomes at a local level.

These recommendations currently sit alongside many other important studies already carried out to understand the experience of local government in responding to climate change, the barriers to local government climate change adaptation in the international context and the adaptation tools and approaches here in Australia. In addition, barriers to adaptation have recently received attention from the Productivity Commission, and this study provides an opportunity to contribute to this work. The Select Council on Climate Change (of the Council of Australian Governments, or COAG) has also circulated a document addressing the need to clarify the roles and responsibilities for responding to climate change. To action the recommendations from this study, formal discussion of the high-level recommendations should be held, and further strategy planning for each of the recommendations should be commissioned. This should include linking with the COAG SCCC planning and strategy development processes.

1 INTRODUCTION

Warming of the global climate system over the past century has been well documented and is beyond doubt. Over the past 60 years, Australia's average temperatures have risen by 0.9°C, with significant variations across the country. This has manifested in the frequency of hot days and nights increasing over this period. Since 1950, most of the eastern and south-western regions have experienced substantial rainfall declines. Extreme daily rainfall intensity and frequency have increased in the north-west, central and the western NSW tableland regions. Sea levels rose by approximately 10 centimetres from 1920–2000 at the Australian monitoring sites. These trends are projected to continue (CSIRO 2007).

The impacts of climate change and variability, such as droughts, flooding, storm surges and sea level rise, have or will be experienced at the local level, requiring a wide range of local interventions in response (Corfee-Morlot et al. 2009). Since local governments have the greatest understanding of the issues facing their jurisdictions, they are the best located to develop local approaches to adaptation. This approach is consistent with the principle of 'subsidiarity' – where responsibility for a particular function should reside with the lowest level of government that is best able to deal with that issue (Productivity Commission 2011). The Garnaut Climate Change Review (Garnaut 2008) also favours strong reliance on local initiatives in determining how Australia as a whole adapts to climate change, since centralised government lacks the agility to orchestrate a differentiated response with the necessary precision to address local needs. In addition, local governments in some cases have been required through regulatory obligations to prepare climate change risk assessments, as was until recently the case in NSW under the Waste and Sustainability Improvement Payment (WaSIP) program (OEH 2011a).

Given that many of the impacts of climate change are expected to manifest at the local level, many local governments globally have initiated plans to adapt to these impacts, such as those initiated through the ICLEI Cities for Climate Protection Program. Concurrently, initiatives have been put in place to support the development and implementation of these plans. However, the process for the planning and implementation of adaptation is not barrier free. In the context of climate adaptation, barriers are defined as 'impediments, that can stop, delay or divert the adaptation process, or that might prevent the community from using its resources in the most advantageous way to respond to climate change impacts' (Moser and Ekstrom 2010; Productivity Commission 2012). The challenges can be found both inside and externally to the responsible organisation. Capacity and financial constraints have often been cited as the main internal challenges facing adaptation at the local council level (Mukheibir & Ziervogel 2007; Smith et al. 2008; MAV 2012). External challenges can take the form of competing priorities, the fact that planning time horizons are longer than political lives of decision makers, and the absence of over-arching legislative frameworks that take climate change into consideration, to mention a few (Smith et al. 2008; MAV 2012).

Additionally, local government in Australia is embedded in a larger multi-scale governance context, consisting of a range of state and non-state actors, all of whom influence the adaptation decision-making space. Moreover, adaptation planning within local government or other vulnerable sectors does not occur in isolation; it is dependent on the extent of adaptation occurring at various spatial scales and within sectors. As Adger et al. (2008, p. 340) suggests, this dependency of adaptation decisions on scale and agency may give rise to hidden limits to adaptation in an increasingly complex and interconnected society. It is thus pertinent to understand and address the critical cross-scale barriers that may limit

effective adaptation planning and implementation within local government (Withycombe 2009; Burch 2010).

Early identification of these barriers can provide incentives for players within a given system, who have greater control over a specific barrier(s), to become proactive in adaptation decision-making and to facilitate adaptation within local government. Simultaneously, it will support the way lessons and experiences with adaptation within local government feed into planning at higher scales, ensuring that local strategies remain relevant and providing a basis for transferring knowledge to other sectors and communities (Corfee-Morlot et al. 2009).

The understanding of barriers/constraints to adaptation is an emerging research area, which has to date identified common barriers to adaptation planning within local government in Australia; these include leadership, competing priorities, planning process, information constraints and institutional constraints (Measham et al. 2011). Similar insights have been drawn from international studies (Dessai, Lu & Risbey 2005). Although these studies have recognised the cross-scale integration and collaboration needs, many of these studies have focused largely on local government itself and internal barriers, rather than understanding the broader multi-governance system and cross-scale barriers that shape adaptation at the local government scale.

In response, the Institute for Sustainable Futures (ISF) has undertaken this study to synthesise a set of critical cross-scale barriers to adaptation planning and implementation by local government in Australia, thereby defining the adaptation capacity interventions to move to a climate-resilient delivery of local government services. Funding for the project was provided through the National Climate Change Adaptation Research Facility (NCCARF).

1.1 Study aims

The study and report do not aim to focus on the internal constraints confronting local governments, but rather focus on the cross-scale nature of the challenges facing local government in developing and implementing their adaptation plans. The study specifically sets out to address the following objectives:

- a) Identify a set of critical cross-scale barriers to adaptation planning and implementation by local government across Australia.
- b) Identify the underlying processes and structures that give rise to these barriers, and understand how the actors and the context of the system contribute to the barriers.
- c) Suggest options for how barriers will be overcome, thereby defining the adaptation capacity interventions to move to a climate resilient delivery of local government services.

A key objective of the project was to be end-user focused in an effort to ensure the research would be informed by end user needs. This research has identified primary end-users as local government representatives involved in adaptation planning and implementation. Secondary end-users of the research have been identified as those working (in various capacities) with these local government stakeholders. Our research approach was therefore driven by engagement with stakeholders from all tiers of government, as well as others identified during various stages of the project (see Section 5).

1.2 Report structure

This report documents all work undertaken for this study, and draws on the workshop reports, case examples and targeted interviews.

The following section presents a background review of common cross-scale barriers within the local government context in Australia and internationally, followed by an outline of the theoretical and conceptual framework underpinning the research.

Section 4 presents a background to the regulatory context as well as the types of adaptation funds/programs that have supported local government in adaptation planning to date in Australia. Section 5 outlines the methodology and activities undertaken to gather data through out the project.

The results from the project activities are presented and discussed in Section 6, in two sub-sections, which focus on the barriers and underlying causes, then the enabling actions to overcome these barriers.

Future research directions, together with summary and the conclusions, bring the report to a close.

A number of supporting documents are provided in the Appendixes.

The background review and the adaptation context, which have been reproduced in part in Sections 2 and 4, are outlined in detail in the study's Preliminary Background Report (Gero, Kuruppu & Mukheibir 2012)

2 BACKGROUND TO AND REVIEW OF COMMON CROSS-SCALE BARRIERS

This section provides an overview of the available literature analysing the cross-scale barriers that exist internationally and nationally, with a view to informing the methods and drawing lessons for the development of enabling actions as an output of this study. Additionally, it guides the development of a theoretical and conceptual framework, which draws attention to the multi-governance arrangements that influence cross-scale interactions and may give rise to the cross-scale barriers identified below.

2.1 Defining climate change adaptation

Climate change adaptation has been defined as the process of reducing the vulnerability to current and/or projected climate change impacts (IPCC 2007; Wiseman et al. 2011). There are many types of adaptation processes, including incremental improvements through the transformation of existing structures and processes, planned or proactive anticipatory actions, or post-impact reactions. Adaptation is a continuous, ever-changing process involving cycles of decision making, planning, action, observation and, above all, social learning and continuous adjustment (Wiseman et al., 2011). Adaptation activities may be in the form of either short-term climate-related 'shocks' such as droughts, floods, bushfires and heat waves, or long-term climate-related trends, such as shifting rainfall patterns, mean temperature changes or sea level rise. Some adaptation responses will address both shocks and trends (Mukheibir, Mitchell et al. 2012).

In this study, climate change adaptation specifically refers to the anticipatory plans and actions by local governments to avoid or reduce the negative impacts due to the projected climate change through, for example, extreme temperatures, droughts, flooding, storm surges and sea level rise. This study does not consider in its analysis any plans and actions to mitigate greenhouse gas emissions.

In Australia, the need to adapt to climate change has been acknowledged for some time. In 2007, the Council of Australian Governments (COAG) endorsed the National Climate Change Adaptation Framework to serve as a basis for government action (COAG 2007). In particular, the framework seeks to identify possible actions to assist vulnerable sectors and regions to adapt to the impacts of climate change, including water resources, human health, settlements and infrastructure, and coasts. Since local governments have the greatest understanding of the issues facing their jurisdictions, they are best located to develop local approaches to adaptation (Garnaut 2008; Corfee-Morlot et al. 2009). Adaptation responses by local governments can take a variety of forms (MAV 2011):

- operational planning, such as changes to watering regimes, using drought-resistant plants, considering climate-related considerations in statutory planning decisions, etc.
- issues-based planning, such as the development of a heatwave response strategy
- corporate planning as it pertains to only council services and assets.

More recently in Australia, climate adaptation has received attention from the Productivity Commission, which was tasked with assessing the regulatory and policy barriers to climate change adaptation (Productivity Commission 2012). The Commission defined a barrier to climate change adaptation as anything that might prevent the community from using its resources in the most advantageous way to respond to climate change impacts (Productivity Commission 2012). It noted that

barriers could include market failures, policy and regulatory barriers, governance and institutional barriers, and behavioural barriers. This study has considered these wide-ranging potential barriers to adaptation in determining how and to what extent they operate across vertical and horizontal scales.

2.2 Cross-scale barriers

It is generally accepted by practitioners and academics that it is at the municipal level of government that adaptation is mostly planned for and implemented, and hence where barriers are widely noted (Ford et al. 2011; COAG 2012a). Identifying barriers or constraints to adaptation is an important process in supporting successful adaptation planning, particularly where reworking the path-dependent institutional structures, organisational cultures and policy-making procedures is required (Burch 2010). Many of these barriers could be overcome through incremental changes, and thus the institutionalisation of processes to facilitate change should occur early on in the adaptation process.

2.2.1 Key barriers

To understand these challenges more deeply, Moser and Ekstrom (2010) drew from the international literature and synthesised a set of cross-cutting barriers for each stage of the common phases of a rational decision-making process (i.e. from understanding and planning to implementation and monitoring), as described in Section 3. The set reinforced a number of key barriers that are frequently cited in the adaptation literature (Measham et al. 2011), namely the lack of information, the lack of resources, institutional limitations, poor communication, and the deeply held values and beliefs that show how people respond to climate risks and their management. The degree to which the barriers appear in each stage of the adaptation process is dependent on contextual features, but it is important to highlight that they have been posed as significant barriers in every documented case of adaptation (Moser & Ekstrom 2010).

2.2.2 Importance of Institutional and governance arrangements

In relation to the cross-scale barriers mentioned above, it is often suggested that institutional challenges present the most significant barrier, further compounded by a lack of political will and leadership, particularly at the local level (Ford et al. 2011). This observation was supported by Burch (2010), who concluded that effective adaptation planning in Canadian councils was less linked to additional resources (e.g. technical, financial, human resources) than to greater facilitation through reworking interconnected structures and processes. These included institutional structures, policy-making procedures and organisational cultures (Burch 2010).

Biesbroek (2010) identified various constraints to national adaptation planning across scales and sectors in seven European Union Member Countries, including the lack of coordination between administrative levels, unclear division of responsibilities, cross-level and cross-sectoral conflicts and lack of resources. To address this, a multi-level governance framework to provide clarity related to the role of the cities, the regulatory context and financing processes for adaptation has been advocated by Fünfgeld (2010).

2.2.3 Barriers for climate change adaptation by local government in Australia

Studies related to barriers in Australia also provide similar insights. Various academic and government bodies have examined barriers to adaptation by local government through in-depth case examples and consultation with diverse stakeholders involved in adaptation planning (Smith et al. 2008; Measham et al. 2011). General consensus prevails in the literature in relation to adaptation by local government being a 'shared responsibility' that must be supported through collaborative efforts across the three levels of government (i.e. local, state and federal) (Withycombe 2009).

However, the key barriers stem from the state and federal policy environment in which local government operates – for example, there is poor clarity around the role of local government in addressing climate change (Withycombe 2009). In addition, the diversity of networks and the complexity of existing governance arrangements hinder attempts to draw clear lines of responsibility and limit the freedom of movement of individual organisations (Smith et al. 2008). The inconsistency between policies of different scales within a jurisdiction is best illustrated by the case for land use planning, which at the state level in NSW assumed a stable climate and thus precluded attempts to incorporate adaptation into local government planning (Pillora 2010; Measham et al. 2011).

Preliminary results from research by the Australian Climate Change Adaptation Research Network for Settlements and Infrastructure (ACCARN SI) confirm the barriers raised by the earlier Australian and international analysts and include the following (Booth 2012):

- unclear delineation of the facilitation roles and responsibilities
- consulting and reaching consensus with a disengaged community
- technical challenges in understanding the complexity of risk assessments and climate science, and difficulty in interpretation of modelling outputs for planning
- resource constraints for the implementation of programs and actions.

In addition, various location-specific studies across Australia confirm these challenges, which have specific relevance at a national level:

- Adaptation policy and practice is messy and is shaped by different perceptions of risks and variable commitments to participatory processes of policy-making in South-East Queensland (Mustelin 2011).
- There is an absence of effective mechanisms for cross-scale coordination of adaptation planning within the coastal zones to address coastal cities and infrastructures (Department of Climate Change 2009).
- In NSW councils, competing priorities exist within council's diverse portfolio of responsibilities (LGSA-NSW 2010).
- There is limited availability of internal and external funding, and limited staff capacity. However, many of these barriers are likely to be more significant in smaller and more isolated local councils, compared with larger urban councils (Pillora et al. 2009; Pillora 2010).

More recently, the Productivity Commission was requested to assess the regulatory and policy barriers to climate change adaptation (Productivity Commission 2012). As part of the inquiry, it identified several potential barriers that could limit local governments' ability to plan for and implement climate change adaptation measures. These concurred with those discussed above, and include (Productivity Commission 2012, p. 13):

- a lack of clarity on roles and responsibilities for climate change adaptation – including responsibility for managing risks of climate change in the areas of land use planning and emergency management
- a lack of capacity in councils to effectively plan for and implement adaptation measures – for example, financial constraints or shortages of technical expertise
- uncertainty about legal liability of local governments hindering adaptation efforts. According to the report, some councils are reluctant to release information on the vulnerability of properties to climatic events because they are concerned that this could impact negatively on property values or lead to legal disputes.

To address these barriers, the Commission has made two key recommendations that relate to local government (Productivity Commission 2012, p. 20):

- That roles and responsibilities between state and Northern Territory governments and local governments should be clarified. The recommendation is that a comprehensive and up-to-date list of laws which delegate regulatory roles to local governments be published to assist state, territory and local governments assess whether local governments have the capacity to effectively discharge their roles.
- That state and Northern Territory governments should clarify the legal liability of local governments regarding climate change adaptation matters and the processes required to manage that liability.

More broadly, the Commission notes that state and territory governments need to ensure local governments have the capacity to carry out their responsibilities effectively (Productivity Commission 2012, p. 115). Local government decision making could benefit from improved information and guidance. Current information and guidance do not appear to be meeting the requirements of some councils. The Commission also recommends that greater coordination and collaboration among local governments would address some of the capacity constraints they face – such as through the establishment of regional organisations of councils or alliances to undertake common activities, or joint activities such as resource sharing (Productivity Commission, 2012, p. 115). A range of examples of regional governance cooperation in Australia are provided by Steele et al. (2012); these include federal–state (the Murray-Darling Basin Agreement), state–state (ACT–NSW urban planning MOU), and local government (Gold Coast–Tweed Shire Cross-border sub-plan) collaborations.

The discussion in this chapter highlights that common barriers to adaptation planning exist in Australia, as they do in other developed nations. Many of these barriers are likely to be shaped by processes and actors working at scales outside of local government, and thus it is important to understand multi-governance interactions and interdependencies. Our analysis of this literature suggests that the most frequent cross-scale barriers that are experienced can be summarised into four key themes:

1. poor understanding of the risks, limited access to and the uncertainty of climate change impact-related information
2. inconsistent problem definition and appropriate climate change adaptation frameworks to plan within
3. inconsistent governance structures, coordination, communications and leadership between the vertical tiers and horizontal levels of government
4. competing priorities due to limited operational resourcing, such as staffing and funding, to plan and implement responses.

The following section discusses how multi-governance theories can be utilised to examine the deeper processes that give rise to these barriers.

3 THEORY AND CONCEPTUAL FRAMEWORK FOR THIS STUDY

3.1 Multi-level governance for supporting adaptation within local government

There is no point in treating cross-scale interactions amongst scale-dependent regimes as a kind of pathology to be cured. But we can and should make a concerted effort to improve our understanding of this phenomenon and to prepare in advance to take advantage of transient opportunities to restructure existing patterns of cross-level, scale dependent interactions. (Cash et al. 2004, p. 7)

Socio-institutional barriers to adaptation planning and implementation (e.g. regulatory structures and social norms associated with the rules in use) often arise through the larger governance context in which the system of focus is embedded (Adger, Arnell et al. 2005). This is largely because planned proactive adaptation is a collective process, and is contingent on the interaction of organisations, together with formal and informal institutions (Pahl-Wostl 2007), at various spatial scales. Smith et al. (2008) suggest that overcoming resource limitations for adaptation within the Coastal Councils Group in Sydney, for example, depends on greater support by higher levels of government and policies that provide councils with freedom of movement. Adger (2001 p. 924) argues that ‘the diversity of impacts of climate change means that the most appropriate adaptation responses will often be multi-level responses’. Theories from multi-level governance are used to describe the management of collective issues, the various stakeholders involved and the processes used to influence adaptation actions and outcomes (van de Meene et al. 2011). They emphasise the significance of interactions among structures and processes across both horizontal levels (between other local councils and agencies) and vertical scales (i.e. between different tiers of government) – see below for further discussion of these terms. Multi-level governance literature, which has its roots in the political sciences, was developed to capture the networked and multi-scale jurisdictional nature of policy making, and demonstrate that the outcomes at the local level are shaped by institutions at multiple levels (Smith 2007; Bisaro, Hinkel & Kranz 2010). The approach also reveals how incentives and interests of actors at various scales interact, the direct costs and benefits of actions, including co-benefits, and who the winners and losers may be in relation to particular policy choices (Corfee-Morlot et al., 2009).

In examining environmental change issues, the multi-level governance approach has shown its utility in understanding the coupled nature of socio-ecological systems and the cross-scale interactions that dominate, separate, build trust and influence relationships between actors (referring to the individual, organisations and networks that participate in climate adaptation decision making) operating at different scales (Adger, Brown et al. 2005; Cash et al. 2006; Bisaro, Hinkel & Kranz 2010). These studies have also demonstrated the limitations to managing cross-scale interactions; minimising disturbances at one scale may come at the expense of increased vulnerability to disturbances at another scale (Schoon et al. 2011). The effectiveness of the way in which multi-level governance issues are handled in a particular sector is a reflection of the strength of interests and power of the actors who define the problem (Adger, Arnell et al. 2005). Power here refers to the capacity to influence outcomes, with or without the legitimacy to do so, and it can be visible or invisible (e.g. exclusion

from decision making via government policies) (VeneKlasen & Miller 2002; Biermann et al. 2010).

Cross-scale refers to the vertical interactions across different scales (e.g. between international, national and local jurisdictions) while cross-level reflects the horizontal interactions among levels within a scale (e.g. local councils interacting with a body representing the interests of a conglomerate of councils, such as the Regional Organisation of Councils) (Bisaro, Hinkel & Kranz 2010). This is complemented by an analysis of the temporal dimension of how historical transitions have precipitated shifts in processes that give rise to barriers. Bosomworth and Handmer (2008, p. 6) suggest the significance of trust to horizontal and vertical connections, maintaining that it is likely to encourage collaboration and assist public policy actors to learn from one another. Scales are dynamic with a history attached; they are constructed and may be destroyed or transformed through social and political practices and struggles (Zimmerer & Basset 2003; Passi 2004). Thus scale issues are often linked with political issues, in which different actors strengthen or weaken cross-scale linkages to further their own interests. For example, Preston et al. (2008) comment on the complex top-down governance arrangements that prevail in Australia, which limit the entitlements of local government in relation to planning and risk management reforms. Other authors have attempted to move away from the traditionally hierarchical definition of scale; the focus is on networked approaches to scale in which various influences are seen as multiple, simultaneous and chaotic, rather than ordered and linear (Robbins, 2004)

Various studies have identified components that characterise multi-level governance and these are often centred around actors, processes, structures and influences (Kjaer, 2004; van de Meene et al., 2011). 'Actors use processes to modify structures, which in turn influence the strategies or actions available to actors' (van der Brugge (2009), cited in van de Meene, Brown & Farrelly 2011, p. 1119). Bisaro, Hinkel & Kranz (2010) suggest structural features that can help determine the effectiveness of cross-scale interactions of multi-level governance for climate adaptation research. These include decision-making authority (the degree of decentralisation), information management (the variety of information sources) and the multitude of user interests.

