THE UNIVERSITY OF SYDNEY

Faculty of Architecture, Design and Planning

Planning for climate change adaptation in Coastal Australia: State of practice

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Report No. 4 for the National Sea Change Taskforce
November 2011

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Executive summary

There is by now widespread awareness and policy concern regarding the impacts of climate change in coastal Australia (Coasts and Climate Change Council 2010; House of Representatives 2009; Department of Climate Change 2009). As well as the wider impacts of changed weather patterns, coastal areas face increased risks from physical exposure to sea level rise, erosion, and storm surge, with implications for coastal infrastructure, homes and biodiversity (Steffen et al. 2009; Department of Climate Change 2009). Significant assets are already exposed: of the estimated 711,000 existing homes in coastal zones, up to 35 per cent are at risk of inundation within ninety years under a plausible sea level rise scenario of 1.1 meters; while many items of significant community infrastructure are also situated in vulnerable locations (ibid). However, local governments in coastal Australia continue to manage demand for growth, approving many hundreds of millions of dollars in building approvals per year (ABS 2010). In most cases, such determinations occur without a clear statutory framework for considering potential climate change impacts.

In this context, this study, commissioned by the National Sea Change Taskforce (NSCT), sought to:

- Re-calibrate the specific, multi-dimensional issues associated with climate change adaptation, faced by local government areas in non metropolitan coastal Australia;
- Undertake an audit of established and emerging responses to climate change adaptation at local and regional scales in coastal Australia; and,
- Identify priorities for further policy, practice, and research development and support, in the context of current legislative, planning and policy frameworks.

The research approach included a targeted review of existing practice in planning for climate change adaptation in Australia and internationally; an analysis of Australian coastal and planning legislation and policy; a survey of coastal local government areas in non metropolitan coastal areas (February – July 2011); and two expert "round tables" comprising coastal policy makers, scientists, lawyers, local councillors, and planners (held on 29 March 2011).

The results of the survey and round table discussions reveal widespread stakeholder acknowledgement of the significant progress undertaken in Australian coastal and climate change policy since late 2008, catalysed by the House of Representatives Inquiry into climate change impacts in coastal areas (Australian Government 2010), and extended by the ongoing release of data associated with the First Pass National Assessment of climate change impacts to coastal Australia (Department of Climate Change 2009). However, significant levels of concern regarding the adequacy of existing Commonwealth and state legislation and policy for addressing climate change in coastal areas persist. The audit of local adaptation planning practice show that some local government areas are well underway towards progressing holistic climate change adaptation strategies spanning multiple sectors of local responsibility, but others have neither engaged, nor anticipate engaging in, adaptation planning activities. Of those areas that have commenced adaptation planning, most strategies and commitments will require additional resourcing and external expertise to implement in the future. Specific findings reported in the body of this report are summarised below.

Recalibration of priority issues

Not surprisingly, participants in this study confirmed that the major areas of concern continue to relate to physical exposure to sea level rise, storm surge and inundation; the exacerbation of existing risk profiles due to ongoing development in vulnerable locations; and loss or damage to important coastal environments such as foreshore and recreational areas, with implications for coastal ecosystems, biodiversity and amenity.

Local government participants in this study also expressed significant concern regarding existing and potential future impacts to public infrastructure, buildings, and private homes, as well as the legal liability of local government in making planning decisions regarding the location and nature of future development.

The capacity of local emergency services to cope with increases in the frequency and or severity of coastal storms and floods, as well as the community health implications of extreme weather events, concerned all local government participants in this study.

Additional factors with particular resonance for local governments include:

- *Uncertain legal liability for spatial planning and development assessment decisions, the provision of information about climate risk, and activities relating to coastal management and protection,* undermining local government capacity for action.
- *The particular challenges associated with meeting the needs of ageing populations.* Maintaining community infrastructure and continuity of community services is particularly important in the context of ageing populations who are often more vulnerable and may require additional assistance during extreme weather events.
- *The emergence of new risks associated with natural hazards such as bushfire is likely to become a major issue for smaller coastal areas.* Local government participants expressed particular concern about the lack of capacity and experience in planning for and minimising bushfire risk in their areas.
- *The quality of professional expertise and standards in undertaking climate vulnerability and risk assessments is a potential problem in some jurisdictions.* A number of participants in this study pointed to concerns about the lack of effective monitoring of the quality of private sector risk analyses being undertaken, particularly work being commissioned by developers to support a planning application in vulnerable coastal areas.
- *The full financial implications for adapting to climate change impacts remain unclear, but all local governments are already experiencing increased budgetary pressure associated with managing climate risk.* The major areas of expenditure include increased costs associated with obtaining legal opinions and in some cases defending planning decisions; meeting insurance premiums; and coastal protection works. Other expense areas relate to staff education and time, as well as consultant studies and expert advice.
- *Local community "pushback" and scepticism towards climate change and potential impacts for coastal areas is emerging in many localities.* Local government participants in this study reported a new level of resistance towards climate adaptation strategies and planning provisions amongst certain sectors of their communities. In some cases, landholders and developers have become more vocal in opposing development restrictions associated with climate risk management; while in other areas, general community "pushback" regarding the overall phenomenon of climate change, may undermine political support for climate action.