Perspectives from Earth System Governance frameworks, which aim to understand the complex relations between global transformations of social and natural systems, also illuminate key characteristics to consider when analysing multi-level governance (Biermann 2007; Biermann et al. 2010). This framework is centred around five research problem areas: the *architecture* of earth system governance; *agency* beyond the state; the *adaptiveness* of governance mechanisms and processes; their *accountability*; and the legitimacy and of the modes of *allocation and access* in governance. In relation to this study, questions that may guide the analysis are outlined in Table 1. Additionally, the perspective draws attention to the need to consider issues of power, norms, scale and knowledge that cut across the five problem areas.

The multi-level governance approach to adaptation planning supports institutional arrangements that facilitate cross-scale coordination and enhance flexibility. Adopting such an approach requires attention to spatial and temporal scales and considerations of the dialectical relations between processes occurring within and between local and other scales, and how these processes have been structured over time. Understanding how local government and other agencies utilise their agency to access resources and pursue various adaptation strategies to overcome existing barriers is also relevant. The significance of the interactions between actors, processes, structures and influences is also noted, with the power of actors operating at different scales needing to be recognised.

Table 1: Key problem areas of Earth System Governance perspectives

Problem areas	Guiding questions
Architecture	<ul style="list-style-type: none">- How is the performance of climate adaptation institutions affected by being embedded in larger architectures?- The extent of vertical institutional interaction and the role of institutions within multi-layered institutional systems?
Agency	<ul style="list-style-type: none">- Who are the key actors that exercise agency in the multi-governance space and how are they related to one another?- How is power and authority configured in the multi-governance arrangements
Adaptiveness	<ul style="list-style-type: none">- What attributes of the multi-governance system enhance capacities to adapt?- Who benefits from adaptation, to what and with which side effects?
Accountability and legitimacy	<ul style="list-style-type: none">- How can mechanisms of transparency ensure accountable and legitimate multi-governance system?- What institutional designs can produce the accountability and legitimacy of multi-governance systems in which different interests and perspectives are balanced?
Allocation and access	<ul style="list-style-type: none">- What contextual factors enhance the strengths and reduce the weaknesses of principles of allocation and access?- Under what circumstances can instruments that provide for fair allocation and access be scaled up and down?

Source: Biermann et al. (2010, p. 281).

3.2 A diagnostic framework for identifying barriers to adaptation

Limited research exists in relation to assessing differing frameworks for characterising barriers, and also in relation to understanding the complex situation in which adaptation decision-making occurs. Rather, the international literature to date has largely focused on characterising barriers according to their types (such as generic or specific) or their nature (e.g. operational, policy, financial and cultural) and the degree of their severity (e.g. high, medium or low) (Arnell & Charlton 2001; Yemen NAPA 2006; URS 2010).

The work by Moser and Ekstrom (2010) provides a useful diagnostic framework for characterising and organising barriers at different phases of the adaptation process across space and time, and locates possible points of intervention to overcome a given barrier. Moreover, it questions how best to support adaptation at all levels of decision-making, and thereby improve the allocation of resources and strategically design processes to address the barriers. The framework draws on theories of coupled socio-ecological systems thinking as well as multi-level governance theories by paying attention to scale, contextual processes, structures, etc., enabling a flexible approach to examining barriers (Gunderson & Holling 2002; Cash et al. 2006).

The analytical framework used in this study is loosely based on Moser and Ekstrom (2010), and comprises three key phases, as outlined in Figure 1. It allows for an understanding of the key underlying processes and structures that give rise to cross-scale and cross-level barriers, and the development of corresponding strategies and actions to remove or overcome these barriers.

In summary, the phases can be described as follows (based on Moser & Ekstrom 2010):

Phase 1: Process of adaptation

This phase organises the barriers according to the three common process phases of adaptation: understanding the problem; planning adaptation actions; and managing the implementation of selected options. For the purpose of this study, greater attention will be placed on the planning and managing phases, as many of the target councils have developed an adaptation plan.

A question that is applied to every stage in the process is *What can hinder, stop, delay or divert the adaptation decision-making process?*

Phase 2: Structural elements of adaptation

This phase emphasises the significance of context, and aims to understand why a given barrier arises in the adaptation process by considering three interconnected structural elements: the actors; the object upon which they act (the system of concern that is exposed to climate change); and the broader context in which the actor and the system of interest are embedded (e.g. governance). This context includes mediating processes such as structures, influences, agency and power. It guides the research to examine how the context shapes local government to collaborate and learn through the networks (Bosomworth & Handmer 2008).

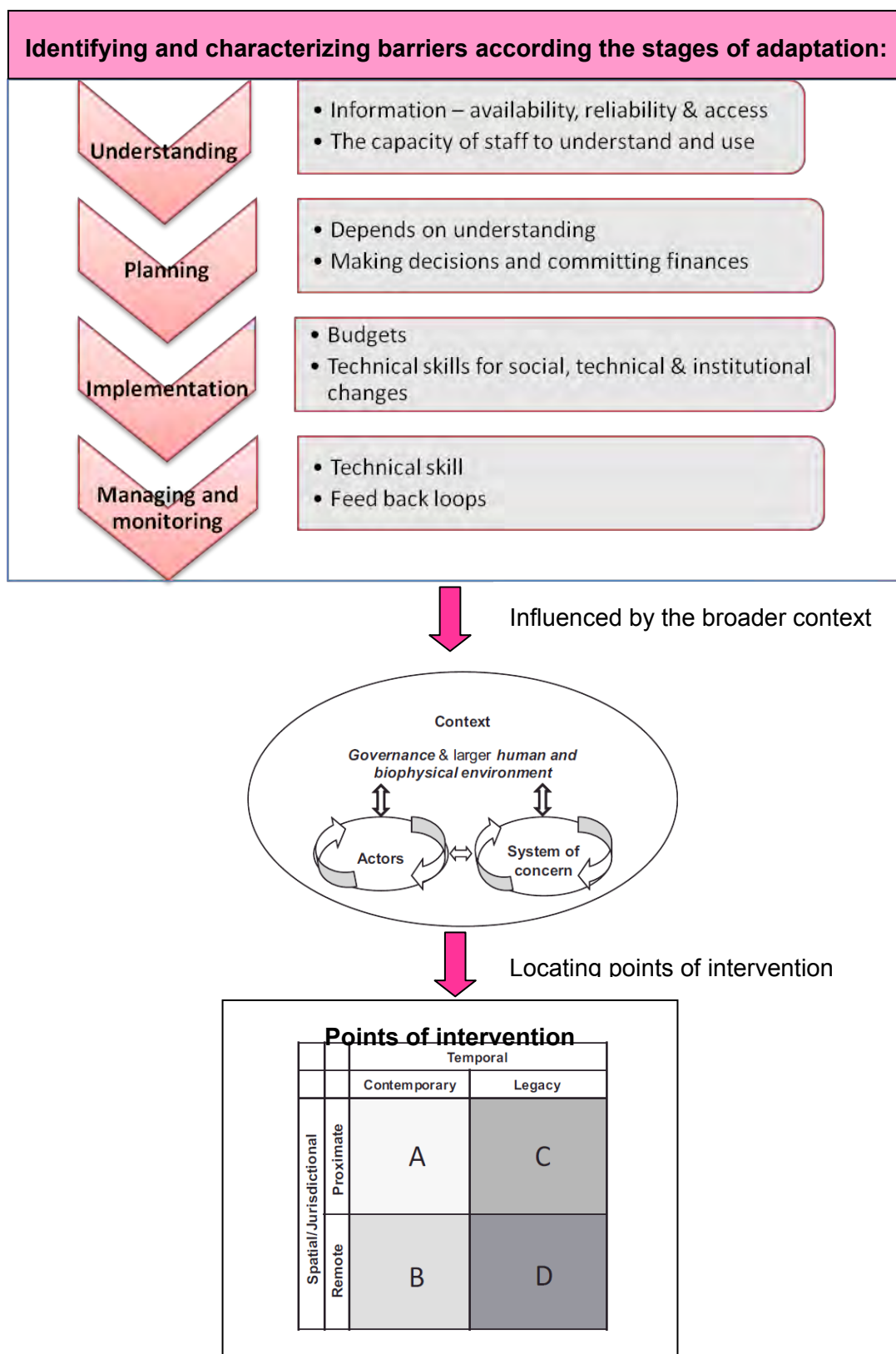
In establishing the sources of the barriers, Phase 2 asks the following questions: *What causes the impediments? How do the actors, context and the system of concern contribute to the barriers?*

Phase 3: Locating possible points of intervention

The final phase aims to help map the source of the barriers relative to the actor's influence over it through adopting a simple matrix that considers the spatial/jurisdictional (proximate/close versus remote barrier) and temporal origins (contemporary/recent versus legacy/inherited) of the barriers relative to the location of the actor. The matrix offers a useful approach to ranking the barriers.

Based on the understanding gained through identifying the barriers, enabling actions can be developed and prioritised, specifying the actors/agents to drive the strategy and actions, the resources required and the timing and duration of the effort.

In this phase, responses to the following questions are sought: *Who is best placed to drive this action? What resources are required? When can it start and how long will it take? What can get in the way of successful implementation? What will success look like?*



Source: Adapted from Moser & Ekstrom (2010).

Figure 1: Conceptual framework for examining cross-scale barriers

3.2.1 Understanding the climate change adaptation context

In order to understand the underlying causes of these barriers, it is useful to gain an appreciation of the legal and governance framework underpinning climate change adaptation in Australia at the national, state and local levels. In addition to this, a number of supporting initiatives have been introduced to assist local governments in developing their adaptation capacity and responses. The background to the regulatory context in Australia, as well as the types of adaptation funds/programs that have supported local government in adaptation planning to date in Australia was captured in the preliminary background report (Gero, Kuruppu & Mukheibir 2012). These two issues are discussed further in the following sub-sections.

3.3 Legal framework for local government climate change adaptation

Governments at the various levels have a number of roles to play in responding to the impacts posed by climate change. The main role for government is to provide the legal, regulatory and socio-economic environment to facilitate autonomous adaptation. In addition, they need to modify their own programs and build community capacity with the aim of facilitating adaptive responses and securing community assets (COAG 2007; Brooks et al. 2009).

At the national level, the Council of Australian Governments' (COAG) National Climate Change Adaptation Framework of 2007 is Australia's main policy vehicle for a collaborative approach across different levels of government (COAG 2007). It aims to set a national agenda for long-term adaptation to climate change. A key focus of the Framework is to support decision-makers to understand and incorporate climate change into policy and operational decisions at all scales and across all vulnerable sectors. Despite this over-arching framework for CCA, there are additional acts and frameworks which form part of the national picture for CCA. These cover water, biodiversity, coastal zone management, emergency management and disaster resilience, which contribute to a somewhat crowded and confusing landscape (this is discussed further in the background study to this project – see Gero, Kuruppu & Mukheibir 2012).

A new COAG group focusing on climate change (including adaptation), the Select Council on Climate Change (SCCC), was announced by the Council of Australian Governments (COAG) in February 2011 (COAG 2011). The purpose of the SCCC is articulated as follows (COAG 2011):

- *To support an effective response to climate change policy issues with national implications,*
- *To provide a forum for the Australian government to engage with states, territories, local government and New Zealand on program implementation issues,*
- *One of the many responsibilities of the group is to determine whether a permanent body to discuss ongoing joint issues related to climate change is required, and*
- *developing national adaptation priorities for agreement by COAG and work plans for these priorities, by building on intergovernmental work already undertaken, in liaison with other ministerial bodies as required, and including, where necessary, recommendations to COAG on matters requiring broader cross-portfolio reform.*

The SCCC held its first meeting in May 2012, which was chaired by the Minister for Climate Change and Energy Efficiency. The meeting included representatives from all state and territory governments, the New Zealand government and the Australian Local Government Association (COAG 2012b). In effect, this means that only one participant

is assigned to represent local government stakeholder perspectives on the Council. At the meeting, the SCCC agreed that an Adaptation Working Group would develop work plans for the seven proposed national priorities, namely water resources, coasts, infrastructure, natural ecosystems, agriculture, emergency management and vulnerable communities (COAG 2012b).

The SCCC has also recently released a document on 'Roles and Responsibilities for Climate Change Adaptation in Australia' for community comment (COAG 2012a). It emphasises the need for role and responsibility clarification, and suggests that the three main things for which governments are responsible in relation to CCA are:

- providing information for private parties to adapt and manage risks to their assets and incomes
- setting the right conditions for private parties to adapt
- protecting public assets and services:

Governments – on behalf of the community – should primarily be responsible for managing risks to public goods and assets (including the natural environment), and government service delivery and creating an institutional, market and regulatory environment that supports and promotes private adaptation. (COAG 2012a)

Specifically, the document proposes that state government has four main roles, two of which link closely with local government:

delivering local and regional science and information where that information is most effectively delivered at the local and regional scale (e.g. fine-scaled projections of inundation or coastal erosion) to assist both government and private parties in assessing climate risks and adapting to climate change and supporting local government to facilitate building resilience and adaptive capacity in the local community and to ensure that policies and regulations are consistent with state government adaptation approaches (COAG 2012a).

With regard to local government, the SCCC acknowledges that:

local governments are responsible for a broad range of services, the administration of a range of Commonwealth, State and Territory legislation, and the management of a substantial number of assets and infrastructure, and as such they are on the frontline in dealing with the impacts of climate change (COAG, 2012a).

There is currently no over-arching national policy in the public domain that guides adaptation at the state level. The National Climate Change Adaptation Framework (COAG 2007) includes the mention of a Planning Ministers Council, which was to have representation from each state and territory; however, this was abolished in 2010. The failure of the states in the past to include climate change considerations in their planning has resulted in some state planning authorities being vulnerable to legal challenges for failing to address climate change considerations (England & McDonald 2007) – for example, the NSW Land and Environment Court ruling against the state government, which failed to consider future flood risk in approving a residential subdivision at Sandon Point in Wollongong (Gurran et al. 2008).

Despite the lack of a coordinated state-level guiding framework, all states and territories have recently begun creating or amending laws, policies and action plans to

account for aspects of climate change impacts. Victoria, Tasmania, South Australia and the ACT have specific climate change legislation (some relate to mitigation), while other states and the Northern Territory have developed targeted policies and guidelines to begin to steer policy in the direction of mainstreaming CCA considerations into various sectoral decision-making. For example, Queensland's 2011 Issues Paper on Climate Change noted:

The Queensland government is also working to ensure that all relevant state planning instruments and land use plans take account of climate change impacts such as increased intensity of floods, fires, storms and heat waves. (DERM 2011, p. 18)

The recently released Queensland coastal planning guide provides adaptation strategies to assist councils to mitigate coastal hazards identified to be high risk over the long term, rather than addressing the risks on a development-by-development basis (DERM 2012).

In NSW, the state government has prepared a Sea Level Rise Policy 'to support sea level rise adaptation' (DECCW et al. 2009). This 'sets out the government's approach to sea level rise, the risks to property owners from coastal processes and assistance that government provides to councils to reduce the risks of coastal hazards'. In addition, the NSW Office of Environment and Heritage has released guidelines on incorporating sea level rise into flood risk (DECCW 2010a) and coastal hazard assessment (DECCW 2010b), while the Department of Planning and Infrastructure has released its *NSW Coastal Planning Guideline: Adapting to Sea Level Rise* for incorporating sea level rise in land-use planning and development.

A number of the Victorian cases decided by the Victorian Civil and Administrative Tribunal have relied upon new policy documents issued to supplement the Victorian State Planning Policy Framework, such as the Victorian Coastal Strategy 2008, which requires that planning in coastal areas is to plan for and manage the potential coastal impacts of climate change (Victorian Coastal Council 2008; Peel 2010).

At the local level, the *Local Government Act* is the principal statute governing councils in each state and territory (DCCEE 2010), providing for the health, safety and welfare of their communities. For example, in Tasmania, if a council cannot show that it has taken preventative action to safeguard the health, safety and welfare of the community within its jurisdiction, it may be charged and face liability costs (LGAT 2004). These costs can be reduced if a council identifies the threats to its community and implements appropriate and timely strategies to prevent these threats. Given the ongoing publicly available information regarding potential climate change impacts, it is also difficult for local governments to claim ignorance on the risks of climate change (Climate Risk 2009). The need for risk to be assessed by local councils was reinforced by the Insurance Australia Group's (IAG) recent submission to the Productivity Commission's inquiry into barriers to adaptation (IAG 2011). It stated that:

higher quality planning standards must be required of local government, to ensure no further development is allowed in areas of unacceptable risk. In addition, existing owners of property in high risk areas should be provided with incentives to relocate to areas with less risk. (IAG, 2011, p. 10)

The impacts of climate change on local government are wide and varied, and include almost all aspects of the services in their mandate (see Pillora 2010 for details). Local government's obligations to respond to climate change are therefore complex, and may even be 'shared, implemented or defined by other agencies and authorities in other

levels of government' (DCCEE 2010, p. 13). The United Kingdom and Australia both report approximately 40% of local governments having completed risk assessments (UK Adaptation Sub-committee, 2010). The difference is that the United Kingdom has a legal framework for climate change adaptation (UK Adaptation Sub-committee 2010), something that has not yet been developed in Australia.

It is acknowledged that the necessary planning instruments can take a long time to modify (Gurran et al. 2008); however, over the past several years, legislative reforms have increased the flexibility of councils to respond to the needs of their local areas, and allowed them to take up CCA activities within their jurisdictions (DCCEE 2010). As a result, specific attempts by local councils to address climate change issues include the NSW Byron Shire Council, which developed a 'planned retreat' policy. In Victoria, the Wellington Shire Council has developed a Planning Scheme to impose minimum floor levels for buildings based on the level of a one in 100 year flood, while in Adelaide, the Planning Strategy for Greater Adelaide includes strategies for climate change adaptation (Productivity Commission 2011). Clarence Valley Council, which is located in northern NSW, adopted a Climate Change Policy in 2010. The policy objectives state council's responsibility both to adapt at the council level and to assist the community in adaptation actions. The Climate Change Policy also requires council to 'develop a Climate Change Action Plan for Council's activities which includes climate change mitigation and adaptation strategies for Council', and 'encourage all sectors of the Clarence Valley community to adapt to the unavoidable impacts of climate change' (Clarence Valley Council 2010).

More recently, local governments have begun to incorporate more systematic and specific actions into their adaptation planning. However, this is occurring in a complex legislative landscape that differs across state and territory borders. While COAG's National Climate Change Adaptation Framework (2007) provides potential actions for the state governments, Australia still lacks a coordinated approach with assigned accountabilities and responsibilities. We therefore see a fragmented response with different approaches to adaptation planning that is not supported by a legal basis for action.

3.4 Initiatives supporting local government adaptation

Climate change impacts are often most acutely felt at the local level. As a result, many local government initiatives have emerged in recent years, some driven from the national level, others state and community driven. This section provides a brief overview of the prominent programs, projects and initiatives undertaken at the local government level in Australia. For further details, please consult Gero, Kuruppu and Mukheibir (2012).

3.4.1 Insurance against climate impacts

Currently, no state or territory legislates for local governments to insure council infrastructure or 'real property', which refers to roads, culverts, buildings, recreational facilities and treatment facilities. While some level of cover exists for real property, most council infrastructure is uninsured, and no council insures roads – in fact, insurance of this type is unavailable in the Australian market (ALGA 2011).

Public liability and professional indemnity insurance is taken out by every state and territory local government, with various degrees of cover, and is a legislative requirement in the states of NSW, Queensland, South Australia and Victoria (ALGA 2011). Statewide mutual liability schemes are available to councils in each state, offering affordable cover for most council needs; however, a few councils have additional cover for major incidents (ALGA 2011).

Information on flood risk for all properties across Australia is available from a National Flood Information Database (NFID) developed by the Insurance Council of Australia (ICA). This allows decision makers and individuals to assess their risk of flood. The ICA is also developing a national flood mapping tool for communities and local governments to better understand their risks of flood, and therefore plan better in the face of climate change (IAG 2011).

3.4.2 Local Adaptation Pathways Program (LAPP)

This federally funded program assists local government to prepare for climate change adaptation by providing funds for the protection of communities, the local economy and the built and natural environments (DCCEE 2011a). Funding, which was of a competitive nature, was provided for local governments to undertake risk assessments or adaptation plans using Australian Greenhouse Office's (AGO) 2006 Guidelines (Booth 2012). Over 90 local councils across Australia (60 coastal and urban councils and 30 rural remote councils) have participated in the LAPP initiative, which provides funds to begin assessing potential risks associated with impacts of climate change, and to formulate adaptation actions.

In addition, Coastal Adaptation Decision Pathways projects have been funded by the Australian government to demonstrate effective approaches to adaptation in the coastal zone. Thirteen projects have received combined funding of \$4.5 million to develop leading practice approaches to better manage future climate risk to coastal assets and communities. The projects are due for completion in June 2012 (DCCEE 2012).

3.4.3 Strengthening Basin Communities program

The Australian government committed \$200 million to establish the Strengthening Basin Communities program, which is implemented through two separate components with the aim of building adaptive capacity for a drier future (SEWPaC, 2010):

- The Planning component provides grants for local governments in the Murray-Darling Basin to assist in community-wide planning for a future with less water.
- The Water Saving Initiatives component provides competitive grants to enable local government authorities and urban water service providers to support projects that improve water security by reducing demand on potable water supplies.

3.4.4 Local Governments for Sustainability (ICLEI)

ICLEI is a global not-for-profit organisation comprising local governments and local government organisations committed to sustainable development. The Oceania branch of ICLEI, based in Melbourne, is active across many climate change-related programs, such as the Cities for Climate Protection – Integrated Action (CCP-IA – see ICLEI 2010), which builds capacity within local government on climate change actions. The CCP-Adapt program includes developing adaptation goals, documenting assumptions and brainstorming options. CCP-Adapt is a two-year program offering support in assessing and managing climate change risks and opportunities via a six-stage process (ICLEI 2010). Local governments have also drawn upon the ICLEI Local Government Adaptation Toolkit (ICLEI Oceania 2008).