Audit of local and regional responses

The results of the local government survey show that many local governments in coastal Australia have begun to engage in climate change adaptation activities, although this is not universal. Our round table discussions and review of initiatives funded under the Commonwealth's Local Adaptation Pathways Program (which operated between 2009 and 2010) and the other examples of adaptation practice identified through this study suggests that a continuum of climate change adaptation responses is emerging at the local level.

- *"Early adaptors" have commenced climate planning with detailed risk or vulnerability analyses before proceeding to comprehensive adaptation plans, covering a range of initiatives to build resilience across many areas of local government responsibility.* However, in most cases, these initiatives remain prospective rather than underway or fully implemented.
- *Less than a fifth of local government areas represented in the study had changed their planning controls to reflect climate change adaptation considerations.* Nevertheless, more than half of respondents reported that they had commenced the process of reviewing and amending their planning schemes and almost all intended to do so in the near future.
- *Strategies to address risks to local infrastructure and to review approaches to infrastructure provision and maintenance are underway in many areas.* However, very few local governments have completed this work.
- *While considerable resources have been set aside in some larger local governments to provide for climate adaptation, in smaller areas, adaptation action is limited by resource constraints.* In these smaller local government areas in particular, there are reservations about the capacity of local planning staff to adequately assess development proposals in vulnerable locations. Some are addressing resource constraints by collaborating with neighbouring areas through a regional approach to risk analyses and strategic planning.

Priorities for policy development, research, and external support

Concern regarding the inadequacy of the current policy and legislative framework for addressing climate change, across all levels of government, was the major theme to emerge through the local government survey and round table discussions.

- *Many participants emphasised the need for a strong, integrated, and consistent policy framework for climate change adaptation stemming from the national level.* More than two thirds of survey respondents indicated that strengthened government policy would be of greatest benefit to their local government area.
- *Support for understanding and responding to specific areas of climate vulnerability within the community, in building collaboration, in disseminating information and in building engagement in climate adaptation initiatives is also a high priority.* Many respondents indicated that assistance would be best provided through a dedicated staff member. However, for a third of responding local government areas, ongoing access to legal advice is also required.
- *Government funding and other resources (for instance, the capacity building activities of the Australian Local Government Association and the state local government associations) have*

been extremely important in helping coastal areas develop climate adaptation responses, particularly those without the rate base or professional staffing profile of larger capital city local government areas. However, many emphasised that competitive funding programs, the major sources of support to date, are resource intensive and may disadvantage smaller local government areas with fewer professional staff able to prepare grant applications and implement funded programs. Accordingly, local government capacity building remains a major priority, particularly in smaller local government areas with smaller professional staff and extremely limited resources.

- *Major inconsistencies and weaknesses across the spectrum of commonwealth, state and territorial climate change policy and law undermine local adaptation action.* However, several jurisdictions demonstrate approaches that might provide a basis for wider emulation. For instance, Queensland's impending climate change adaptation framework appears to represent the new 'generation' of policies, not only by identifying sea level rise benchmarks for different time periods but also by graduating standards for different types of coastal development. The New South Wales action to limit local government liability for advice or decisions undertaken in good faith (under Section 733 of the NSW *Local Government Act 1993,* as amended) enables a more constructive approach to local planning in coastal areas and facilitates information sharing with local communities.
- *A major priority for many local government areas in addressing potential climate impacts relates to the management of areas with existing development potential in areas now known to be affected by climate risk.* Participants called for higher level government support in delivering and resourcing schemes for compulsory acquisition or relocation, or to prevent rebuilding of assets in locations now situated in areas of climate vulnerability.

Introduction

Coastal communities, particularly those beyond Australia's capital cities, are at the frontline of impending climate change impacts. Varying levels of physical exposure to shoreline erosion, storm surge, flooding, and changed weather patterns, exacerbated by sea level rise, represent significant environmental, financial, social and legal risks to coastal populations. Fragile coastal ecosystems, already threatened by urban encroachment, are particularly susceptible to ocean warming and acidification (provoking coral bleaching and coral reef loss); while rising sea levels and increased frequency of storm surges are expected to intensify processes of shoreline recession, saline intrusion to freshwater systems, habitat shift and reduction (Steffen et al. 2009; Department of Climate Change 2009). Significant assets are already exposed: of the estimated 711,000 existing homes located in the coastal zone, up to 35 per cent are at risk of inundation under a sea level rise scenario of 1.1 meters; while many items of significant community infrastructure – including fire stations, hospitals, water treatment plans, and emergency services are situated within 200 meters of the shore (Department of Climate Change 2009, p. 71). Overall, Australia's ageing population will be more vulnerable to climate impacts associated with temperature, natural hazards, and water, food-borne, and vector diseases (Harvison, Newman, and Judd forthcoming). Not only are these risks particularly concentrated in coastal locations, but coastal areas beyond the capital cities typically have older age profiles and are aging at a faster rate than the rest of the nation (Australian Institute of Health and Welfare 2007).

Despite these risks and uncertainties, urban development pressures continue to focus on coastal areas surrounding the capital cities and in Australia's key lifestyle regions, with some of the nation's fastest population growth occurring in key coastal destinations such as Victoria's Bass Coast; South East Queensland, Townsville and Cairns; Wollongong, Lake Macquarie, and Newcastle in NSW and Capel and Busselton in Western Australia. These pressures – with annual growth rates more than double the national rate of 1.7 per cent – are compounded by ongoing demand for second homes and tourism development to accommodate seasonal populations in coastal areas (Kelly and Hosking 2008).

Local governments have primary legal responsibility for the majority of decisions regarding future development in locations potentially exposed to climate risk, many of which are concentrated in peri and non metropolitan coastal areas, yet much legal uncertainty remains about potential liability for such decisions (Coasts and Climate Change Council 2010; Baker & McKenzie 2011).

The National Sea Change Taskforce (NSCT) was one of the first organisations to call attention to these issues, through baseline research on planning for climate change in coastal communities (Gurran, Hamin, and Norman 2008), and subsequent policy development and advocacy. Since this time, many new initiatives to understand and plan for climate change adaptation in general, and in coastal areas in particular, have arisen both in Australia and internationally (House of Representatives 2009; Coasts and Climate Change Council 2010; Australian Government 2010; 2010; Department of Climate Change 2009; Nicholls 2011; Martinez et al. 2011; Tompkins et al. 2010). Many local governments in Australia and internationally have begun to plan for climate change adaptation, but, given the varying characteristics of local government, it is likely that many others lack the resources, capacity or political mandate to engage in such activities.

It is therefore timely to review the evolving state of practice in planning for climate change adaptation in coastal Australia, particularly at the local level, and the major factors supporting or impeding this work.

Research aims and approach

As a basis for assessing the state of practice in local climate change adaptation planning in coastal Australia, and the factors contributing to or hindering local responses, this project aimed to:

- Re-calibrate the specific, multi-dimensional issues associated with climate change adaptation, faced by local government areas in non metropolitan coastal Australia;
- Undertake an audit of established and emerging responses to climate change adaptation at local and regional scales in coastal Australia,; and,
- Identify priorities for further policy, practice, and research development and support, in the context of current legislative, planning and policy frameworks.

The project approach involved a targeted review of existing practice in planning for climate change adaptation in Australia and internationally; an analysis of Australian coastal and planning legislation and policy; a survey of local governments in non metropolitan coastal areas (February – July 2011); and two expert "round tables" comprising coastal policy makers, scientists, lawyers, local councillors, and planners (held on 29 March 2011).

Survey of coastal local government areas in non metropolitan coastal Australia

To ascertain the perspectives of local government staff and elected councillors as they absorb the implications of new information on climate change risks, an internet survey was administered to coastal planners and councillors between February and July 2011. Initially, invitation to participate in the survey was circulated via the NSCT network, of over 50 local government areas. Twenty nine responses were received via this approach, from 27 member local government areas, across NSW, Queensland, Western Australia, South Australia, and Victoria (although there were slightly more responses received from NSW, Queensland and Western Australia than the other two jurisdictions). The survey was broadened to include participants at the national coastal council conference held in Torquay in March 2011, resulting in a total of 49 responses (although many conference participants focused on the key issues affecting their local government area, rather than completing the whole questionnaire). Approximately half of the round table participants were from Victoria.

The majority of respondents to the survey were professional staff employed in local government areas, including directors of planning, natural resource management or environmental services. Two respondents held designated climate change positions. Although a relatively small sample, it is likely that the self-selecting respondents were particularly aware of climate change matters, and overall, more likely to represent local government areas which have commenced some adaptation planning initiative than other local governments who did not respond to the survey invitation.