3.4.5 ACELG activities

The Australian Centre of Excellence for Local Government (ACELG) works with local governments in enhancing professionalism and skills and showcasing innovation and best practice, including in the area of CCA. It is active in publishing materials on CCA for a local government audience. Research papers can be found on the ACELG website (<http://www.acelg.org.au>).

In addition, ACELG hosted a Climate Change Roundtable in 2011 (assisted by NCCARF) to:

- build a common understanding among leading local government researchers about 'where councils are at' in terms of both adaptation and mitigation
- explore gaps in research and policy support available to the local government sector – especially smaller councils
- identify specific actions that can be taken by the ACELG and NCCARF networks and partners.

An additional source of information specifically aimed at the local government audience on CCA is the Information and Knowledge Exchange Network website (www.iken.net.au), where case studies, experiences and innovations from across Australia are shared among local government professionals.

3.4.6 The Climate Change Adaptation Skills Grants program and risk management

Funded by the former Australian Greenhouse Office (AGO), this initiative provided local governments (or professional organisations) grants of up to \$30,000 for risk management processes and \$20,000 for climate change action plans. It was later replaced by the LAPP initiative for local governments and the Climate Change Adaptation Skills for Professionals program.

3.4.7 Other research and guidance materials

There is a growing body of literature and research aimed at assisting local government with adaptation planning and implementation. This section is by no means exhaustive, but provides a flavour of the research and guidance initiatives being undertaken.

The 2006 *Climate Change Impacts and Risk Management Guide* (AGO 2006), published by the Australian Greenhouse Office, was a first consolidated reference for local governments to draw upon. Since then, the Department of Climate Change and Energy Efficiency (DCCEE) has released its *Climate Change Adaptation Actions for Local Government* report (DCCEE 2010), which extends and builds upon the 2006 document, further acknowledging the importance of local action and the agency of local government in developing appropriate responses.

Vulnerability or risk assessments are becoming increasingly common within local governments. Risk assessments are often informed by specific guidelines, namely the AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines, which supersede the former AS/NZS 4360:2004 Guidelines (see SAI Global, 2009). These generic guidelines on risk management provide the basis upon which local governments can ensure a robust approach and process to follow in addressing local risks, including those associated with climate change, as was the case for the LAPP program.

NCCARF has funded a number of research projects that may have some relevance to climate change and local government. Recent NCCARF-funded research undertaken by the Australian Climate Change Adaptation Research Network for Settlements and Infrastructure (ACCARNSI) involved a national survey and case studies to investigate the various tools and processes local government practitioners drew upon in their efforts to plan for and implement CCA interventions. The research synthesises key lessons to develop a Decision Support Guide to assist local government practitioners (Booth 2012).

The NSW Office of Environment and Heritage (OEH), working with NSW LGSA, is engaging local government to identify the information and data needs in relation to climate change projections. The Climate Change Centre at the University of New South Wales is leading the way in Australia by developing fine-scale projections (10 x 10 km grid) for NSW, which are anticipated to be useful for urban planning, emergency management, water and energy and biodiversity management (OEH 2012).

NSW OEH has additional guidance material for local governments, including a guide to risk assessment for assets and operations (OEH 2011b) and land use planning studies to learn from local governments who have implemented (or are in the process of implementing) climate change adaptation interventions (e.g. Kuring-gai Council 2012).

3.5 Mapping the cross-scale linkages

To provide an understanding of the cross-scale linkages between the various institutions that are in some way responsible for responding to projected climate change impacts, the mapping of key players in the climate change adaptation sector and their relationship to each other is illustrated below. While not exhaustive, this mapping, synthesising the maps produced by project participants in New South Wales at an early stage of the research (Workshop One), provides an indication of the vertical and horizontal interdependencies between the various institutions and stakeholders, as well as the strength and direction of the engagement. As can be observed, the interactions are multifaceted and wide ranging, indicating the complexity of governance structures shaping planned adaptation initiatives by local government.

Six maps were generated in Workshop One and then analysed for commonalities. This mapping formed an important element of the research, and assisted in forming the basis of identifying participants for future workshops and key informant stakeholder interviews.

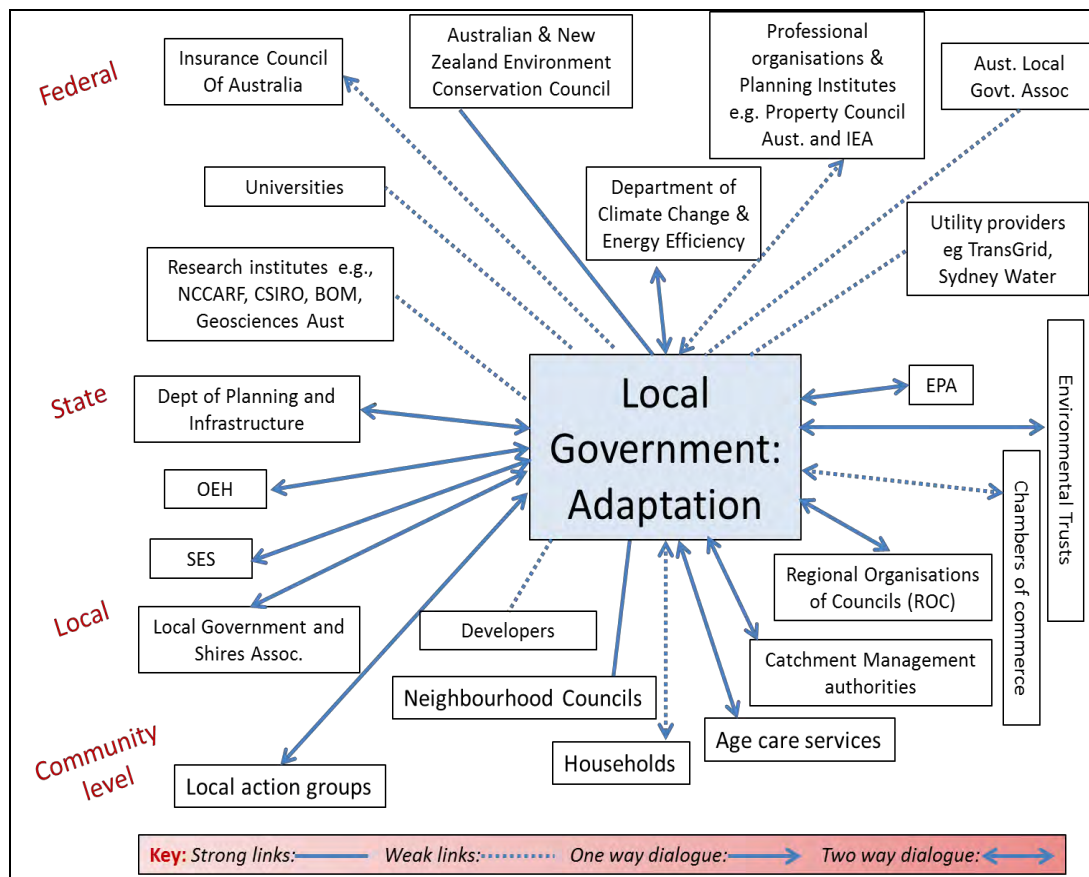


Figure 2: Cross-scale linkages (NSW)

4 END-USER ENGAGEMENT METHODS AND ACTIVITIES

The over-arching objective of this study was to identify cross-scale barriers that limit local government's ability to plan and implement climate change adaptation interventions. The research design consciously set out to ensure that the selection of stakeholders and selection of methods would include perspectives from different social actors. The research involved the following methods, which are discussed further in the following sub-sections:

- semi-structured key informant interviews with 20 national stakeholders involved in adaptation planning
- case examples from five local councils across Australia, demonstrating how particular barriers have been overcome (see Appendix E)
- workshops with various stakeholders, which included:
 - *Workshop 1 (January 2012)*: Identify critical barriers and causes with local government representatives in NSW (Kuruppu et al. 2012).
 - *Workshop 2 (April 2012)*: Re-prioritise barriers and identify methods of overcoming barriers with multi-level stakeholders (Herriman et al. 2012).
 - *Workshop 3 (May 2012)*: Discussion, validation and prioritisation of enabling actions to overcome cross-scale barriers (Mukheibir, Gero & Herriman 2012).

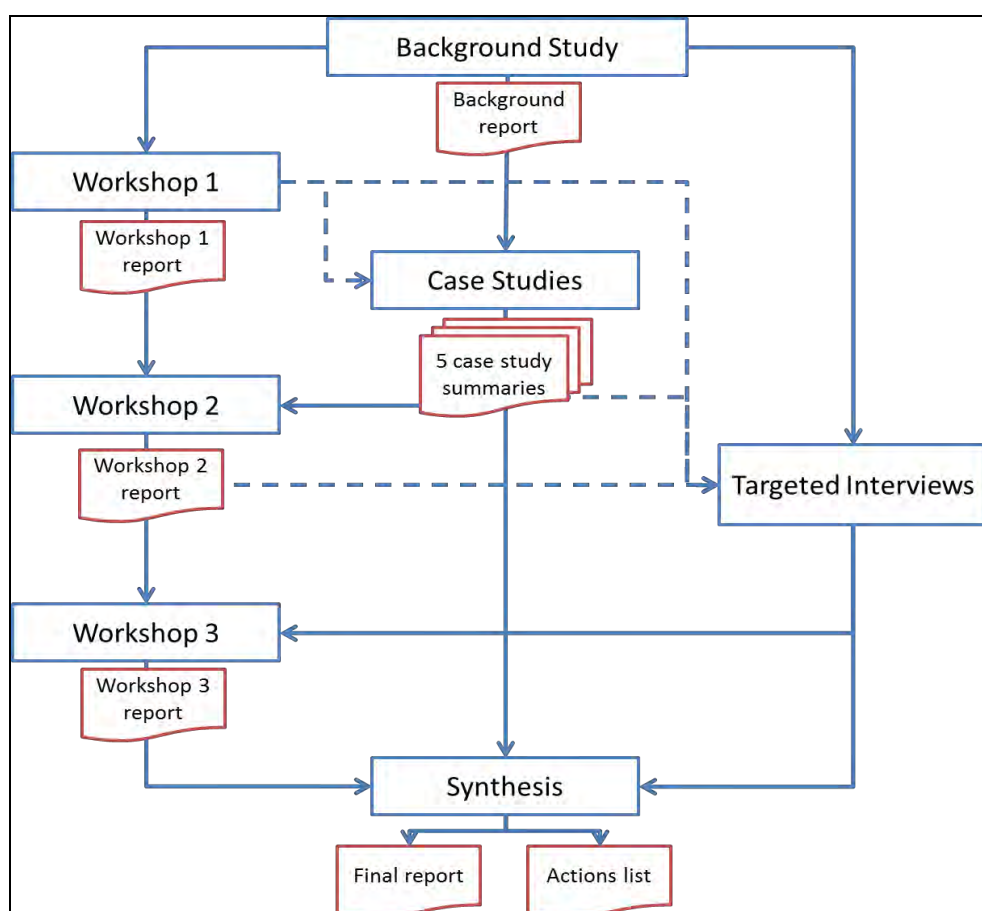


Figure 3: Study activities

4.1 Stakeholder engagement

From the outset, the research was specifically designed with stakeholder engagement in mind. This also allowed a deeper engagement between adaptation researchers and practitioners, enabling an understanding of some of the disconnections between adaptation theory and practice. Three participatory workshops and 20 key informant interviews engaged with a range of stakeholders from across Australia. Nineteen local governments participated in the research, seven of which were from outside Sydney. The national focus of the research was assisted by the participation of Western Australia, Queensland, Victoria, the Northern Territory, the ACT and national local government and mayors' associations. The workshop process provided the opportunity for participants to be engaged in all three workshops. For example, a few of the participants from Workshop 1 attended all three workshops and represented views of local government. It was not feasible for participants to attend all three workshops due to the need to ensure the participant numbers remained manageable, in order to ensure quality dialogue as well as representation.

In addition, other local, state and national representatives who were identified as relevant to adaptation planning and implementation by local government contributed to the research. This included state and federal government, the insurance industry, universities, regional partnerships and the CSIRO, among others. Many of the research stakeholders were involved in multiple workshops and interviews, as shown in Table 2.

Table 2: Participating stakeholders and their involvement, arranged by sector

Organisation	Workshop 1	Workshop 2	Workshop 3	Interviews
Local Government – Individual councils				
Blacktown City Council	✓			
Randwick City Council	✓			
Kogarah City Council	✓			
Kuring-gai Council	✓			
Gosford City Council	✓			
Hunters Hill Council	✓			
Rockdale Council	✓			
Blue Mountains City Council	✓			
North Sydney Council	✓			
Albury City Council	✓			
Shoalhaven City Council	✓			
Bankstown City Council	✓			
Parramatta City Council	✓	✓		
Penrith City Council	✓	✓		
Wyong Shire Council	✓	✓	✓	
Lake Macquarie City Council	✓	✓	✓	✓
Cairns City Council				✓

Organisation	Workshop 1	Workshop 2	Workshop 3	Interviews
Bunbury Council				✓
Hobart City Council				✓
Local government – regional bodies				
Sydney Coastal Councils Group	✓	✓		
Peron Naturaliste Partnership (WA)				✓
Local government – associations				
Municipal Association of Victoria (MAV)			✓	✓
Western Australia Local Government Association			✓	✓
Local Government Association of Queensland				✓
NSW Local Government & Shires Association				✓
Local Government & Shires Association (NT)				✓
Australian Local Government Association (ALGA)				✓
Local Government Mayors Association (LGMA)				✓
International Council for Local Environmental Initiatives (ICLEI)				✓
State government – departments and agencies				
NSW Office of Environment and Heritage (OEH)		✓	✓	
NSW Department of Planning & Infrastructure		✓	✓	✓
Sydney Catchment Authority		✓	✓	
Sydney Water			✓	✓
Department Environment & Conservation (WA)				✓
Federal government and agencies				
Department Climate Change & Energy Efficiency				✓
Productivity Commission		✓		
Industry				
Insurance Australia Group (IAG)		✓	✓	
Research organisations				
University of Wollongong	✓	✓		
NCCARF/ACCARNSI	✓	✓	✓	
Australian National University (ANU)		✓		
Macquarie University			✓	
CSIRO				✓

The participants in the process spanned a number of organisational positions, including strategic planners and managers, sustainability and environmental officers and managers, researchers and academics, and heads of departments.

4.1.1 Ethics

Informed consent was obtained from participants – either verbally or in written form, depending on the type of consultation. All participants were advised either verbally or in writing that the research was covered by university ethics guidelines. Potential participants were directed to, and encouraged to read, the documentation provided to them if they had any concerns.

Where the ISF project team sought to digitally record any meetings, verbal consent was sought prior to commencement of digital recording. It was the intention that responses would be used to inform the research and resultant research publications, but that the respondents' identities would be confidential. However, organisations may be identifiable through the nature and content of the responses. All responses to stakeholder interviews were coded, and the corresponding names and personal details are being kept in a separate secured folder on the ISF server, in accordance with university ethics guidelines.

No direct payment or compensation was provided for stakeholder participation. For out-of-state participants, the cost of flights and accommodation was covered by the project.

4.1.2 Workshops

The first workshop was designed to engage with local government officials from NSW. The subsequent workshops brought in stakeholders from state government, and final workshop invited representatives from the local government associations from interstate. The participants were mainly asked to engage in small groups when undertaking the tasks designed to identify the cross-scale barriers and enabling actions to overcome them. After each workshop, participants were requested to provide feedback on the process and outcomes. Specifically, the participants were asked what output they expected from their input, who would benefit from the findings of this research, and what would be the best way to disseminate research findings (see Appendix F).

Detailed reports of the three workshops and the participant workshop feedback are available as separate publications (Kuruppu et al. 2012; Herriman et al. 2012; Mukheibir et al. 2012).

Workshop 1 involved 25 representatives from 16 local governments (as well as NCCARF/ACCARNSI, Sydney Coastal Councils Group and the University of Wollongong), and aimed to synthesise a set of critical barriers to the three key phases of the adaptation process, namely understanding, planning and implementation. The workshop also aimed to identify the processes that gave rise to these barriers – for example, governance structures, and how actors and the context of the system of concern contribute to these barriers. An important element of Workshop 1 was the identification of other important local, state and national stakeholders in the adaptation process. This resulted in the development of a stakeholder map, which was drawn upon for future workshops and identification of interviewees.

Referring to the diagnostic framework for characterising and organising barriers at different phases of the adaptation process, as outlined in Section 3.2, this workshop focused on Phase 1: Process of Adaptation and Phase 2: Structural Elements of Adaptation.

Workshop 2 invited a broader range of participants into the discussion. The 17 participants comprised four local government representatives and the Sydney Coastal Councils Group (all present at Workshop 1), who were joined by representatives from state government, the insurance industry, the Productivity

Commission and academics from ANU and University of Wollongong. This broader range of participants allowed for robust discussion on roles and responsibilities, and the various perspectives on adaptation planning at the local government level. Case examples were presented by the research team, allowing insight into the various ways in which local governments across Australia were tackling adaptation and some of the cross-scale barriers identified in Workshop 1.

A key part of Workshop 2 was describing a future in which the barriers to adaptation for local government were absent. Strategies and actions to achieve this 'preferred future' were discussed, considering how these strategies would be implemented, by whom, over what timeframe and what would stand in the way. In order to guide this process and complement the conceptual framework, the study adopted methods from Appreciative Inquiry (AI), which aims to elucidate the assets and personal motivations of organisations that are strong, and envisions what might be rather than analysing causes. Additionally, AI steered the analysis towards what *should* be rather than analysing possible solutions, thereby reframing the barriers as an opportunity to do things better, rather than an overwhelming problem.

Workshop 3 brought together local government representatives from councils and state local government associations for a more national perspective on overcoming the barriers to adaptation. Presentations from the Municipal Association of Victoria and Western Australian Local Government Association (WALGA) provided examples of where cross-scale barriers had been overcome in different contexts. This allowed for a positive approach to the adaptation challenges, and framed the thinking throughout the workshop to one of enabling actions and strategies for the future.

4.1.3 Stakeholder presentations

One of the indirect aims of the project was to facilitate the sharing of experiences between local government officials grappling with the planning and implementation of climate change adaptation. Representatives from local council organisations were invited to make presentations at two of the workshops. At the first workshop, participants heard presentations from three speakers who had been actively involved in adaptation planning and implementation with their respective local government organisations. For the third and final workshop, two speakers from interstate were invited to speak on their experiences with overcoming cross-scale barriers in non-climate change contexts.

- **Dr Paul Hackney** (Senior Project Officer, Environmental Outcomes-Parramatta City Council) presented an overview of the process to formulate the Parramatta City Council's Climate Adaptation Plan. Overcoming the barriers of scepticism and competing priorities included activities targeting councilors to highlight the need for adaptation in which adaptation was framed as a risk management strategy (Kuruppu et al. 2012).
- **Dr Jennifer Scott** (Sustainability Program Leader, Kuring-gai City Council) presented on the process adopted by the Kuring-gai City Council in framing adaptation and developing an adaptation plan through stakeholder engagement. One key barrier that she highlighted included the limited power possessed by local government to deal with climate adaptation issues; the process is largely dependent on the state, but currently there is very little leadership from the state level (Kuruppu et al. 2012).
- **Geoff Withycombe** (Executive Office, Sydney Coastal Councils Group) provided an overview of the climate adaptation work done in association with the Coastal Councils Group (a conglomerate of 15 councils). He emphasised

that there is a great need to identify solutions to barriers and synthesis adaptation barriers across Australia (Kuruppu et al. 2012).

- **Liz Johnstone** (Manager, Planning Policy and Projects, Municipal Association of Victoria (MAV)) discussed her experience in overcoming cross-scale barriers in three different sectors in Victoria to highlight that many of the issues are systemic and can be overcome through collaboration and good communication (Mukheibir, Gero, et al., 2012).
- **Mark Batty** (Executive Manager Environment & Waste at Western Australia Local Government Association (WALGA)) spoke about his experience in ensuring the health of the Swan-Canning River System in Perth, involving numerous stakeholders. Collaboration was achieved by ensuring the issue is relevant for all stakeholders (Mukheibir, Gero & Herriman 2012).

4.1.4 Targeted interviews

Targeted interviews were conducted with 20 representatives from a wide range of organisations across Australia, as shown in Table 2. Interviewees were identified through recommendations from workshop and case example participants. Interviews were conducted predominantly by telephone. They were semi-structured in nature, allowing for interviewees to contribute to predetermined questions but also allowing for flexibility in responses depending on their organisation and experience.

The interview questions (see Appendix A) were based on the findings of Workshops 1 and 2, as well as the theoretical Earth Systems Governance framework adopted in the study (see Section 3.1). Specific questions that relate to the issue of *scale* investigated interactions between various stakeholders involved in adaptation planning both in the vertical and horizontal scales. Examples of how barriers of this nature were overcome in other contexts were elicited. With regard to *agency and accountability*, interviewees were asked what they thought could be done to facilitate an equal distribution of power in decision making to balance different stakeholder interests in the multi-stakeholder context in which adaptation planning by local government occurs. The system of *allocation and access* to resources for adaptation planning (e.g. funding, information, data, technical capacity) was interrogated for its fairness across all tiers of government.

Interviews were recorded and transcribed, with transcriptions analysed using the qualitative software tool NVivo. Common and recurring themes were coded and assessed, and aligned with existing findings. New perspectives and ideas were also identified, particularly given the national perspective of some interviewees. Results from the interviews were coupled with results from the first two workshops, and incorporated into workshop three and the overall analysis of findings.

4.2 Case examples

An advantage of developing multiple case examples is that they provide comparative data that can explain variations in phenomena or provide a tool for generalisation, if there are trends between them. The objective of developing short case examples in this study was to demonstrate how some councils have overcome cross-scale barriers and to highlight that the key cross-scale barriers are not endemic to NSW alone but are experienced nationally during adaptation planning efforts (see Appendix E). The following councils, or groups of councils, were identified through end-user consultations, and the relevant office bearers for each of the initiatives were interviewed by telephone:

- Lake Macquarie City Council
- Western Australia: Peron Naturaliste Partnership
- Cairns Regional Council
- Tasmania: Regional Climate Change Adaptation Project
- Penrith City Council



Figure 4: Location of case examples

The results were presented at Workshop 2 (Herriman et al. 2012), and also informed the development of the enabling actions discussed in Section 6.2.

A recurring element from several of the case examples was that a successful approach to overcoming cross-scale barriers was regional collaboration among local governments. The Western Australian and Tasmanian case examples followed a regional approach, and found many benefits in doing so. These included having greater voice and advocacy, the possibility of greater funding and sharing of technical capacity, expertise and experience between more able and less able local governments.

5 RESULTS AND OUTPUTS OF STAKEHOLDER ENGAGEMENT

This chapter first discusses the cross-scale barriers and the underlying causes that were identified by the participants of this study (Section 6.1). The thematic areas that evolved from the workshop process, case examples and the key informant interviews proved to be similar to those identified through the literature review in the previous chapter. Among the contributions of the participants to the knowledge in this field are the identification and elaboration of enabling actions to overcome the key cross-scale barriers, discussed in Section 6.2. Whilst these remain the opinions of the participants, the contributions provide valuable insights into the challenges and potential mechanism to overcome them.

By considering the four stages of adaptation as defined by Moser and Ekstrom (2010) – understanding, planning, implementation and monitoring – a systematic environmental scan and analysis of a wide range of barriers and underlying causes was undertaken (more details can be found at Kuruppu et al. 2012).

In Workshop 1 (January 2012), a long list of barriers was initially identified by participants, mainly local government representatives from NSW. This list of barriers is included as Appendix B. Since many of the barriers were not of a cross-scale nature, a list of 11 key cross-scale barriers were prioritised by the participants.

Focusing on these 11 barriers, the participants then identified potential cross-scale causes for each (see Table 4 and Appendix C). In order to focus the thinking at Workshop 2, the project team further synthesised the list to five key barriers and their causes under the corresponding phase of the adaptation cycle – see Table 3.



Table 3: Summarised barriers and causes against the four stages of the adaptation process

Understanding	Planning	Implementation and monitoring
1. Poor leadership from above (cross-cutting) <ul style="list-style-type: none"> • No statutory obligations • Lack of ownership of the implications of CC impacts • Short political timeframes, agendas and cycles – which do not coincide with planning time frames, reluctance to make long term decisions • Lack of incentives to do now – rather defer cost to future office bearers or other arms of governance • No acknowledgement that the issues cut across all tiers of government 		
2. Limited co-operative governance (Cross-cutting) <ul style="list-style-type: none"> • Poor communication between tiers of government • Inconsistent messages • Local decisions over-ridden by higher tiers 		
3. Lack of information and knowledge <ul style="list-style-type: none"> • No investment in the collection of data over the long term • Poor data sharing • Inconsistency of the available data and climate projections – lack of ‘certainty’ of the data and availability of the ‘latest’ data. • Scale of the problem has not been made relevant at the local government level • Misinformation by the media and strong industry lobby groups • New issue for some • Skeptics in some councils • Inadequate training for engineers, planners and councilors 	4. Lack of definition of problem and planning <ul style="list-style-type: none"> • Lack of guidance and consistent frameworks – planning and regulatory. • Unclear whose role it is to plan • Legal responsibilities unclear 	5. Limited funding <ul style="list-style-type: none"> • Prioritisation of funds at different tiers of government, due to competing priorities, exacerbated by short- vs long-term agendas • Funding constraints at local government level for large capital adaptation projects, partly due to rate capping at state level. • Limited funding for RD and pilots • ‘cost’ of already sunk capital in existing infrastructure that is now viewed as vulnerable under CC impacts.

In parallel to this workshop process, the case example research also investigated these barriers, mapping the barriers identified at each for the five case example sites (see Table 4 for more details). This process confirmed that each of the 11 identified barriers from Workshop 1 was an issue in more than one of the case example areas, but that no single barrier was evident in every case area. Nor did any one barrier dominate the

case examples. This suggests that barriers are varied across locations and situations, and generally the barrier landscape consists of a number of barriers, when looking at local government. The outcome of the case example analysis was presented at Workshop 2.

Also in parallel to the workshop process, analysis of the semi-structured interviews provided similar insights and the interviews been considered in the analysis of the study results that follow.

Table 4: Summary of case examples in comparison to the cross-scale barriers

	Case Example 1 <i>Lake Macquarie</i>	Case Example 2 <i>WA region</i>	Case Example 3 <i>Cairns</i>	Case Example 4 <i>Tasmania region</i>	Case Example 5 <i>Penrith</i>
Cross-scale barriers					
Lack of political leadership from higher tiers of government – i.e. no champions		X		X	
Lack of evidence and data related to climate change vulnerability			X		X
Spatial scale of the problem – the issues are global and multi-level	X		X	X	X
High uncertainty associated with large timescale and extreme variability	X		X	X	X
Lack of guidance frameworks (related to regulation, legislation and methodology)		X	X	X	X
Poor definition of the problems and therefore difficulty in identifying options	X		X	X	
Historically entrenched development, infrastructure, cultural values and education	X		X	X	
Difficulty in balancing long-term and short-term priorities	X	X		X	X
Lack council funding and low staff capacity to plan and implement responses		X	X	X	X
Lack of local political will and social licence for change		X		X	
Lack of knowledge of climate impacts, tools and monitoring		X		X	X

At Workshop 2 (April 2012), participants (from local and state governments in NSW) were asked to reconsider the causes of barriers and identify potential methods of overcoming the challenges (more details can be found at Herriman et al. 2012). They were given Table 3 as an input to this process. The output of this workshop was a set of ideas for action, which were combined with inputs from the interviews and case examples to produce the list included in Appendix D. In order to structure the analysis and discussion, the two cross-cutting issues, as shown in the table, were combined to provide four thematic challenges:

1. inconsistent governance and lack of leadership
2. uncertainty of, and limits to, information and knowledge
3. poorly articulated and inconsistent problem definition and planning responses
4. Limited resourcing to plan and implement responses.

Based on Appendix D, participants (including NSW and interstate representatives) at Workshop 3 (May 2012) were invited to discuss, validate and prioritise the enabling actions to overcome cross-scale barriers that had been identified in Workshop 2 and subsequent interviews. By envisaging a future that would be free of the four thematic cross-scale challenges, a number of enabling actions to overcome the challenges were identified by the workshop participants. The initial wide-ranging initiatives were prioritised to two significant actions per theme that could enhance the development of the adaptive capacity of local governments (see Mukheibir et al. 2012). As shown later in Section 8, by consolidating two of the actions, a final list of seven enabling actions is presented.

5.1 Cross-scale barriers and the underlying causes

Based on the process described above, the following four sub-sections provide a synthesis of participant contributions and have been used to bring together the common themes drawn from insights of the participants. It is acknowledged that they are not distinct from each other; rather, there is much inter-linkage between them. A more detailed list of all the barriers and underlying causes identified through this process is provided in Appendixes B and C respectively.

Moreover, the research recognises that these barriers are not endemic to adaptation planning but exist within other issues in which local government is involved. According to one participant, it is important to understand that the need for adaptation did not cause these barriers, but rather the existing cross-governance structures and relationships may not be as effective as people envisaged.

5.1.1 Inconsistent governance and lack of leadership

Description of the barrier

The importance of cross-scale connectivity between governments was identified as a recurring theme through all the engagement processes. The lack of consistency in governance between federal, state and local tiers of government, together with poor communication between them, has resulted in a disaggregated approach to climate change adaptation.

A key component of this disaggregated approach that was raised is the lack of ownership, accountability and commitment to the issue at the federal and state levels, and the unclear roles and responsibilities involved in taking action. It is not clear who is or should be taking leadership of this issue. Increased expectations are being made of local government – which is responsible for implementing many state policies/strategies – due to the legal status of local government, which makes it accountable to the various states. However, when it comes to climate adaptation, there is little statutory protection of local government activities/initiatives (e.g. states do not have consistent sea level rise policies that local government can adopt to support its adaptation planning decisions).

Possible causes

Further, a significant underlying cause is the lack of direct contact and communication between federal and local government. Participants in the research believe that addressing this issue would result in local government's interests being better understood by the federal

government, and would allow for improved strategic funding and planning of national priorities. There is no direct administration connection between federal and local government, as it is mainly coordinated through the states. Federal government is mainly informed by the states, with very little reflecting local government's needs. However, it could be argued that the provision of Local Adaptation Planning Pathways and Coastal Adaptation Decision Pathways funding has to some extent reflected local government needs.

In a similar vein, no clear mechanism for interdisciplinary communication exists, resulting in people working in silos at all levels. This disrupts the communication and sharing of information required for adequate responses to and planning for cross-cutting issues such as climate change. According to several interview respondents, an underlying cause is the uneven power distribution between state and local government. In many states, local government is a creation of state government, which often does not see local government as an equal player. Often programs are designed by the state for local government rather than in cooperation or conjunction with local government. This is particularly prominent in the Northern Territory, where local government has no statutory role in planning and requires the territory government to take the lead in adaptation planning. An additional theme that arose from the key informant interviews included the frequent shift in state agencies, which hampered accountability and limited the potential for consistent points of contact and dialogue between agencies and local government.

Short political timeframes and cycles, which do not coincide with planning timeframes, result in the reluctance of elected officials to make long-term decisions, which could sometimes be difficult and not popular in the short term. Since councils are ultimately an instrument of the states, and are not recognised in the Australian Constitution, the states can amalgamate or unbundle local governments, or even remove the elected representatives from office and run the local government under appointed administrators. Under these situations, planning processes can be disrupted and cause officials and councillors to lose focus. With few incentives (legal or statutory) to act on projected climate impacts in the present, large capital expenditures are deferred to future office bearers or other arms of governance. Changes in state government could result in the overturning of local government policies and programs and/or creating a level of uncertainty through inconsistent political policies and messages, resulting in planning paralysis.

Participant comments

With climate change, we're going to have a constantly changing future. I don't think our decision-making approaches are at all set up to deal with that. It's not the way that we've traditionally worked. So I think there's also going to be some cultural barriers in just how planners work and how comfortable they feel making decisions in an area of uncertainty.

But when it comes to how you might implement a climate change policy nationally, and what that means for planning agencies, then I think you need to take a hard line because state governments come and go and state governments have different views often, to national governments. Once we have that alignment of policy from National through to state then what we need is a strong partnership then, with local government who, I mean, statutorily, have no role, but play a key role in implementing policy down to that local level.

If you have the politics aligned, then you will get people willing to play the same game. We're our own worst enemy when it comes to this because politics intervenes in what is a fundamentally crucial issue for the human race in the end.

5.1.2 Uncertainty of, and limits to, information and knowledge

Description of the barrier

Before adequate adaptation planning can be undertaken, the likely impacts at a local level due to projected climate change need to be understood. The challenge to gaining

this information is less about the lack of data and knowledge than about the challenges associated with understanding what information is needed, where to find it, and how to use it effectively.

Possible causes

Currently, there is no coordinated climate change-related data collection and analysis facility at state or federal level to collate from and share with the various agencies working in this field. The existing informal networks are ad hoc and result in limited information flows between private industries, councils and agencies. Furthermore, this barrier also deals with inconsistent use of terminology, inconsistent data-collection techniques and a perceived lack of locally appropriate information. The geo-physical characteristics of a local area will influence the nature of the specific climate change risks, and hence the type of information needed to make informed analysis and decisions. For example, the impact of less rainfall on specific catchments is likely to be understood better through historical knowledge than the impact of sea level rise on storm surges and inundation.

Climate projections are currently only relevant at a national and to some extent regional level. The scale of the problem has not been made relevant at the local government level. Efforts by the Office of Environment and Heritage (OEH) in NSW in developing new, fine-scale climate projections for NSW and the ACT should be replicated in a consistent fashion across the other relevant regions of Australia (OEH 2012).

The challenge associated with understanding the science of climate change – particularly projections – and also understanding how uncertainty in climate science should be dealt with is also apparent. This is complicated by the mixed messages coming from a range of sources, including the media and big business, who deny the evidence of global warming.

Results from key informant interviews also suggest the existence of poor communication between local government and researchers/consultants who are active in producing data; often research is not closely linked to end-users' needs whilst simultaneously there is poor articulation from local government on their information/data needs to make informed adaptation decisions. Inadequate training for engineers, planners and councillors across all scales of government results in practitioners and decision makers being unaware of the key information required for their analysis and decision making for local-level CCA initiatives as well as often lacking the skills to scrutinise the data and results provided by researchers or consultants. Scepticism about the projected climate impacts through lack of information and/or misinformation only serves to exacerbate the problem.

Participant comments

You'll probably never get to the position where there can be a single national repository of this stuff. That's fine, but there does need to be more solid investment.

I think the whole idea of understanding climate projections is difficult for anybody unless you've got a very good science background. I think that is being addressed.

When people say they want to know about climate, we've tended to give them climate projections – projections of temperature, rainfall, etc. from the global climate models. Now, what they really want is information about how it's going to affect them; information about how it's going to affect their livelihoods, their businesses, water supplies, lifestyle, etc., and that research is much less developed.

Sometimes councils don't do the right thing – not because they don't want to, but they don't know what to do.

In terms of the feedback that we've had around data and information and advice, is that it's not so much the shortage, as is relevance ... there is a real need for tailored information that is directly relevant to councils and CEOs in order for them to be sufficiently informed, so that they can make some decisions.

5.1.3 Poorly articulated and inconsistent problem definition and planning response

Description of the barrier

This barrier refers to the lack of consistency in planning and regulatory frameworks between jurisdictions, which is partly driven by the inconsistent defining of the climate change adaptation 'issue' as a whole. The uncertainty about how climate change impacts will manifest at the local level, as discussed above, also plays a part in this challenge.

Possible causes

The lack of policy behind climate change initiatives for councils and state government, and the limited political consensus across tiers of government, make it unclear whose role it is to plan for climate change adaptation. This has consequences for the legal responsibilities of local governments, as discussed under the first barrier.

Without a clear definition of the problem and related jurisdictional responsibilities, the legal responsibilities remain unclear. The absence of a clearly defined mandate (legal and political responsibility) – especially in relation to appropriate zoning to incorporate climate change – results in a poorly coordinated planning response. It is not clear whose role it is to plan for climate change impacts, nor is the extent of the problem obvious. According to the interview respondent from the Northern Territory, the issue of geographical scale is overlooked in adaptation planning within the territory, and thus programs developed by territory and federal government agencies often neglect contextual issues, or at the minimum fail to account for the three distinct regions found in the territory.

Participant comments:

You can have done every action in a plan and not achieved the strategic objective that the plan was set up to achieve. How many times have you sat on a policy of strategic review and everyone is going, 'Oh, 98 per cent of actions were fully implemented, but nothing's changed?'

The inconsistent messages, I suspect, are perhaps more driven by the fact that you open the newspaper one day and there's an article there saying, you know, sea levels might be rising higher and faster than originally thought. Then you open up the newspaper the very next day and you'll see an article there saying the science is all a load of nothing.

It's hard to push a climate change agenda when we're so uncertain about what's happening in the short term.

You can fiddle around with education forever but until we change the regulations we're not going to get the step changed and start to build the community awareness around what is critical.

5.1.4 Limited resourcing to plan and implement responses*Description of the barrier*

Many local government participants noted the limitations of resourcing climate change adaptation interventions at the local government level, including financial as well as technical and human resourcing constraints. Local governments acknowledged their numerous competing priorities in meeting the needs of their LGAs, which can push CCA down the list of concerns. While these predominately are issues specific to local government internal operations, support from higher tiers of government to address these challenges was expressed as being constructive.

Possible causes

The various funding models available for adaptation were criticised by participants. Prioritisation of funds at different tiers of government, together with competing priorities, was raised as a cause for the limited dedicated adaptation funding at the local government level. In addition, adaptation responses often need a larger pool of money, which wasn't available within councils' own discretionary income. The current funding approach at the federal level is viewed as being piecemeal, without any systematic follow-through. Two interviewee respondents argued that the criteria for resource allocation from state to local government was not reflective of the circumstances in the state, and was largely based on population size rather than economic, social and government capacity. For example, one-third of the coast in Australia is in Western Australia, a state in which some of the populations are small and remote, and many of these councils are capacity poor with limited infrastructure. However, resource allocation criteria are not reflective of such needs. Western Australia received approximately one-fifth of the LAPP funding and one-tenth of the Coastal Adaptation Decision Pathways funding.

While guides for general risk management exist (such as AS/NZS ISO 31000:2009), and have been used by local governments in NSW, for example, having a standardised guide across the country for assessing and planning for climate-induced risks by setting out the type, minimum resolution and possible sources of information and data needed to make credible business and investment decisions would be useful for both state and local governments. In addition, the use of cost-benefit methodologies in this context has not been fully described to include processes for multi-criteria decision analysis for considering non-monetised benefits and costs, as well as the setting of

boundaries. Further, no systematic cost-benefit analysis to assess adaptation projects has been developed or implemented to guide the spending of public funds. Currently, no framework exists to assist local councils assess the viability of already sunk capital in existing infrastructure that is now viewed as vulnerable under CC impacts. There is a need to look at the costs and benefits of preparedness versus recovery, especially in the case of doing nothing, in order to make informed decisions.

Funding constraints at the local government level, especially for large capital adaptation projects, are viewed as being partly due to rate capping (a mechanism whereby some state governments peg the level of rate increase for local government) at state level and the lack of state governments' ability to endorse rate rises or the setting of special levies or infrastructure charges, although it was acknowledged by the project participants that there is fierce community opposition to rate rises. This is particularly true of small councils who are more grant dependent, with limited capacity to raise revenue from own sources – especially those with large asset bases and proportionally small rate bases.

A view was expressed that the federal government uses contingency funding rather than dedicated line items in budgets to pay for emergency responses. The true cost of responding to climate related events is therefore not transparently accounted for, and this then skews investment towards response rather than investing in long-term adaptation.

Limited technical and human resources in the form of in-house expertise were noted as a challenge, especially for the smaller and more remote councils. As discussed in barrier two, this limits a council's ability to plan appropriately and make strategic decisions.

Finally, a view was held by some participants that there is limited funding for R&D and pilots, and the dissemination of these activities. As can be attested by the feedback from the participants to this process, projects and processes that are end-user focused, such as this project, can make a valuable contribution to bringing groups across scales to a common understanding, with potential to find common ground and shared lessons.

Participant comments

Once again, it's a resourcing issue and it needs some very clever people to be able to convert very complex science into meaningful policies that people understand.

My perception of local government is that they're very stretched and also there's a perception that that's where the rubber hits the road: they're the bottom line, they're the ones who are supposed to act. They don't necessarily have the correct or the necessary resources or connections or awareness to be able to deal with it.

I don't think you can throw money at it [CCA] and expect a solution. It all needs to be embedded in a framework where there is guidance about what might be the best thing to do or try.

We should all do more with more resources, but is the lack of resources really limiting people's ability to get to grips with adaptation.

I think it's more that inability to quantify and use an accepted methodology rather than the funding.

5.2 Research findings in the context of current literature

5.2.1 *Inconsistent governance and lack of leadership*

Biermann's (2007) focus on *architecture* in the earth systems governance framework draws specific attention to interaction of institutions as being important for good governance and decision making. The importance of institutional and governance arrangements, specifically the cross-scale interaction between governments, has been suggested in the literature as being the most significant barrier to effective decision making (Burch 2010; Ford, Berrang-Ford & Paterson 2011). This has been confirmed through all the engagement processes in this study, where poor communication between federal, state and local tiers of government in Australia has resulted in a disaggregated approach to climate change adaptation.

Accountability is viewed as key challenge for effective system governance (Biermann 2007), where the roles and responsibilities of the various actors and their relative influence need to be defined clearly. Participants from local government expressed their concern about the lack of ownership, accountability and commitment to adaptation at the federal and state levels, and that there were unclear roles and responsibilities for taking action. Withycombe's (2009) view that adaptation planning is a 'shared responsibility' across the three levels of government (i.e. local, state and federal) has particular relevance – specifically since lines of accountability in such an environment need to be clearly articulated and understood (Booth 2012). This study has revealed that the disaggregated nature of the approach to adaptation has resulted in a leadership vacuum. This is exacerbated by the presence of short political timeframes and cycles, which in some cases has resulted in the reluctance of elected officials to make long term decisions.

Long accountability chains have been questioned in the recent literature, where legitimacy is derived through various tiers of government, ending finally with the voters (Dingwerth 2005). According to several interview respondents, a significant underlying cause for the institutional barrier is the lack of direct contact, administrative connection and communication between federal government and local government. This has led to local government's interests not being well understood by the federal government, which means they are not always reflected in strategic funding and planning of national priorities. Often programs have been designed by the state for local government rather than in cooperation or conjunction with local government.

An additional theme raised by several interview respondents was power inequalities between various tiers of government that had hindered cooperative governance arrangements. It was highlighted that, at times, outcomes of discussions are driven by individual needs, motives and agendas. Local government representatives sometimes felt that they were an instrument of the state, with less power to make the larger decisions related to adaptation. A regional approach to adaptation planning by some local governments has contributed to addressing these power inequalities. One respondent commented that inequalities in power will always be a factor with which to contend, but efforts should be made to reach a middle ground on issues related to adaptation planning; this will ensure common interests are served and that the information produced is as fair and equitable as possible. The existence of a uniform national adaptation policy would also assist in ensuring that decisions between and within government agencies are not overridden by personal agendas.

5.2.2 Uncertainty of, and limits to, information and knowledge

The first stage in the adaptation process discussed in Section 3.2 is the *understanding* phase, which focuses on the availability of adequate and appropriate information and knowledge, and the capacity of actors to engage effectively with it (Moser & Ekstrom 2010). It has been documented that local governments face technical challenges in understanding the complexity of risk assessments and the uncertainty associated with climate projections for planning (Measham et al. 2011; Booth 2012). This was confirmed through the engagement processes in this study.

It was reported that there was no coordinated climate change-related data collection and analysis facility. Fine-scale climate projections are currently only being produced for NSW and the ACT by the NSW Office for Environment and Health (OEH 2012).

Results from key informant interviews suggested that the poor communication between local government and institutions producing data often results in research that is not closely linked to end-users' needs. This is reportedly compounded further by the inconsistent use of terminology and data-collection techniques.

5.2.3 Poorly articulated and inconsistent problem definition and planning response

In considering the second phase in Moser and Ekstrom's (2010) framework – namely the *context* – it is apparent that institutions will view a problem from different points of view, and thereby formulate a definition of the problem and related response from their respective perspectives. Several respondents stressed that incoherent terminology related to climate adaptation was leading to an epistemologically messy landscape. Moser and Ekstrom (2010) suggest that if a 'system extends across multiple jurisdictions, the problem requires coordination and collaboration across jurisdictions to implement'.

Respondents to the study indicated that it was unclear whose role it was to plan for climate change impacts, as discussed in Section 6.1.3. The absence of a clearly defined mandate (legal and political responsibility), especially in relation to appropriate zoning to incorporate climate change, results in a poorly coordinated risk definition and associated planning response. This response is consistent with the findings in recent work conducted by The Climate Institute (2012). In considering the context, several respondents agreed on the need to arrive at a common understanding and agreement of what the climatic impacts may be for a particular area and what is required to address those issues.

5.2.4 Limited resourcing to plan and implement responses

Biermann's (2007) focus on *allocation* in the Earth Systems Governance Framework, emphasises the need to consider fairness and equity in the distribution of resources. An oft-cited concern is the constraint in resources to effectively plan and implement adaptation responses (Measham et al. 2011). Many local government participants in the study noted the limitations of resourcing climate change adaptation interventions at the local government level, including financial as well as technical and human resourcing constraints.

A number of councils, especially the smaller ones, are dependent on federal grants for capital expenditure. The prioritisation of the funding at the various levels of government is viewed as being piecemeal and unsystematic.

It was also argued by some participants that local councils are not equipped to properly assess the climate impact risk, and therefore are not able to lobby for appropriate

capital funding. While guides for general risk management exist, having a standardised national guide to assessing and planning for climate-induced risks would be useful for both state and local government.

Funding issues were also related to the inconsistency of government and the lack of leadership; adaptation was not seen as a political priority at the state government level, and this led to the limited allocation of resources. Other respondents commented on the need to continually keep abreast of new scientific findings in the field of adaptation to support the prioritisation of adaptation planning within their strategic plans (see Sections 6.2.2 and 6.2.3). This would provide justification for the allocation of dedicated resources for supporting adaptation planning.

5.3 Enabling actions for a preferred future

This section describes the enabling actions, prioritised by theme, that have the potential to enhance the development of the adaptive capacity of local governments. A full list of the actions is located in Appendix D. A key theme that arose through interviews and workshops was the need for the presence of multiple conditions (e.g. engagement processes, institutional support, the knowledge brokers, connections to science, resourcing, etc.) if adaptive governance is to be implemented.

Drawing on examples of success from other sectors – as illustrated by Johnston and Batty in their presentations (Mukheibir, Herriman & Gero 2012) – it was found that the challenges facing climate change adaptation planning and implementation are not too dissimilar. Common challenges related to collaboration with local, state and national counterparts, advocacy and voice of smaller organisations (in this case, local councils), addressing emerging issues that are surrounded by uncertainty about and difficulty in obtaining funds, given competing priorities.

5.3.1 *Improved co-operative governance, coordination and communication*

A less hierarchical level of governance was envisaged by the participants, to promote cooperative governance and collaborative planning between the three tiers of government during the adaptation planning and implementation stages. Local issues would then be taken into consideration by tiers of government. A common theme from interviewee responses was that cooperative governance was a key prerequisite for the effective and efficient use of resources.

Such a future would see many state agencies also view adaptation as a core business area, rather than the response being driven only by local government. This would ensure that adaptation plans and strategies are maintained beyond the three-year political cycles – for example, the NSW MetroPlan covers the time period to 2030.

Collaboration (vertical and horizontal), together with the use of targeted partnerships for implementation in response to regional and or shared impacts, would involve more effective use of resources, thereby avoiding the duplication of work, allowing for more funding to be freed up for other work. Additionally, local efforts would be coordinated to be collectively effective. It was recognised that these partnerships also included industry groups and the private sector. Respondents from federal agencies argued that it was more effective for them to work with regional local government organisations or other umbrella groups.

Good unconditional information and knowledge sharing through effective collaboration between other stakeholders, including private organisations and communities, are key

to ensuring that all stakeholders work from the same regional data sets and information. The national database for floods, which is currently accessible to the public through Geoscience Australia, is such an example. This is discussed further in the next sub-section.

The participants considered that disaster and emergency management was a good example of where such collaboration had worked well. In this example, they acknowledged the presence of particular enabling factors, which included:

- greater collaborative planning between the three tiers of government
- targeted partnerships for dealing with the extreme event, and
- the way in which resources had been used effectively to avoid doubling up.

Another good example of cooperative governance was in the management of pollution and water quality in rivers and waterways. The positive contributing factors cited included follow-through legislation, funding, education and mechanisms for inter-agency work (e.g. catchment management authorities).

To support a move to this improved collaborative environment, a number of enabling actions were identified for consideration; these are listed in Appendix D. In essence, they can be summarised as:

- enhancing collaborative planning at all levels – state, regional and local
- identifying and supporting climate change champions at all levels of government.

The two key actions that were discussed in detail are:

1. Allocate and agree upon priorities, roles and responsibilities at the three levels of government

This action has relevance for all states and territories, since they all have three tiers of government (except for the ACT). Building models of mutual responsibility through participatory engagement mechanisms that enable proactive actors at different levels of government to come together to exchange ideas about how people feel they need to adapt and how they believe they can make a contribution is a key way forward. Introducing a mandate for working together was also suggested as a mechanism that would ensure the willingness of actors to work together, particularly under conditions in which state governments were at odds with the federal government. Given the jurisdictional constraints, it would be best for state governments to action this initiative and set up a process to negotiate and clarify the various roles and responsibilities, and outline clear lines of responsibility and accountability at the various levels of government. All role players should then be educated (and trained if necessary) in the agreed allocation of roles. This should be accessible to the community in a transparent manner. The authors note that recent COAG SCCC discussions have moved toward this greater clarification of roles and responsibilities (see Section 4.1), but it remains to be seen whether the local government sector finds the specificity it seeks in this document (COAG 2012a).

2. Utilise effective regional mechanisms, groups and initiatives to deliver regional priorities for CCA

Integrated impact assessments and responses conducted on a regional scale have advantages over national and local approaches, since in the first instance

more reliable data are available locally, system complexity is better understood and communication is usually superior. These regional groups could be organised around various climate impacts such as flooding, bushfires, drought and storm surges. Coordination of these initiatives is necessary to ensure a coherent approach to enhancing resilience. The establishment of these networks/forums would require some form of state recognition and support. Local champions should be identified and encouraged to drive these initiatives. It was highlighted during the interviews that one particular collaborative example that seemed to be working well, and was achieving the vertical cross-agency integration, was the Climate Change Policy Interdepartmental Steering Group in Western Australia, which comprised representatives from various government agencies and met regularly. Each agency exchanged information related to activities and what had worked well, and future plans and policies were shared and negotiated. These partnerships can also offer mechanisms for improved use of adaptation funding as well as gaining increased funding through a collaborative approach to planning.

5.3.2 Better understanding of and use of information and knowledge

A situation where all stakeholders (practitioners and decision makers) have a clearer understanding of their knowledge needs, and which agencies meet these information needs, would go a long way towards ensuring adaptation is implemented in a consistent manner. Clear planning frameworks with specified climate-related data requirements would assist end-users to incorporate the impacts of climate change in all stages of planning and implementation.

Australia has a range of climate drivers that affect the various regions of the continent. Re-analysing historical data and engaging with traditional knowledge may further aid an assessment of climate change drivers. This, together with an improved understanding of these climate drivers, may allow for a proactive adaptation approach for local governments to predict increased need for emergency planning or when best to undertake maintenance actions, such as those being explored by the agricultural sector.

Reliable and accessible knowledge to support quality decision-making through the provision of strategic data and knowledge would need to be easily and logically accessible. All tiers of government would agree on priority data sets of national interest with which all parties could consistently work. This could be in the form of improved hazard maps showing extreme weather impacts. Such a situation, where evidence bases are more robust with regard to the value of adaptation interventions, would enhance business and investment decisions, and ensure accountability. This could be further supported by monitoring and evaluation criteria.

To support a move to this improved knowledge and information environment, a number of enabling actions were identified for consideration, and are listed in Appendix D. In essence, they can be summarised as:

- providing a clearer understanding of knowledge needs and sources among stakeholders
- improving evidence to support business and investment decisions
- establishing a central mechanism for data management and sharing.

The two key actions that were discussed in detail are:

1. Planning frameworks to improve evidence to support business and investment decisions

Having a standardised approach to assessing and planning for climate-induced impacts would be useful at both the state and local government levels. Such an approach would set out the type and possible source of information and data needed to make credible business and investment decisions. This would ensure there was necessary evidence for the political support required in order for decisions to be made by elected officials.

The development of such a planning framework is a collaborative exercise between all tiers of government. Federal government's role would be to ensure consistency across the country, and could provide the resources to develop the framework. A key theme that came out of the interviews was the need for robust methods to facilitate continuous learning. These would include the monitoring and tracking of the adaptation processes, including barriers and outcomes, against key performance indicators. In particular, it would involve tracking where local government should be in terms of adapting and whether it is adapting adequately, as well as measuring the different contributions of each level of government and communities towards this goal. Respondents highlighted that there is currently limited work in this area into which local government can tap.

2. Establish a central mechanism for data management and sharing

A national repository is required for climate impact-related data to be stored and made freely available to state and local governments, with the ability for local governments and other agencies to upload and download data and information. Approved data sets for flood mapping, sea level rise, etc. should be audited or peer reviewed to ensure dependability and public trust in decisions that are based on them. This facility could be hosted by Geosciences Australia or the Bureau of Meteorology, and would need an intergovernmental committee to determine the terms of reference and the types of information to be made available.

5.3.3 Frameworks for problem definition and planning

A consistent framework applied by all tiers of government will ensure a well-articulated problem and result in a consistent definition of the problem and planning response. This may encourage a situation where it is the norm to adapt to climate impacts when pursuing a sustainability agenda. COAG could play a greater role in better coordinating climate adaptation actions across the states in this regard.

A well-articulated problem and solution (or range of solutions) would contribute towards ensuring that the community are appropriately informed, and understand and support local government initiatives – especially when interventions by government target those most in need (in relation to climate change). This was considered important, since the success of any planned response to climate change requires the support of the community.

An improved understanding of the problem (through enabling actions described in Section 6.3.2), together with an appropriate planning framework, would assist in developing robust and flexible adaptation responses. In addition, a planning framework would describe the moral and legal responsibilities that need to be in place, resulting in mandatory adoption of adaptation in all aspects of government decision making. This would ensure that:

- future planning and building in vulnerable areas would be enabled through improved building codes and planning laws
- economically feasible retreat plans would be considered.

As an initial approach, the concept of an 'Adaptation Watchdog' was put forward as an interesting and potentially useful idea. This independent body would act like the Productivity Commission/IPART to ensure climate adaptation activities were socially, culturally and economically fair and equitable, and aligned with best practice. However, it was acknowledged that the Watchdog idea was ambitious – especially given that uncertainty remains about what the 'best' approach to adaptation would look like.

Over time, climate change would be integrated into councils' mainstream activities (e.g. project planning and implementation, operations, etc.), and would not necessarily be viewed as a separate portfolio or activity. This would involve the incorporation of climate adaptation considerations into governance structures, together with the ability to modify the ways in which organisations operate in response to gradual and discrete changes resulting from climate change – either directly or indirectly.

To move towards an improved problem definition and planning framework, a number of enabling actions were identified for consideration; these are listed in Appendix D. In essence, they can be summarised as:

- Ensure a consistent CCA framework at state and national level.
- Build community consensus on a shared understanding of the seriousness of climate change and the need to act.
- Mainstream adaptation at all levels of government.
- Make adaptation fair and equitable.

The two key actions that were discussed in detail are:

- 1. Ensure a consistent climate change adaptation framework at state and national level for policy and legislation**

Linking climate adaptation to sustainability would allow for a more consistent approach to policy and legislation at all tiers of government. The variation in the current state level policies will need to be overcome to achieve this goal. The obvious place to coordinate this would be through COAG; however, the urgency to act will need to be communicated by local government through state government COAG representatives. Within this move towards consistency, there was also a keen interest in recognising that the actual adaptation approach of each local government area would necessarily be tailored to local circumstances, and that the process of adaptation itself is 'messy' and difficult to replicate in an identical fashion across jurisdictions.

- 2. Build community consensus on a shared understanding of the seriousness of climate change and the need to act**

Local councils are best placed to communicate the relevant climate-induced impacts to the community in their area. A number of local councils undertake community consultation when developing their adaptation plans. Some participants were of the opinion that by having a consistent and accepted data and information to draw on would help to develop community consensus on the potential threats to the region. However, they need the support from federal and state government to provide a consistent message based on sound and accepted data and information (as discussed in Section 7.2.2 above). Allowing public access to this single source of data and information will reduce the level of misinformation and misunderstanding. This, of course, needs to be balanced with having space for dialogue and healthy debate within the community.

5.3.4 Adequate resources to plan and implement responses

It was envisaged that in future climate change risks could be considered within already well-established processes and funding arrangements by applying both a systematic process to identify and prioritise the risks, and a rigorous cost/benefit analysis that would demonstrate a net community benefit of the adaptive responses. Further, adopting a flexible approach to addressing adaptation would result in an incremental response. An important element of this approach would be identifying which climate change impacts were urgent and what was not urgent (e.g. what needs action to begin this year, what can wait – sea level rise, for example, may be an incremental impact that can be tackled gradually rather than immediately in some areas). Perhaps it would also be useful to identify which localities have more urgent adaptation needs – for example, by taking a state or regional perspective – whereas others can be tackled over time.

In addition, since many climate change risks are increases on existing climate variability, there is not always a need to label it as ‘adaptation’ *per se*, but instead ‘climate risk/extreme events/hazards’, etc. An example was provided of a NSW council referring to ‘ocean flooding’ rather than ‘sea level rise’ in its communication with the public. This would possibly avoid the scepticism and perceived political sensitivity of the issue, which many council staff participants felt is currently being experienced when budgets are put up for approval on climate change adaptation measures. The choice of language is useful in avoiding the debates around anthropogenic induced global warming, and focuses the attention on risk mitigation.

This approach would perhaps also help to demonstrate that this is a continuation of existing work, and that it should fit within existing areas of responsibility – rather than being a new area of work. Such a language shift could also help in accessing other sources of funding. For example, it was suggested by study participants that the existing Regional Development Australia Fund (administered by the federal Department of Regional Australia, Local Government, Arts and Sport) should be able to be used for ensuring resilience to climatic impacts, even though adaptation benefits are not currently one of its selection criteria for allocating funds.

Another approach to sourcing alternative funding for climate resilience in potentially vulnerable locations would be to apply a levy to those properties benefiting from the adaptation investments. In addition, uniform minimum building standards for flood- and fire-prone zones should be introduced, based on regional climate change modelling and monitoring. This would introduce a level of fairness and ensure that the whole community does not have to bear the cost of remediation.

Insurance was proposed as a mechanism to further reduce local government's responsibility and expenditure in disaster recovery, through the use of fine-grained geographically sensitive premiums to create a price signal that would encourage design and building that reduces risk. For example, it was pointed out that some councils do not pay for the building of seawalls to protect individual private homes, since it is not viewed as a public good – the landowner is expected to pay for this or obtain appropriate insurance. Such a policy could be extended, if it is not already widespread, to coastal councils.

To move towards a situation where councils have adequate resources to plan and implement adaptation responses, a number of enabling actions were identified for consideration, and are listed in Appendix D. In essence, they can be summarised as:

- more effective use of existing government funds
- supporting local councils to develop their own business case for investment in the future
- developing new funds for adaptation
- encouraging higher use of insurance.

The two key actions that were discussed in detail are:

1. Support local councils to prepare their own business case for investment and to improve the evidence to support business/investment decision

While guides for general risk management exist (such as AS/NZS ISO 31000:2009), creating a standardised guide for assessing and planning for climate-induced risks by setting out the type, minimum resolution and possible sources of information and data needed to make credible business and investment decisions would be useful for both state and local government. A standardised approach to assessing the costs and benefits of proposed responses to projected climate-induced impacts would provide the necessary rigour and confidence in investment decisions made by all tiers of government.

This is especially necessary when considering the future uncertainty of the projected impacts. While there are risk assessment frameworks that are used by local government, the use of cost-benefit methodologies in this context has not been described fully. This would include processes for multi-criteria decision analysis for considering non-monetised benefits and costs, as well as the setting of boundaries.

The use of such a costing guide would ensure that local government across Australia approaches the issue in a consistent way to produce outputs that are usable and defensible in business case preparation. State departments would then have a transparent tool for assessing local government climate adaption plans.

2. Make more effective use of existing government funds and develop new funds for adaptation where appropriate

Like most of the proposed actions, this is applicable in all states and territories. Through improved accountability and responsibility definition, funding has the potential to be used more effectively, with targeted focus and less overlaps. Investment in successful existing programs should be prioritised to carry it through to completion, and to avoid abandoning projects after the initial planning phase.

Grant funding should also prioritise the building of capacity among end-users who will be implementing outcomes at a local level.

These long term adaptation projects should be federally funded on a priority basis, possibly based on the return of investment.

5.3.5 Summary of the proposed enabling actions

The seven key enabling actions to overcome the cross-scale barriers to adaptation at the local government level which were identified through the process described in this report can be summarised as follows:

1. Build community consensus on, and a shared understanding of, the seriousness of climate change risks and the need to act, through training and the delivery of a consistent message from all tiers of government.
2. Allocate and agree upon the priorities, roles and responsibilities at the three levels of government for addressing climate-induced risks for improved cooperative governance, coordination and communication.
3. Improve the National Climate Change Adaptation Framework to guide complementary state and national level policy and legislation.
4. Utilise effective regional mechanisms/groups and initiatives to deliver regional priorities for climate change adaptation and establish new ones where necessary.
5. Develop a consistent business case framework to support local government to prepare their own adaptation investment plans and to improve the evidence to support business/investment decisions.
6. Establish a central mechanism for data management and sharing.
7. Make more effective use of existing government funds and develop new funds for adaptation, to ensure continuity in the implementation of the plans.

6 FUTURE RESEARCH DIRECTIONS

The aim of this study was to gain an understanding of the potential strategies that would enable local governments to overcome the cross-scale challenges facing them in the preparation of adaptation plans and the implementation of the identified programs and actions. It is not the intention of this study to develop action plans or allocate specific responsibilities to any agency.

In order to put the recommendations from this study in place, the following further work is required:

- In-depth analysis of the state and federal climate change adaptation policy differences, to determine the needs across all tiers of government.
- Further formal discussion between the various tiers of government about the high-level recommendations made in this report, and the commissioning of further strategy planning for each of the recommendations. This may include linking to the COAG SCCC planning and strategy development processes.
- Engagement with state governments and territories on the results of this report, to encourage clear policy development guidance for local councils on this issue.
- Some clear steps to improve adaptation governance, accountabilities and responsibilities.
- A strategy to enable better integration of climate change adaptation across all tiers of government, especially across local government.
- Encouragement of regional bodies to proactively support the councils within their jurisdiction.
- Evaluating how the barriers identified within the local government adaptation context compare with barrier to adaptation planning in other systems (e.g. water or health) and how they interact to shape adaptive governance.
- Envisioning what an adapted Australia look like and establishing the relative roles of the community, private sector and different levels of government within it.
- Exploring the role of the level of public involvement in local politics (e.g. through voting and enrolment eligibility) in shaping the extent of adaptation planning and implementation within local government in various states.
- Working out the extent to which changing demographics in various local government areas (e.g. rapid growth areas versus declining population) influence the planning and implementation of adaptation within local government.

7 SUMMARY AND CONCLUSIONS

Identifying barriers or constraints to adaptation is an important process in terms of supporting successful adaptation planning, particularly where reworking the path-dependent institutional structures, organisational cultures and policy-making procedures is required (Burch 2010). The understanding of barriers to adaptation is an emerging research area, and has to date identified common barriers to adaptation planning within local government in Australia, which include leadership, competing priorities, planning process, information constraints and institutional constraints (Dessai S, Lu & Risby 2005; Smith et al. 2008; Measham et al. 2011).

This study undertook a literature review and engaged participants from 42 different state and federal organisations to determine cross-scale barriers and the related underlying causes to achieving effective climate change adaptation planning and implementation. The stakeholder engagement revealed seven key enabling actions required to overcome these challenges. An over-arching message received during this study was the acknowledgement that the issues confronting effective adaptation to climate change are not unique, and are to a large extent systemic in terms of institutional processes.

Throughout the various stakeholder engagements undertaken in this study, a strong push has emerged for local government's responsibilities to be recognised and/or acknowledged at state and federal levels, and for these responsibilities to be supported by appropriate resourcing. This is supported by the fact that the impacts of climate change are felt at the local level, thus needing to be managed by local governments. While local government representatives acknowledge there are some mechanisms for support, more needs to be done to ensure a response to the impacts of climate change that balances the likely environmental, social and economic impacts already emerging at the local level.

The key causes of these challenges identified through this process, and confirmed by the available literature, fall into four broad themes:

1. poor understanding of the risks, limited access to and the uncertainty of climate change impact-related information
2. inconsistent governance structures, coordination, communications and leadership between the vertical tiers and horizontal levels of government
3. inconsistent problem definition and appropriate climate change adaptation frameworks to plan within
4. competing priorities in planning and implementing responses, due to limited operational resourcing, such as staffing and funding.

It is not the intention of this study to develop action plans or allocate specific responsibilities to any agency, but rather to gain an understanding of the potential strategies that would enable local governments to overcome the cross-scale challenges facing them under a changing climate. Many of the strategies proposed are not unique to adapting to climate change impacts, but lessons from other sectors and programs can be drawn upon to overcome the cross-scale challenges. The key enabling actions include the following:

1. Build community consensus on a shared understanding of the seriousness of climate change risks and the need to act, through training and the delivery of a consistent message from all tiers of government.

The first stage of the adaptation process, *understanding* (Moser & Ekstrom 2010), requires that the community is adequately informed of the climate change risks. The potential exists to undermine community consensus on the seriousness of these risks through inconsistent messages from the various tiers of government and other political and private organisations with vested interests. A number of stakeholders concurred with the published literature (see Measham et al. 2011) that the poorly and inconsistently articulated problem of climate change by the various tiers of government was a key barrier to effective adaptation response planning and overcoming the deeply held values, beliefs and scepticism faced by local government planners.

It is generally accepted that local councils are best placed to communicate the relevant climate-induced impacts to the community in their area (Ford, Berrang-Ford & Paterson 2011), and as such they undertake community consultation when developing their adaptation plans. By having consistent and accepted data and information to draw on would help to develop community consensus on the potential threats to the region. To achieve this, they require support from federal and state government to provide a consistent message based on sound and accepted data and information. Allowing public access to this single source of data and information would reduce the level of misinformation and misunderstanding.

Further, the case examples and workshop presentations revealed that framing the adaptation response as a risk reduction and management approach attracted less resistance to adaptation planning and implementation.

2. Allocate and agree upon priorities, roles and responsibilities at the three levels of government for addressing climate induced risks for improved co-operative governance, co-ordination and communication.

The poor clarity of roles and responsibilities for climate change adaptation, including the responsibility for managing risks of climate change, has been identified by both the study participants and the published literature, and is best illustrated in the areas of land use planning and emergency management (Productivity Commission 2012). This inconsistency between the policies of different departments within a jurisdiction is best illustrated by the case for land use planning, which at the state level is assumed to be a stable climate, and thus precluded attempts to incorporate adaptation into local government planning (Pillora 2010; Measham et al. 2011).

Adaptation at the local government level is generally considered to be a 'shared responsibility', which must be supported through collaborative efforts across the three tiers of government (Withycombe 2009; Productivity Commission 2012); hence the roles and responsibilities of state and territory governments and local governments should be clearly clarified. The recent discussion document released in May this year by COAG (2012b) that outlines the responsibilities of state and local governments is an attempt to address this vacuum. In addition, a draft recommendation by the Productivity Commission (2012) is that a comprehensive and up-to-date list of laws that delegate regulatory roles to local governments be published to assist state, territory and local governments to assess whether local governments have the capacity to effectively discharge their roles.

3. Improve the National Climate Change Adaptation Framework to guide complementary state and national level policy and legislation.

The lack of consistency in the current planning and regulatory frameworks, which are in part driven by the inconsistent definition of the climate change adaptation issue, has resulted in an uncertainty about the legal liability of local governments (Funfgeld 2010; Mustelin 2011; Productivity Commission 2012). Participants in the study suggested that linking climate adaptation to sustainability and risk management frameworks and processes would allow for a more consistent approach to policy and legislation at all levels of government. This would encourage the mainstreaming of adaptation into currently established planning and risk management processes. The current variation in the state-level policies will need to be overcome to achieve this goal. State and territory governments should therefore clarify the legal liability of local governments regarding climate change adaptation matters and the processes required to manage that liability (Productivity Commission 2012). The obvious place to coordinate this would be through COAG; however, the urgency of addressing this policy and regulatory challenge will need to be communicated by local government through state government.

4. Utilise effective regional mechanisms / groups and initiatives to deliver regional priorities for climate change adaptation and establish new one where necessary.

In addition to cross-scale responses to the challenges identified in this study, *cross-level* collaboration in the form of regional approaches has been demonstrated by the case examples as being a viable mechanism to deliver collaborative outcomes. Integrated assessments and responses conducted at the regional scale have advantages over national and local approaches, since in the first instance more reliable data are available locally, system complexity is better understood and communication is usually superior. Regional groups could be organised around various climate impacts such as flooding, bushfires, drought and storm surges. Coordination of these initiatives is necessary to ensure a coherent approach to enhancing resilience.

Greater coordination and collaboration among local governments could also address some of the capacity and resource constraints they face – such as undertaking common activities or joint activities through resource sharing (Productivity Commission 2012). However, in some cases the establishment of these networks/forums would require some form of state recognition and support.

5. Develop a consistent business case framework to support local government to prepare their own adaptation investment plans and to improve the evidence to support business/ investment decisions.

A standardised approach to assessing the costs and benefits of proposed responses to projected climate induced impacts would provide the necessary rigour and confidence in investment decisions made by all tiers of government. This is especially necessary when considering the future uncertainty of the projected impacts. While there are risk assessment frameworks that are used by local government, the use of cost benefit methodologies in this context has not been fully

described. This would include processes for multi-criteria decision analysis for considering non-monetised benefits and costs, as well as the setting of boundaries.

While guides for general risk management exist (such as AS/NZS 4360:1999), having a standardised guide for assessing and planning for climate-induced risks by setting out the type, minimum resolution and possible sources of information and data needed to make credible business and investment decisions would be useful for both state/territory and local government.

The use of such a guide would ensure that local governments across Australia approach the issue in a consistent way to produce outputs that are usable and defensible in business case preparation. State departments would have a transparent tool for assessing local government climate adaptation plans. The development of such a planning framework is a collaborative exercise between all tiers of government. Federal government's role would be to ensure consistency across the country, and could provide the resources to develop the framework.

6. Establish a central mechanism for data management and sharing.

It has generally been argued that before adequate adaptation planning can be undertaken, the likely impacts at a local level due to projected climate change first need to be made available, and then understood (Booth 2012; Productivity Commission 2012). However, participants in this study suggested that the challenge in gaining this information is less about the lack of data and knowledge than about the challenges associated with understanding what information is needed, where to find it and how to effectively use it. This notion is supported by the COAG Select Council on Climate Change, which states that those parties with a clear understanding of their climate change risks will be better placed to identify the actions necessary to manage the risks (COAG 2012b).

Current information and guidance do not appear to be meeting the requirements of some local governments, since the climate change-related data collection and analysis are ad hoc (Productivity Commission 2012). Furthermore, the inconsistent use of terminology and data-collection techniques, and a perceived lack of locally appropriate information have been put forward as challenges. Climate projections are currently only relevant at a national and to some extent regional level. The scale of the problem has not been made relevant at the local government level; however, efforts are underway in NSW to develop fine-scale climate projections to address this information gap (OEH 2012).

A national repository, possibly hosted by Geosciences Australia or the Bureau of Meteorology, has been suggested for climate impact-related data to be stored. This would be made available to state and local governments, with the ability for local governments and other agencies to upload and download data and information, such as audited or peer-reviewed data sets for flood mapping, sea level rise, etc. Hosting such a facility at the national level would avoid trans-boundary issues. An intergovernmental committee would determine the terms of reference of such a facility and the type of information to be made available. Such dependable and peer-reviewed data and information would underpin investment decisions and support internal business cases for sustainable infrastructure.

7. Make more effective use of existing government funds and develop new funds for adaptation, to ensure continuity in the implementation of the plans.

A consistent theme across all international and local literature, as well as being a key challenge raised by the study participants, is the resource constraints (financial and staff) faced by local governments in all states and territories, together with competing priorities within their diverse portfolio of responsibilities (Pillora, Blackburn & Artist 2009; LGSA-NSW 2010; Pillora 2010; Measham et al. 2011). However, many of these barriers are likely to be more significant in smaller and more isolated local councils, in comparison to larger urban councils. Areas with small and remote populations, together with vast infrastructure networks, are likely to find it difficult to resource adaptation activities.

The current funding approach at the federal level was viewed by participants as being piecemeal, without any systematic follow-through. Large, long-term adaptation projects that aren't available within local governments' own discretionary income should be federally funded on a priority basis. Further, investment in successful existing programs should be prioritised to carry it through to completion, and to avoid abandoning projects after the initial planning phase. In addition, grant funding should be used to build capacity among end-users who will be implementing outcomes at a local level.

Some participants were of the opinion that, through improved accountability and responsibility definition, funding had the potential to be used more effectively, with targeted focus and fewer overlaps. It was suggested that by framing adaptation as a sustainability risk, asset management under a changing climate could be addressed under existing budget and resources.

While recommendations and enabling actions are aimed at our primary end-users – that is, local government – it is recognised that these actions cannot be taken by this stakeholder group alone. Leadership at all levels will be needed to ensure that progress towards adaptation at the local level is achieved. A cooperative and collaborative approach is needed, in which joint recognition of the scale of the issue and its inherent cross-scale complexities is realised.

The research has demonstrated that many of the barriers or constraints to adaptation planning are interlinked, requiring a whole-of-government approach to adaptation planning. The research suggests a stronger role is required at the state and federal levels for adaptation to be facilitated and supported at the local level. This will not only benefit adaptation planning by local government, but will have wider implications for supporting adaptation within the private sector or amongst communities.

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APPENDIX A: STAKEHOLDER INTERVIEW QUESTIONS

SECTION A: General questions to set the context

- 1) What is your current role in adaptation planning with local government (LG)?
- 2) Can you describe any programs you have worked on that have helped LG adapt to climate change?
 - a) At what stage is the initiative: knowledge/planning/implementation complete?
 - b) What worked/or is working in this program?
 - c) What were/are some of the challenges/barriers you have encountered?

SECTION B: Questions to validate the research findings

As part of our research and in collaboration with local government and other relevant stakeholders, five cross-scale barriers to adaptation planning and implementation faced by local government have been identified. These include:

1. poor leadership from above,
 2. limited co-operative governance
 3. lack of information and knowledge,
 4. lack of definition of problem and planning,
 5. limited funding
- 3) From your experience, are there **any other key barriers** that may have been overlooked? If yes, please clarify.

SECTION C: Revisiting the barriers and causes

If I could now discuss with you how you may have experienced each of the barriers identified in the research.

- 4) For example, the barrier on 'poor leadership' was identified to be caused by:
 - No statutory obligations
 - Lack of ownership of the implications of CC impacts
 - Short political timeframes, agendas and cycles – which do not coincide with planning time frames, reluctance to make long term decisions
 - Lack of incentives to do now – rather defer cost to future office bearers or other arms of governance
 - No acknowledgement that the issues cut across all tiers of government
- a) What is your experience with this barrier in your work?
- b) What do you think is the critical cause of this barrier?
- c) What practical actions do you believe needs to be taken to overcome it OR how have you overcome it? By who? And what could or did get in the way?

- 5) The next barrier relates to limited co-operative governance and was said to be caused by:
- Poor communication between tiers of government
 - Inconsistent messages
 - Local decisions over-ridden by higher tiers
- a) What is your experience with this barrier in your work?
- b) What do you think is the critical cause of this barrier?
- c) What practical actions do you believe needs to be taken to overcome it OR how have you overcome it? By who? And what could or did get in the way?
- 6) The next barrier relates to lack of information and knowledge and was said to be caused by:
- No investment in the collection of data over the long term
 - Poor data sharing
 - Inconsistency of the available data and climate projections – lack of ‘certainty’ of the data and availability of the ‘latest’ data.
 - Scale of the problem has not been made relevant at the local government level
 - Misinformation by the media and strong industry lobby groups
 - New issue for some
 - Sceptics in some councils
 - In adequate training for engineers, planners and councillors
- a) What is your experience with this barrier in your work?
- b) What do you think is the critical cause of this barrier?
- c) What practical actions do you believe needs to be taken to overcome it OR how have you overcome it? By who? And what could or did get in the way?
- 7) The next barrier relates to lack of definition of problem and planning and was said to be caused by:
- Lack of guidance and consistent frameworks – planning and regulatory.
 - Unclear who’s role it is to plan
 - Legal responsibilities unclear
- a) What is your experience with this barrier in your work?
- b) What do you think is the critical cause of this barrier?
- c) What practical actions do you believe needs to be taken to overcome it OR how have you overcome it? By who? And what could or did get in the way?

- 8) The last barrier relates to limited funding and was said to be caused by:
- Prioritization of funds at different tiers of government, due to competing priorities, which is exacerbated by short vs long term agendas
 - Funding constraints at local government level for large capital adaptation projects, partly due to rate capping at state level.
 - Limited funding for RD and pilots
 - 'Cost' of already sunk capital in existing infrastructure that is now viewed as vulnerable under CC impacts.
- a) What is your experience with this barrier in your work?
- b) What do you think is the critical cause of this barrier?
- c) What practical actions do you believe needs to be taken to overcome it OR how have you overcome it? By who? And what could or did get in the way?
- 9) Of these five barriers discussed, which do you feel is the most significant and why?

SECTION D: Additional barriers

10)

- a) Are there any examples in which similar barriers have been worked through collaboratively in other areas of your work?
- b) What conditions were needed to make it work?
- c) Can these examples be applied to the adaptation context?

- 11) Often responses to specific environmental challenges have side-effects on other environmental, social and political goals (e.g. inappropriate building codes that don't account for climate change may also affect the health of communities).
- a) What do you believe needs to be done to avoid side-effects from some of the barriers identified in this research on other environmental/social issues your agency is addressing?
- b) What do you believe needs to be done so that the barriers identified in the research do not benefit particular agencies?

SECTION E: Deeper questions relating to conceptual framework

[Scale:]

12)

- a) What do you believe can be done to improve the level of vertical (e.g. between local-state-federal agencies) and horizontal (e.g. between local councils or local councils and LGSA) interaction between various stakeholders involved in adaptation planning?
- b) How practical do think these suggestions are?
- c) Would other agencies buy-in to these suggestion?
- d) Has this worked in another context? If so, please explain?

[Agency and Accountability:]

- 13)** What do you believe can be done to facilitate an equal distribution of power in decision making to balance different stakeholder interests in the multi-stakeholder context in which adaptation planning by local government occurs?

[Allocation]

- 14)** What do you believe can be done ensure that the system of allocation and access to resources (e.g. funding, information, data, technical capacity) for adaptation planning in your state is fair?

APPENDIX B: FULL LIST OF BARRIERS

The following table captures the results of the process to identify the barriers identified in Workshop One through a brain storming exercise.

Theme 1: Understanding

Politics/leadership	<ul style="list-style-type: none"> • Political environment • Election cycle • Leadership (corporate and political) • State agencies – lack of champions in some state agencies → lack of support for local government (LG). • Urgency of climate change action – tipping points, methane, etc. • Lack of responsibility/accountability – It's not my job/it's someone else's responsibility
Evidence/data	<ul style="list-style-type: none"> • Lack of two-way communication (with LG leaders/senior management) • Lack of data/information specific to local environment • Inconsistency of information/direction • Information/communication – scientific jargon/technical terms • Lack of regular 'big' environmental events e.g. big flood event in the Shoalhaven River • Disconnected communication about CCA between federal and state
Vested interest	<ul style="list-style-type: none"> • Pressure private sector/developers • Proliferation of misinformation • The media • Living in 'the Nile' – denial, sceptics, etc. CO₂ good.
Scale	<ul style="list-style-type: none"> • Lack of stakeholder interest • Myriad of stakeholders (no order) • It's too hard/too complex – business as usual • Scale of problem: climate change affects so much <ul style="list-style-type: none"> – Environment – Social – Cost and consequences, etc.
Resourcing	<ul style="list-style-type: none"> • Funding/resourcing • Poor LCC in asset management • Lack of proper resourcing (\$) Can't afford to be proactive
Legislation	<ul style="list-style-type: none"> • Legislative structure • Legislation i.e. standard instrument LEP template etc.
Timescale/uncertainty: Direction + authorities	<ul style="list-style-type: none"> • The lack of clarity and/or shared understanding of strategic intent of initiatives • The tendency for 'sustainability' to be a rag bag where initiatives are bundled rather than ordered • The 'junior-ness' of roles specifically authorised to develop climate change strategy • Silos with separate people working on the same problem • Who's responsible? – no clear mandate for LG to do it • Need to have a policy adoption giving go ahead for such action
Time scale/uncertainty: Cost funding methods	<ul style="list-style-type: none"> • Expense of adaptation • Typically short timeline for consideration of future council budgets e.g. one to five years
Timescale/uncertainty: lack of interest – internal	<ul style="list-style-type: none"> • Lack of interest: 'not my problem' – community, staff, councillors • Rate bare not applying pressure; minority showing interest

and external	<ul style="list-style-type: none"> • Belief that changes in climate can be managed as business as usual
Timescale/uncertainty: political cycle	<ul style="list-style-type: none"> • Elections: inability to make a decision before September • Short sighters – looking at short terms issue for elections purposes • The belief that the views of councillors on climate change cannot be challenged
Time scale/uncertainty: denial	<ul style="list-style-type: none"> • Denial! • Denial that there is likely to be an issue with climate • Sceptism of climate change by councillors/staff
Time scale/uncertainty: No local info	<ul style="list-style-type: none"> • Local data on impacts • Lack of regional specific information • No solid regional information showing climate has already changed

Theme 2: Planning

History(s)	<ul style="list-style-type: none"> • Historical decisions (zoning development ... etc.) • Lead/lag times to institute change • (...) of communities • Infrastructure 'the big stuff'
Options	<ul style="list-style-type: none"> • Identifying options • Adoption options: ID/Sell/Fund
Expertise and culture	<ul style="list-style-type: none"> • Disciplinary 'culture' difference e.g. engineers, planners, management, environmental staff • Expertise – capacity (in council) • Adaptation 'language' stifles/distracts ownership, responsibility, commitment to change original direction/culture
Frameworks	<ul style="list-style-type: none"> • Statutory regulatory requirements – e.g. LEP, BCA, Standard Australia • Inconsistencies of nation-wide level in planning laws/models/templates • Identifying process or methodology to do planning • Inflexible/'one size fits all' state planning templates – no allowance for contextual differences • Lack of local implementation direction (good strategies) • Consistency across scales to boundaries
Legal	<ul style="list-style-type: none"> • Legal challenges by developers (with deep pockets) to CC scenarios e.g. sea-level rise model • Liability
Funds	<ul style="list-style-type: none"> • Obtaining funding commitment to resource
Defining pros: acceptance	<ul style="list-style-type: none"> • When to start • What is the hazard – what is the risk? • Defining objectives for study plans • Deciding what is the procedures
Community interest	<ul style="list-style-type: none"> • Consultation and engagement • Vested interests; change sceptics • Generating interest – urgency or need for adaptation • Getting enough community engagement • How to engage community
Guidance and regulation (political will)	<ul style="list-style-type: none"> • Inability to back zone • Lack of political will to implement environment protection overlays • Standard template restricts zonings e.g. no flood zones, no local clauses • State government DoP doesn't have a clear enough guidelines in LEP to include climate change info

	<ul style="list-style-type: none"> • LEP/DCP Lack of council input into guidelines • Biodiversity + water clauses are useless – set up to fail. Impossible for assessing officers to retain vegetation using these clauses • Council worried about back lash from land owners if they flag ‘at risk’ properties – lack of protection from state + feds • Can’t put building hazard lines in the LEP – only the DCP (which can be overturned). WEAK • Fear of litigation in realising SLR information • Standard LEP is Sydney based – doesn’t cater for regional issues
Values/education	<ul style="list-style-type: none"> • Manager of infrastructure assets doesn’t believe in climate change and doesn’t attend meetings • Perceived need to grow business in LGA, therefore weaker planning control
Operation	<ul style="list-style-type: none"> • Lack of LIDAR info to inform mapping for planning • No effective engagement with community as to needs • Lack of funding to do studies to inform planning • SES is situated in a flood zone • Emergency service data can’t be utilised in our GIS system – wrong format (technical)
Behavioural	<ul style="list-style-type: none"> • CCA planning often conflicts with individual interests • Planning department not interested in environment issues, especially not sea level rise • Absence of unifies direction/needs • General sense that GC is too political and our data shouldn’t be related to public • Myriad of competing pressures: population, economic, environmental ... etc. • Strategic planners and assessment teams lack of communication (assessment under time pressure, therefore little thought for the future)

Theme 3: Implementation

Community engagement	<ul style="list-style-type: none"> • Finding act. Climate proof, residential land • Confusion in general population regarding climate change and long term risks
Mandating	<ul style="list-style-type: none"> • Legislative restrictions (council can only do so much) • Lack of directory guidance from a state level • Seen as global, national, or state issue – not local
Prioritising/short term with long term	<ul style="list-style-type: none"> • Higher short term priorities • Competing priorities (budgetary) • Time lag in being implemental through management plans • Financial cost beyond capacity • Lack of cost-benefit/financial analysis tools • Sunk investments; too much invested in the status quo • The ‘future’ nature of problem for people not as processing as ‘now’ problems • Temptation to place implementation in too-hand booklet
Funding/council capacity/strategy resources	<ul style="list-style-type: none"> • Funding availability • Funding limits • Lack of capital • Social vs. environmental benefits e.g. seawalls • Staffing limits • Insufficient staff to deal with it

	<ul style="list-style-type: none"> • Inertia of staff with little interest • Lack of council capacity e.g. to gather relevant data • Lack of engagement with/of our strategic planners • Silos within council can reduce implementation capacity • Fear of change/decision paralysis • Uncertainty as best way to proceed • Certainty of projections? (design/capacity)
Political will/social licence	<ul style="list-style-type: none"> • Political resistance by vested interests • Willingness to act (politically) • Politicisation of climate change • Day-to-day political pressures • Planning pressures • Community disinterest • Lack of engagement of key stakeholders • Community antagonism (e.g. urban retreat) • Lack of community and councillor knowledge
Floating barriers	<ul style="list-style-type: none"> • Climate change scepticism • Media support of climate change scepticism • Scepticism about capacity to change • Uncertainty/scepticism about science • Difficulty of communicating connections between what we do now and the consequences • Lack of information – e.g. on impacts • Who pays?
Leadership	<ul style="list-style-type: none"> • Local governments aren't the lead agency → not their jurisdiction • Lack of leadership internal • Uncertainty of need to act vs. certainty (seawall raising vs road repair)
Land zoning	<ul style="list-style-type: none"> • <u>Barriers imposed by an anti-sustainability land use planning system</u>
Knowledge	<ul style="list-style-type: none"> • Lack of accurate info on risks • Climate scepticism • Permitting poor reporting of climate science e.g. Lord Monkton • What are we monitoring? • Monitoring: Establishing a baseline • Monitoring: Quantifying CCA actions → reduce risks? • Lack of methods to prioritise options (where do we start)
Systems	<ul style="list-style-type: none"> • Internal system change • Dominance of council finance department in decision making • Silos demarcation
Resources	<ul style="list-style-type: none"> • Competing need for resources • Lack of resources for implementation both financial and human
Money	<ul style="list-style-type: none"> • Lack of allocated funding • Financial budget • Weak power of LCI in terms of fundraising and autonomy to legislate for local conditions
Priorities	<ul style="list-style-type: none"> • Competing priorities • Time competing activities workload
Political	<ul style="list-style-type: none"> • Political agendas • Lack of political will (implementation projects get rejected at budget time) • Influence of party politics on the local level of decision making • Councillors with vested interest in status quo

APPENDIX C: FULL LIST OF UNDERLYING CAUSES

The following table captures the results of the process to identify the main causes for the key barriers identified in the previous activity. The causes below are all the causes listed by the group as they worked together collectively. The critical causes nominated by the groups have been highlighted in bold.

Barriers	Causes (Why?)
Politics/leadership	<ul style="list-style-type: none"> • Short election cycle • No obligation to maintain/implement/stick with long term plans • No statutory obligations • No accountability, poor performance measuring • Lack of incentives • Conflicting vested interests • Democracy
Evidence/data	<ul style="list-style-type: none"> • Investment in collection of data over the long term • Not long enough data sharing – IP and state agency secrecy. • Inconsistency in data / info scale etc. • Media – misinformation • Resources
Scale	<ul style="list-style-type: none"> • Number of stakeholders • All encompassing • Too big – paralysing • Communication strategies not working • National / global / state wide issue being managed locally
Timescale/uncertainty/variability	<ul style="list-style-type: none"> • Regulation – Political (short) cycles versus planning cycle (long, evidence based) • Adversarial versus consensus politics (value based) • Defer costs to future – intangible returns
Lack of guidance frameworks (related to regulation, legislation and methodology)	<ul style="list-style-type: none"> • Climate change is a recent/new issue(s) so understanding of it is not embedded in people's cognitive maps • Ownership of issue(s) is not determined in planning/legal/statutory frameworks (i.e. motherhood statements versus local, practical, well-resourced implementation frameworks) • Lack of communication between local government and both the fed/state • Minority government • Strong industry voice (e.g. mining lobby, Farmers' Federation, Coles and Woolworths); political will
Defining problems/identifying options	<ul style="list-style-type: none"> • Timeframes/timescales often outside of: <ul style="list-style-type: none"> – councillors' views/election cycles – management performance accountabilities – regulatory framework ; ability to change/consults/achieve, legal change – method of determination –'hazard', community engagement
Historical (development, infrastructure, cultural values and education)	<ul style="list-style-type: none"> • Previous planning decisions/infrastructure/training of professional disciplines determines 'currency' • Already exists (and has life of 20 years plus – e.g. roads, footpaths) • Training areas for engineers/planners/architects don't feature climate change let alone adaptation

	<ul style="list-style-type: none"> • Cultural expectations (egocentric) • Religion • Mass media misinformation • Competing interests • Climate change fatigue/apathy • Threat to Australian prosperity (i.e. resource base and Australian cultural identity)
Prioritising long-term and short-term balance	<ul style="list-style-type: none"> • Lack of long term investment funds for change (at federal, state and local levels) • Lack of tools for assessing short vs Long term benefits/costs and risks • Short term nature of politics • Lack of funding leads to short term focus
Low council funding and staff capacity Funding	<ul style="list-style-type: none"> • High cost of capital works • Lack of data (providing certainty), designs and solutions • Lack of recognition in the federal constitution • Rate capping at state level • Competing priorities • Lack of funding for capital works • Lack of funding for innovative research and pilots • Lack of holistic view of expenditure across services and departments
Political will and social licence for change	<ul style="list-style-type: none"> • Lack of community engagement • Competing vested interests • Lack of legislative strength • Competing priorities • Short term political cycle and short term agendas • Media coverage • Risk averse councils • Noisy minority • Ignorant politicians • Reactive rather than strategic planning • Competing political system • Inconsistency between federal-state-local levels of government • Lack of cooperation between councils and levels of government
Lack of knowledge	<ul style="list-style-type: none"> • Keeping up to date (confusion with too much information) • Credibility of models and researchers in question • Misinformation through social media, radio & newspapers.

APPENDIX D: FULL LIST OF ENABLING ACTIONS FOR CONSIDERATION

A. Improved co-operative governance, co-ordination and communication:

Enhance collaborative planning between all three levels of government to provide clear leadership

- Establish an intergovernmental adaptation forum with relevant representatives from all three levels of government (eg. local, state and federal government). This could be coordinated at the state level, with the same Commonwealth representative sitting on every state's forum designed to shape national planning framework with clear roles and responsibilities.

Establish workable and proven inter-agency mechanisms (cross jurisdictional) to improve co-operative governance at state level

e.g. local government and state planning departments,

- Shape state planning framework with clear roles and responsibilities
- Provide clarity on roles and responsibilities
- Investigate existing or alternate mechanisms/groups
- Take advantage of informal networks across governments

Utilise or establish new effective regional mechanisms/groups and initiatives to co-ordinate strategic regional planning, approaches and information

- e.g. ROCs, RDAs, CMAs, LGSAs
- Establish and maintain a publications library/ database
- Establish a directory service for adaptation to find relevant staff in different agencies/councils, etc.
- Progress beyond the fragmented decision making through a commitment to regional strategic planning.

Identify and support climate change champions at all levels of government

B. Better understanding and use of information and knowledge:

Provide a clearer understanding of knowledge needs and sources amongst stakeholders

- Knowledge providers meet the needs of stakeholders to guide decisions
- Government roles and responsibilities are clarified to assist decisions
- Implement institutional capacity building initiatives

Improve evidence to support business/ investment decisions

- Monetary value of adaptation options & interventions recorded (acknowledge that engineering options are not always the best)
- Establish M&E criteria
- Clarify the accountability of/for decision makers to achieve more rigor in decision making
- Determine minimum types, scale, specificity of information requirements underlying decisions
- Sharing of lessons on a national scale, tracking what is happening for continuous learning
- Guidance material and resources developed centrally for LGs
- CCA Audit tool to assess if CCA plans will deal with future requirements OR a self-assessment mechanism to help councils know where their focus is

Establish a central mechanism for data management and sharing

e.g. establish a new state or federal coordinating body such as an 'Adaptation Office' to facilitate knowledge sharing and funding. This would be responsible for considering:

- Consistent Information
- expertise and information gaps

Create more opportunities for councils and states, to share their data with each other

C. Frameworks for problem definition and planning:

Ensure a consistent CCA framework at state and national level (policy/legislation)

- Legislative reform process, creating new legislation
- Reaching political consensus across all levels of government
- Redefining the role of COAG
- Develop a 'target to shoot for' – a coordinated and stepped approach to guide CCA planning

Build community consensus on a shared understanding of the seriousness of climate change and the need to act

- Implement widespread education of climate change impacts and adaptation across the community
- Develop coordinated education campaigns targeting all sectors of society
- Ensure a consistent message from all tiers of government

Mainstream adaptation

- Flexibility within government (adaptive planning)
- Incorporating uncertainty in planning and operation
- Collaboration between sectors and government departments around planning and implementation

Make adaptation fair and equitable

- Encourage participatory decision making (genuine engagement and community participation, accountable, etc.)
- Creation of an 'Adaptation Watchdog' (an independent body), ensuring economic, social, cultural equity in adaptation decision making

D. Adequate resources to plan and implement responses

Make more effective use of existing government funds

- Tracking where money is currently spent now to service our values and economy
- Focus on re-allocation of funds rather than new money (e.g. focus on public goods like width of beach rather than sea walls for private property)
- Rationalising/bringing together small 'pots of money' into a bigger fund
- Ensuring Regional Development Agency funding includes climate adaptation criteria

Support local councils to develop their own business case for investment in the future

- Councils should develop budgets for implementation in their own right
- State and Federal funding should supplement local government commitments
- Relieve the technical capacity shortage for planning and implementing CCA

Develop new funds for adaptation

For example:

- Link up with carbon tax e.g. take 5% and invest in adaptation,
- Set up a 'Future fund' for adaptation,
- Special levies to recover costs of adaptation – e.g. coastal infrastructure works
- State policy currently provides the mechanism for raising funds and there are restrictions on this for rates and special levies. State government should provide approval for local governments to raise funds independently.

Encourage higher use of insurance

- Private insurance to reduce costs for councils after a natural disaster/legitimate risk management/preventative measure can reduce premiums.

APPENDIX E: FIVE CASE EXAMPLES

1. Lake Macquarie City Council
2. Western Australia: Peron Naturaliste Partnership
3. Cairns Regional Council
4. Tasmania: Regional Climate Change Adaptation Project
5. Penrith City Council

Case 1: Lake Macquarie City Council

Brief description of the Impacts and responses:

The City of Lake Macquarie is a local government area located in the southern suburbs of Newcastle in NSW. Its population of 200,000 resides on the shores of Lake Macquarie which is a large coastal lake covering 112km² (Giles & Stevens 2011). Assessment of the impacts of sea level rise (SLR) indicated 9800 properties to be at risk of inundation or flooding with a 0.9m rise in sea level (NSW Department of Planning 2008), which is the projected increase in 2100 and the benchmark used in the NSW state government's Sea Level Rise Policy (DECC 2009). The NSW government benchmark is for a 0.4m rise in mean seal level by 2050 (Cardno 2010). Lake Macquarie City Council (LMCC) is beginning to plan for future risk now to avoid significant losses in years to come. LMCC responded early by adopting its Sea Level Rise Policy and Action Plan in 2008, and also integrating SLR concerns across its planning portfolio.

State: NSW

Stage in the process:

Understanding

Planning

Implementation

Barriers encountered:

Lack of political leadership from higher tiers of government - i.e. no champions	
Lack of evidence and data related to climate change vulnerability	
Spatial scale of the problem - the issues are global and multi-level	X
High uncertainty associated with large time scale and extreme variability	X
Lack of guidance frameworks (related to regulation, legislation and methodology)	
Poor definition of the problems and therefore difficulty in identifying options	X
Historically entrenched development, infrastructure, cultural values and education	X
Difficulty in balancing long-term and short-term priorities	X
Lack council funding and low staff capacity to plan and implement responses	
Lack of local political will and social licence for change	
Lack of knowledge of climate impacts, tools and monitoring	

Causes across levels of government:

The significant progress LMCC has made in its response to climate change impacts, particularly SLR, has not come without challenges. At the federal, state and local government levels, SLR regulations are contained in numerous policies and guidelines (Giles & Stevens 2011), presenting a highly complex legislative landscape within which to operate.

While the NSW coastal planning and protection legislation and guidelines have assisted by identifying planning levels for SLR adaptation, LMCC notes that *'The experience in Lake Macquarie shows the NSW planning framework can be a significant barrier to good adaptation'* (Giles & Stevens 2011, p. 9). Standard planning instruments such as Local Environmental Plan (LEP) templates have presented barriers to LMCC by lacking flexibility to include risks, complexity and unique needs associated with SLR and coastal zone management.

At the state level, intentions to reduce unnecessary bureaucracy have resulted in the state Environmental Planning Policy (SEPP) for 'Exempt and Complying Development', which removes the need for Development Applications for low hazard areas (DCCEE 2011b). LMCC notes the

need for local government to ensure this does not undermine its ability to control development and impose restrictions on development relating to SLR (Giles & Stevens 2011).

Causes of additional cross-scale barriers relate to financial challenges faced by local governments as a result of rate-capping and cost-shifting of government budgets, with local government now paying for services previously covered by state government (Giles & Stevens 2011). This relates to challenges associated with timescales, given the most severe SLR impacts are most likely to manifest post-2050. Planning and financial allocations at these timescales can be difficult to justify given short term pressures and needs within local governments.

Timescale challenges also relate to the planning horizons of council, and the need to balance development opportunities with safeguarding current and future development against projected climate change impacts. Uncertainty relating to exact SLR projections has led to media reports that have highlighted the discrepancy between historic SLR and projected SLR (Cubby, 2012a). The NSW state government is reviewing its SLR Policy, which may complicate LMCC's ability to enforce its local approach to SLR.

Overcoming the barriers:

LMCC was able to overcome the complexity of the legislative landscape by strategically ensuring compliance against relevant legislative instruments. For example, limitations of LEPs were overcome by engaging a flexible approach and working with a range of planning templates to ensure SLR requirements were included. More specifically, given the limitations of the standard LEP template (e.g. it removes coastal development zones), LMCC used the 'E3 Environmental Management Zone' template to ensure inclusion of the coastal zone. This was not considered completely satisfactory given the latter's exclusion of the unique nature of the coastal zone (Giles & Stevens 2011).

LMCC is also actively engaged across a number of climate change adaptation projects, including with the Hunter & Central Coast Regional Environmental Management Strategy (HCCREMS) in a Department of Climate Change and Energy Efficiency-funded project to develop a decision making framework focusing on vulnerable coastal communities. LMCC is also undertaking coastal hazards assessments and related coastal planning. Other internal projects include a soft engineering project ('Adaptation by Design') and local area plans for vulnerable areas developed in consultation with residents and infrastructure agencies.

Other comments:

LMCC has been subject to political backlash by a network of local residents who have challenged the scientific and policy basis for council's SLR policy. A local developer has threatened to sue council and has sponsored a public meeting addressed by scientists who challenge conventional climate science, some with linkages to well-funded climate change sceptic organisations in the United States (Cubby 2012b). These challenges, and council's defense of its policies, have been prominently covered in the Newcastle and Sydney Morning Herald newspapers and highlight how local issues and challenges may have global interactions (Cronshaw 2012).

Acknowledgements

Researchers would like to thank Sustainability and Integrated Planning staff at Lake Macquarie City Council for their time in contributing to this case example.

Case 2: Western Australia: Peron Naturaliste Partnership

Brief description of the Impacts and responses:

Observed changes in weather patterns and climate change projections for the south-west of Western Australia are well documented, and there is a high degree of consensus amongst the global climate models that the relatively abrupt recent reduction in rainfall in the region is a result of anthropogenic climate change (Climate Commission 2011). Sea level rise in the region is predicted to be higher than the global average, with observational trends indicating an increase of 7.4 mm/yr between 1990 and 2010, compared to a global average of 3.1 mm/yr between 1993 and 2003 (Climate Commission 2011). In response to these and other climate change projections for the area, and coupled with the region's inherent vulnerability to erosion and inundation, nine local governments (Bunbury, Busselton, Capel, Dardanup, Harvey, Mandurah, Murray, Rockingham and Waroona) between Cape Peron and Cape Naturaliste have responded collectively via a regional approach called the Peron Naturaliste Partnership (PNP). The PNP's current project, 'Developing Flexible Adaptation Pathways for the Peron Naturaliste Coastal Region of Western Australia 2011–2012' has received state and federal support (via the Coastal Adaptation Decisions Pathways Project (CAP)) to provide an economic assessment of regional adaptation responses, and to demonstrate such options at the local scale.

State: WA

Stage in the process:

Understanding

Planning

Implementation

Barriers encountered:

Lack of political leadership from higher tiers of government – i.e. no champions	X
Lack of evidence and data related to climate change vulnerability	
Spatial scale of the problem – the issues are global and multi-level	
High uncertainty associated with large time scale and extreme variability	
Lack of guidance frameworks (related to regulation, legislation and methodology)	X
Poor definition of the problems and therefore difficulty in identifying options	
Historically entrenched development, infrastructure, cultural values and education	
Difficulty in balancing long-term and short-term priorities	X
Lack council funding and low staff capacity to plan and implement responses	X
Lack of local political will and social licence for change	X
Lack of knowledge of climate impacts, tools and monitoring	X

Cross-scale causes:

Local governments are faced with a range of issues requiring intervention, with adapting to climate change emerging as an additional challenge given capacity constraints in terms of technical knowledge, financial and human resources. There remains a lack of guidance frameworks for climate change adaptation interventions from the state and federal level in terms of relevant policies and plans to assist in the implementation of local, effective adaptation initiatives. It is for this reason that Local governments must devise strategic ways to address local needs both in the short and longer terms.

Along with the state Department of Transport (which has responsibility for the management of the coastal zone in Western Australia), the West Australian Local Government Association (WALGA) supported the PNP and its application for CAP funding. WALGA has since withdrawn this support, given competing priorities and limited capacity. This demonstrates the difficulty in prioritising climate change adaptation and related initiatives, and the limited capacity for emerging challenges such as climate change.

Lack of political will (at the state and federal level) is seen as another cause to several barriers in the above table. If climate change adaptation is not prioritised appropriately within state policies and planning regulations, it becomes a greater challenge for local governments to develop, implement and enforce initiatives, with no regulatory framework to base its local approach.

Overcoming the barriers:

The PNP was established to overcome these and other barriers, by providing a regional approach and a stronger voice to advocate for change at the local government level. Smaller local governments within the PNP with less capacity and less progress towards developing adaptation plans gain the skills, knowledge and learnings from more experienced councils. More experienced councils gain from the regional approach via their access to further information and local knowledge across the region, and with the increased momentum and benefits from positively influencing practices in neighbouring local government areas. The regional approach provides a stronger case for funding, given the scale at which outcomes will be relevant and benefits are shared.

West Australia's State Planning Policy (SPP – 2.6) is currently under review, with submissions open until the end of May 2012. The PNP's regional approach provides an effective avenue to advocate more strongly for appropriate planning controls and guidelines, with the impacts of climate change on the local region in mind. The regional approach taken with the PNP is an approach in itself in overcoming the challenges local governments face in adaptation planning and implementation. By amalgamating local councils into one partnership arrangement with common goals and objectives, issues associated with a lack of voice and visibility are (in part) addressed.

The PNP's visibility and progress to date has also been assisted by the progressive and well-connected nature of several of the Mayors in the partnership. Some of the PNP's mayors are represented on relevant taskforces and roundtables (e.g. National Sea Change Taskforce), allowing the PNP's voice to be heard in related forums and gaining further momentum outside the realms of the PNP and its CAP project.

Given the lack of frameworks and guidelines at the state and national level, the PNP provides a 'best shot approach', and a learning-by-doing method that is assumed to be better than nothing. The PNP's active project aims to acknowledge and identify gaps, and work within the time and budgetary constraints of the CAP project to produce an output that is transferable to other regions. It is hoped that learnings from this and the other CAP projects can be shared to develop an approach to local government adaptation that is grounded in best practice.

Other comments:

Although the PNP's Memorandum of Understanding (MoU), upon which the partnership is based, states that a collective regional voice is a useful mechanism to drive change, arriving at an agreed perspective on some issues has proven difficult. Some individual councils within the PNP have been reluctant to sign off on regional approaches, such as the SPP submission process. This illustrates that while a regional approach can be beneficial in some situations, there are times when individual views from councils are prioritised.

Acknowledgements:

Researchers would like to thank Joanne Ludbrook (PNP) for her time in contributing to this case example.

Case 3: Cairns Regional Council

Brief description of the Impacts and responses:

Cairns Regional Council initiated a climate adaptation risk assessment as part of the Local Adaptation Pathway Program (LAPP) funded by the federal government. The key climatic impacts projected for the Cairns region included an increase in the number of tropical cyclones in the more intense categories (3–5), inundation from sea level rise and change in rainfall patterns. An Adaptation Action Plan was developed as a result with 47 actions documented. These actions fell into the following categories: Corporate Governance, Land Use Planning and Development, Assets and Operations, Natural Disaster Planning and Response, Environment and Community Health. Following this report, council developed a Climate Change Strategy to consolidate council's climate change response under leadership, mitigation, adaptation and transition. This Strategy was adopted by council in August 2010 and comprises 70 actions which attribute associated responsibility. Since its adoption council has been working on the implementation of these actions.

Council has made the most significant progress on strategy actions within the Leadership and Mitigation section of the Strategy. Notably climate change has been included in the Corporate Risk Register with mitigation strategies and have ensured it is considered in Core Asset Management Plans for future technology changes. It is estimated that an annual budget of \$700 000 is needed to fund the implementation of actions.

State: Queensland

Stage in the process:

Understanding

Planning

Implementation

Barriers encountered:

Lack of political leadership from higher tiers of government – i.e. no champions	
Lack of evidence and data related to climate change vulnerability	x
Spatial scale of the problem - the issues are global and multi-level	x
High uncertainty associated with large time scale and extreme variability	x
Lack of guidance frameworks (related to regulation, legislation and methodology)	x
Poor definition of the problems and therefore difficulty in identifying options	x
Historically entrenched development, infrastructure, cultural values and education	x
Difficulty in balancing long-term and short-term priorities	
Lack council funding and low staff capacity to plan and implement responses	x
Lack of local political will and social licence for change	
Lack of knowledge of climate impacts, tools and monitoring	

Causes across levels of government:

Evidence/data related to climate change vulnerability and timescale/uncertainty: Climate change scenarios produced by the state and federal governments are often inconsistent, which constrains the adaptation planning decisions of council e.g. sea level rise scenarios. These inconsistencies influence the time horizon on which adaptation is to occur; communities look to council for guidance and leadership as to when the projected changes are likely to occur and when best to adapt. Council could be liable if incorrect projections are used.

Scale and lack of guidance frameworks: There is no consolidated policy response to adaptation from the federal level, which has led to inconsistent adaptation planning regimes across the states. Policies constantly change, and it is difficult for councils to keep abreast of. For example, the introduction of the new Queensland Coastal Plan requires coastal areas at risk to storm tide inundation to develop adaptation strategies for high hazard areas. However, there is little guidance as to how to develop this or who is to pay for the implementation of such strategies.

Historical (cultural values): Residents have experienced extreme weather by living in the Cairns region – e.g. tropical cyclones and flooding – so people are often desensitised about climate change impacts. As a positive this means residents in the region are potentially more prepared for extreme weather and seasonal climatic variability however less likely to think climate change is a big deal.

Funding: Local governments require greater support from the state and federal government for the implementation of adaptation actions regarding land use and planning.

Overcoming the barriers:

In overcoming the inconsistencies in climate scenarios, particularly around sea level rise (SLR), Cairns Regional Council adopted SLR scenarios produced by the Queensland government rather than national averages. In doing so, council is abiding by Statutory measures set by the state government which reduces risk of future litigation. Council is an active member of the Queensland Coastal Councils Taskforce (C-CAT) establishment committee which brings together coastal councils across Queensland to identify common risks, barriers and needs. It enables councils to work collaboratively on shared issues. This committee will assist councils in overcoming problems around inconsistent climate data and will play an advocacy role for consistent adaptation planning regimes. The committee has been a valuable forum to discuss the implications of the new Queensland Coastal Plan for many of the councils. One positive outcome will be the participation in a pilot project to examine the key concerns related to the Coastal Plan in which the findings will be shared amongst the group of councils.

Council has taken a proactive role in seeking funding from both external and internal sources to assess climatic risks and implement adaptation actions. Funding through the LAPP program enabled a climate change risk assessment and adaptation action plan as a priority issue for council. Since this initial assessment council has been increasing its own staff capacity to address climate change, particularly to contextualise adaptation at the council level and to become less reliant on consultants. Up until now council has had two full-time equivalent staff working across issues of climate change and sustainability. It has recently increased to three.

While developing the Climate Change Strategy, council staff built relationships with other councils within the region and also researched other local government Climate Change Strategies in other states and overseas. This ensured that council built on past experience and lessons learnt elsewhere. Communication is seen as paramount to successful outcomes with regards to climate change, both internally and with external stakeholders. Internally council has ensured its Executive team and managers are informed and involved in the governance for such projects. Currently, council is working on establishing a reserve from its capital budget to finance its climate change related actions. Council has recently established a Climate Change and Sustainability Grant stream to fund local organizations to undertake projects in order to build resilience in the community.

Other comments:

In adopting and implementing a Climate Change Strategy, Cairns Regional Council is acknowledging the risks to the region as a result of climate change. It has adopted the strategy as a leadership response to an important issue. While the Strategy has been adopted, council recognizes the need for a multi stakeholder response to barriers for adaptation strategies especially with regard to land use planning. The adaptation actions within the Climate Change Strategy pose the greatest challenge for council.

Acknowledgement:

The researchers would like to thank Maree Grenfell (Cairns Regional Council) for her contribution.

Case 3: Regional Councils Climate Change Adaptation Planning

Brief description of the Impacts and responses:

The southern region of Tasmania presents a diverse landscape, which fundamentally influences the social, economic and cultural welfare of the population. It is the largest and most densely populated of Tasmania's three regions with a population of 252 543, or 50% (ABS Nov 2011) of the total Tasmanian population. It comprises 12) local government areas: Brighton, Central Highlands, Clarence City, Derwent Valley, Glamorgan Spring Bay, Glenorchy City, Hobart City, Huon Valley, Kingborough, Sorell, Southern Midlands and Tasman. The impacts of climate change are projected to vary across the region, reflecting the diverse council areas the project covers. These include: coastal erosion and inundation from sea level rise and storm surge, increased severity and intensity of droughts and floods impacting both rural and urban areas, and impacts to coastal tourism. The Regional Climate Change Adaptation Project (RCCAP), initiated in 2011, is a partnership with the 12 Southern Tasmanian Councils to address climate change adaptation at both the local and regional level.

The project, which was due for completion in April 2012, is complemented by the following key project outputs: Council (corporate) Climate Change Adaptation Plans (CCCAP) for each of the 12 southern councils; a Regional Climate Change Stakeholder Report, a companion document to the CCAP's and the Strategy; and a Climate Change Adaptation Toolkit for review of Council's Climate Change Adaptation Plans and extension to Cradle Coast and Northern Regional Councils. RCCAP was funded by the Australian government's Local Government Reform Fund (LGRF), which is administered by the Department of Regional Australia, Local Government, Arts and Sport. The Hobart City Council also provided a financial contribution of 20% of the overall project funds. The project is being delivered by the Southern Tasmanian Councils Authority (STCA) in partnership with the Tasmanian Climate Change Office and the Local Government Association of Tasmania.

State: TAS

Stage in the process:

Understanding

Planning

Implementation

Barriers encountered:

Lack of political leadership from higher tiers of government – i.e. no champions	X
Lack of evidence and data related to climate change vulnerability	
Spatial scale of the problem – the issues are global and multi-level	X
High uncertainty associated with large time scale and extreme variability	X
Lack of guidance frameworks (related to regulation, legislation and methodology)	X
Poor definition of the problems and therefore difficulty in identifying options	X
Historically entrenched development, infrastructure, cultural values and education	X
Difficulty in balancing long-term and short-term priorities	X
Lack council funding and low staff capacity to plan and implement responses	X
Lack of local political will and social licence for change	X
Lack of knowledge of climate impacts, tools and monitoring	X

Cross-scale causes:

Many of the barriers listed above have been experienced during different stages of the project and were often catalysed through the interaction of a few key barriers. The barrier related to climate data and evidence was not experienced as the Antarctic Climate and Ecosystems CRC Climate Futures for Tasmania (CFT) project had modelled climate impacts under an A2 and B1 scenario across the state at 1 degree (14 km²) intervals. The project engaged CFT to produce a regional and municipal area climate change profile/s, The state government subsequently engaged CFT to produce these for the other regions. These profiles, which examined 147 climatic variables, were a valuable data set that informed the risk assessment stage of the project. The local evidence based data also contributed to overcoming negative perceptions and uncertainty surrounding climate change by various stakeholders involved in the project. While the CFT climate profiles have been released by the state government it has not been formally endorsed which leads towards an additional 'political barrier' in that potential liability rests with local government for operational decisions related to climate change adaptation. A further barrier was the lack of adaptation frameworks specific to local government that encompass the whole process of adaptation – i.e. from planning to implementation. The lack of frameworks meant that some of the risk assessment processes were not informed by appropriate stakeholders. For example when it came to ranking and assigning responsibility for adaptation actions, the project would have benefited by having executive level staff who have authority to make key decisions and are responsible for funding within council rather than operational/ technical staff. The lack of leadership from the federal and state governments and inconsistent messaging on climate change meant that some members within the partnership remained sceptical about climate adaptation and its real benefits. This was also shaped by the type and quality of climate information that was accessible to the diverse councils to inform adaptive decision making – e.g. rural versus urban councils.

Overcoming the barriers:

It is often intimidating for councils to plan for adaptation alone, particularly given the multi-scale nature of adaptation in which successful planning at the local level is contingent on efforts across other spheres of government. The RCCAP was an approach whereby this was overcome through the partnerships that were built both horizontally across the 12 councils as well as vertically across state agencies to facilitate cross-scale coordination and sharing of knowledge and skills. Cross-scale barriers particularly related to uncertainty about climate information and climate scepticism was alleviated through the peer-pressure created by partnership members and the funding from the state level re-confirmed the significance of adaptation planning. The RCCAP partnership approach not only addressed common regional vulnerabilities but the development of Corporate Climate Change Plans ensured risks specific to each council was not overlooked. To provide greater weight to the adaptation issue and to steer adaptation, the RCCAP also developed a Climate Change Adaptation Policy for all the 12 councils to adopt as part of their Corporate Plans.

The RCCAP has set the standard for adaptation planning for the rest of Tasmania. In the absence of context specific adaptation frameworks, the RCCAP partnership developed their own methods of risk assessment and prioritisation adaptation options. The methods cut-across various biophysical and social stressors that the 12 councils were projected to experience under changing climate. Climatic impacts were contextualised in order to identify practical adaptation actions; questions were asked around what the impacts were for the council's key business areas and who are the key stakeholders, how does climate change impact on council's roles and responsibilities. A key outcome of this process will be the development of a step by step toolkit

comprising spreadsheets and templates for adaptation planning tailored Tasmanian Councils. Additionally this toolkit benefits from the fact that it has been piloted and validated to some extent through the experience of the 12 councils. The state government has provided funding recently to the RCCAP to pilot the toolkit amongst four other councils in Tasmania.

Acknowledgements:

The researchers would like to thank Katrina Graham, Joint Project Manager, Regional Councils Climate Adaptation Project and Hobart City Council for her time in contributing to this case example.

Case Example 5: Penrith City Council

Brief description of the impacts and responses:

In 2009, the Penrith City Council, an urban council in Western Sydney, engaged consultants to undertake a climate change risk assessment and adaptation planning project. The project engaged stakeholders from both within and external to council, in order to first identify the risks presented by climate change for the Penrith region, prioritise those risks, and then identify and evaluate measures to manage those risks. As a result of this process, a total of 59 risks were identified and prioritised, and a Draft Adaptation Action Plan incorporating strategies to manage those risks was developed. Increased incidence of heatwaves, increased rainfall intensities and increase incidence of bushfires were identified as the key impacts of council's services and communities. Since the development of the Draft Adaptation Plan, council has recognised that many of the strategies identified interact with broader sustainability goals of the organisation, and is now taking the approach of incorporating these strategies into the redevelopment of its broad scale sustainability plan.

State: NSW

Stage in the process:

Understanding

Planning

Implementation

Barriers encountered:

Lack of political leadership from higher tiers of government – i.e. no champions	
Lack of evidence and data related to climate change vulnerability	X
Spatial scale of the problem – the issues are global and multi-level	X
High uncertainty associated with large timescale and extreme variability	X
Lack of guidance frameworks (related to regulation, legislation and methodology)	X
Poor definition of the problems and therefore difficulty in identifying options	
Historically entrenched development, infrastructure, cultural values and education	
Difficulty in balancing long-term and short-term priorities	X
Lack council funding and low staff capacity to plan and implement responses	X
Lack of local political will and social licence for change	
Lack of knowledge of climate impacts, tools and monitoring	X

Cross-scale causes:

Evidence/data related to climate change vulnerability: There is limited locally relevant information to inform the risk assessment and adaptation planning process, and very little information is shared from the state agencies.

Scale: The sheer size of the issue and the breadth of impacts make it difficult to address. In turn, responses are difficult to implement due to the number of stakeholders involved and their various roles. Many of the adaptation strategies are contingent upon the cross-scale coordination efforts of various stakeholders.

Timescale: The breadth of the impacts also creates a barrier in terms of monitoring adaptation activities as they are not always 'labelled' as such, but are instead labelled according to the particular impact they are addressing (i.e. flood) or the service they relate to (i.e. planning).

Lack of guidance/frameworks: There is very little in the way of frameworks, policy, or legislation to assist local government in addressing climate change, or to require other stakeholders to conduct their activities with appropriate consideration for climate change impacts.

Prioritising short/long term: Resourcing/funding constraints and a lack of tools to assess costs/benefits and the likelihood of risks makes it difficult to know where to focus attention.

Lack of knowledge: There is an abundance of broad scale information related to climate change – which makes it difficult to keep up to date; simultaneously, there are still a lot of questions about what is the best way forward and how to contextualise this to the local level, particularly within the scope of council's own limitations.

Overcoming the barriers:

Many of the above-mentioned barriers broadly relate to the sharing of information and access to knowledge across scales. A key method council adopted in overcoming this barrier was through utilising existing networks that were strongly connected to council. Constraints relating to the limited availability of locally relevant data was overcome through targeting the correct contacts in agencies that council had a close working relationship with. Both the NSW Local Government Shires Association (LGSA) and the Hawkesbury-Nepean Catchment Management Authority (CMA) were particularly helpful in providing locally specific data to support the risk assessment process. The LGSA at the time also had a dedicated Climate Change Mitigation and Adaptation Project Officer who provided direction as to key contacts in other agencies to support adaptation, and coordinated the 'Climate Change Action Pack' on the LGSA website, which provided a pool of resources for council.

The constraint related to scale was partly addressed during the adaptation planning process through a targeted engagement approach. At the onset of the process, targeted interviews were conducted with the key stakeholders both internal and external to gauge current perceptions of climate change impacts on the delivery of services and possible points of intervention to adapt to those risks. The results of these interviews then informed the risk identification and adaptation planning workshops with council staff. Some examples of the collaborative adaptation actions identified ranged from working with area health network (SWAHS) to address heat stress in vulnerable communities through to working with the Office of the Environment and Heritage to undertake biodiversity monitoring to overcome the key risk of losing endemic species. Council found that undertaking a climate change risk assessment at the local government level was beneficial as it placed the significance of the issue on the table identifying the key cross-scale collaborations that were vital for implementing the priority adaptation actions.

With a lack of guidance frameworks or tools available for prioritising adaptation options according to their costs/benefits, council relied on guidance from the consultant engaged for the project. Priorities were assigned following a process of assigning colour coded traffic lights based on the urgency to act and whether further analysis or investigations were required, combined with an assessment of the relative value of each of the proposed actions which considered both the benefits and costs against economic, social, environmental and governance or certainty criterion.

Other comments:

Since the development of council's plan, the Climate Adaptation Officer position at the NSW LGSA no longer exists. Information tools, packages and case studies are still available on the LGSA website for councils to use. The LAPP guidelines and the Australian Risk Assessment Standard for Climate Change do not provide a ranking methodology for weighing up costs and benefits of implementing specific adaptation actions.

Acknowledgements:

The researchers would like to thank Bernadette Riad, Sustainability Coordinator at Penrith City Council, for her time and contribution to the development of this case example.

APPENDIX F: ROLES AND RESPONSIBILITIES FOR CLIMATE CHANGE ADAPTATION

The COAG Select Council on Climate Change release for discussion, a document that sets out the principles for allocating the management of climate change risks, and roles and responsibilities for adapting to climate change within the three tiers of government: Commonwealth, state and territory, and Local (COAG 2012a).

The document proposes that state government has four main roles, two of which link closely with local government: providing local and regional science and information (p. 7); and encouraging climate resilience and adaptive capacity (p. 8). Excerpts from the document are provided below as reference.

State government role in providing local and regional science and information

This role will include:

- collaborating with the Commonwealth and other States and Territories as part of a national climate projections program to develop and implement a consistent approach to regional climate projections, climate change impact modelling and reporting
- collaborating with the Commonwealth and local government to develop other public good information and analytical tools that are most efficiently produced at the national scale (eg approaches to understanding costs and benefits of adaptation actions, methods for assessing vulnerability and risks), and
- delivering local and regional science and information where that information is most effectively delivered at the local and regional scale (eg. where links with ecological, biophysical or social processes are critical, such as fine-scaled projections of inundation or coastal erosion) to assist both government and private parties in assessing climate risks and adapting to climate change.

State government role in encouraging climate resilience and adaptive capacity:

This role will include:

- promoting a risk management response to climate change adaptation by government and private parties through appropriate forums. For example, communicating changes in bushfire risk through emergency management organisations and communicating climatic changes to providers of infrastructure (both private and public)
- ensuring state and territory regulatory and market frameworks promote effective adaptation by private parties, using market mechanisms where these are likely to be most effective
- ensuring existing and new state planning, property and environmental legislation and policy encourages effective adaptation by asset owners and managers
- working with the Commonwealth government to identify and implement priorities to improve adaptive capacity and strengthen climate resilience in vulnerable communities, and
- supporting local government to facilitate building resilience and adaptive capacity in the local community and to ensure that policies and regulations are consistent with state government adaptation approaches.

The specific role of local governments in relation to adaptation is outlined as follows: (pp. 8–

9):

Local governments will:

- administer relevant state and territory and/or Commonwealth legislation to promote adaptation as required including the application of relevant codes, such as the Building Code of Australia
- manage risks and impacts to public assets owned and managed by local governments
- manage risks and impacts to local government service delivery
- collaborate across councils and with state and territory governments to manage risks of regional climate change impacts
- ensure policies and regulations under their jurisdiction, including local planning and development regulations, incorporate climate change considerations and are consistent with state and Commonwealth government adaptation approaches
- facilitate building resilience and adaptive capacity in the local community, including through providing information about relevant climate change risks
- work in partnership with the community, locally based and relevant non-government organisations, business and other key stakeholders to manage the risks and impacts associated with climate change, and
- contribute appropriate resources to prepare, prevent, respond to and recover from detrimental climatic impacts.

APPENDIX G: PARTICIPANT FEEDBACK FROM WORKSHOPS

What would you most like to see emerge as a result of this project?

- Engagement with state government on the results of this report, to encourage clear policy guidance for councils on this issue.
- That we can move on from identifying barriers and can address action!
- Informed legislative review.
- Tools/suggestions to overcome the barriers.
- It would be good to see an active response to the findings and suggestions of this study – instead of another project which isn't effectively utilised.
- Stronger cross-governmental commitment to CCA. Ambitious?
- Impetus to resolve the challenges transmitted to decision makers.
- Solutions, evidence to "empower" change and actual effective adaptation.

Who would benefit from the findings of this research?

- Planning and policy at state and commonwealth levels and LG Associations for incorporation into LG policy debate and discussion.
- CCA Managers e-policy makers, researchers
- All stakeholders: public, government, corporate, NGOs, Indigenous land councils.
- All councils across all states; council groups – e.g. Sydney coastal councils; all state government agencies; relevant federal departments.
- Hopefully local government would be key beneficiary but it should be as broadly useful as practicable.
- All government workers in adaption space – local, state and federal.
- Local councils.
- Decision makers at the three levels of government.
- Senior policy makers.
- All state local government associations and ALGA. Relevant departments in state and federal government. NCCARF synthesis and integration re: future synthesis. Regional bodies – NRM, catchment managers, RDAs, etc.
- Program desogners and evaluators (i.e. don't leave it to the policy wonks(??) on their lonesome).
- Hopefully councils and communities.
- All public sector administrators and related service users and providers.

What is the best way to disseminate research findings from this project?

- For LGAs – use existing networks. Possibly use ACEL4(??) to inform Commonwealth as well as ALG??
- Through relevant peak and regional organisations, CeS?, LGA, Rocs, ICAust
- Govt bodies, LGSA, Insurance bodies. Conference/seminars for interested persons. Related websites. Provide findings for seminar participants.
- Web based – on website, Facebook, etc. Seminar/conferences, council/agency champions.
- NCCARF website. Existing networks (RoCs and SOGs, etc.).
- Electronically.
- Briefing ... just publishing a report never reaches the right people.
- Direct to 'Connectors' e.g. state LG Associations, regional groups etc.
- Make a visually engaging, short (10-15 Min) presentation so that practitioners & community champions 'get' the key findings and outcomes.
- Through local government ROCs as the recommendations are likely to refer to regional coordination.

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