The questionnaire (Attachment 3) canvassed key issues associated with climate change and adaptation for coastal areas beyond the major capital cities; existing and emerging responses to these pressures; the adequacy of the existing legislative/policy/planning framework; financial expenditure by the local government area, projected local expenditure, and funding shortfalls; as well as priorities for support. The survey was developed with reference to previous studies and consultation processes relevant to climate change adaptation in Australian local government (Pillora 2010; Department of Climate Change 2009; Department of Climate Change and Energy Efficiency 2010; Coasts and Climate Change Council 2010; Gardner, Parsons, and Paxton 2010) and the wider international literature on local government issues and responses to climate change (Tang et al. 2010; Howard 2009).

Survey responses were anonymous and in presenting results, care has been taken to remove identifying information.

Expert "round tables" comprising coastal policy makers, scientists, local councillors, and planners

To explore the survey themes in greater detail, two expert focus groups or "round tables" were held during the coastal local governments ' conference in Torquay, Victoria in late March 2011. Round tables provide an efficient opportunity to gain high level perspectives and insights, and offer the benefit of participants being able to interact with one another and stimulate a deeper level of discussion in relation to shared concerns. The round tables followed a semi-structured format, and were attended by a combination of invited and self-nominating participants. The 22 participants included local government councillors; planners, and environmental officers; state policy makers; and consultants working on climate risk analyses in coastal areas. Round table discussions were tape recorded and transcribed for analysis. Participation in the round tables was also undertaken on an anonymous basis and while we draw on specific comments in chapter three of this report, these comments have been modified where necessary to maintain confidentiality.

Targeted audit of existing practice in local planning for climate change adaptation in Australia

An audit of existing practice in local planning for climate change adaptation in Australia was conducted via the snowball techniques used in previous research for the NSCT whereby databases, local/state/Commonwealth government websites, catalogues and publications, are searched to identify examples of relevant practice (Gurran, Hamin, and Norman 2008). The survey and round table discussions were key sources of information about initiatives and, particularly, of leading practice. All non metropolitan coastal projects funded under the Commonwealth's Local Adaptation Pathways program were also reviewed in this audit as well as the wider work of recipient local government areas. The intention of the audit was twofold: firstly, to estimate the level of existing state of practice in planning for climate change adaptation in coastal Australia, particularly beyond the capital cities; and secondly, to identify promising models of climate adaptation planning for emulation.

Report structure

The first section of the report establishes the context for the study, providing a brief introduction to climate change and planning responses. It sets out the policy and legal framework for climate change adaptation in coastal Australia, updating and building on previous research for the NSCT (Gurran, Hamin, and Norman 2008).

The second section presents the results of the survey and round table discussions, focusing on the key climate change adaptation issues affecting local government areas in non metropolitan coastal Australia; initiatives already underway; costs associated with climate change; views regarding the strengths and weaknesses of state and local planning frameworks, and priorities for support.

The third section focuses on the 'state of practice' in local planning for climate change adaptation in coastal Australia, including established and emerging responses at local and regional scales.

In the conclusion, the report identifies key priorities for further policy, practice, and research development and support for local government areas in planning for climate change adaptation in coastal amenity areas.

1. Evolving legal and policy frameworks for climate change adaptation in coastal Australia

Australia's policy and legal responses to climate change are evolving. This section of the report summarises and compares these responses, focusing on key Commonwealth and state/territorial level policies, laws and programs relating to climate change adaptation in coastal areas. For context, the first part of this section outlines the key risks associated with climate change in coastal Australia, the need for adaptation, and overarching principles to guide local planning, drawing on work previously undertaken for the NSCT (2008) and subsequent international research (Howard 2009; Davoudi, Crawford, and Mehmood 2009; Martinez et al. 2011). Current policy and legislative framework arrangements governing planning for climate change adaptation in coastal Australia are then reviewed.

1.1 Climate change, adaptation, and principles for local planning

There is global scientific consensus that naturally occurring processes of climate change have accelerated over the past century and particularly over the past 50 years, due to increased production of greenhouse gases and consequent 'global warming' (Solomon et al. 2007; Climate Commission 2011). Projected impacts of climate change due to extreme weather and climate events are profound. In Australia, rising temperatures, changing patterns of rainfall and wind speeds will be associated with increased frequency and intensity of heatwaves, droughts, bushfires, storms, and floods (Department of Climate Change 2009; Climate Commission 2011). Ongoing sea level rise, predicted to reach between 0.5m – 1m by 2100 will exacerbate the impact of increased rainfall and storms, making many low lying areas prone to more frequent and severe inundation (Climate Commission 2011). While the actual magnitude of sea level rise is uncertain (linked to the rate of polar ice sheet loss), even very small increase in sea level of 10cm are associated with significant and magnified impacts during storm events. For instance, within 50 years, parts of the Gippsland region of Victoria are expected to be subject to inundation levels requiring relocation of assets including roads, homes and commercial buildings, with the town of Lakes Entrance anticipated to be permanently flooded from sea level rise in the long term (Hughes, Nicholls, and Karoly 2011).

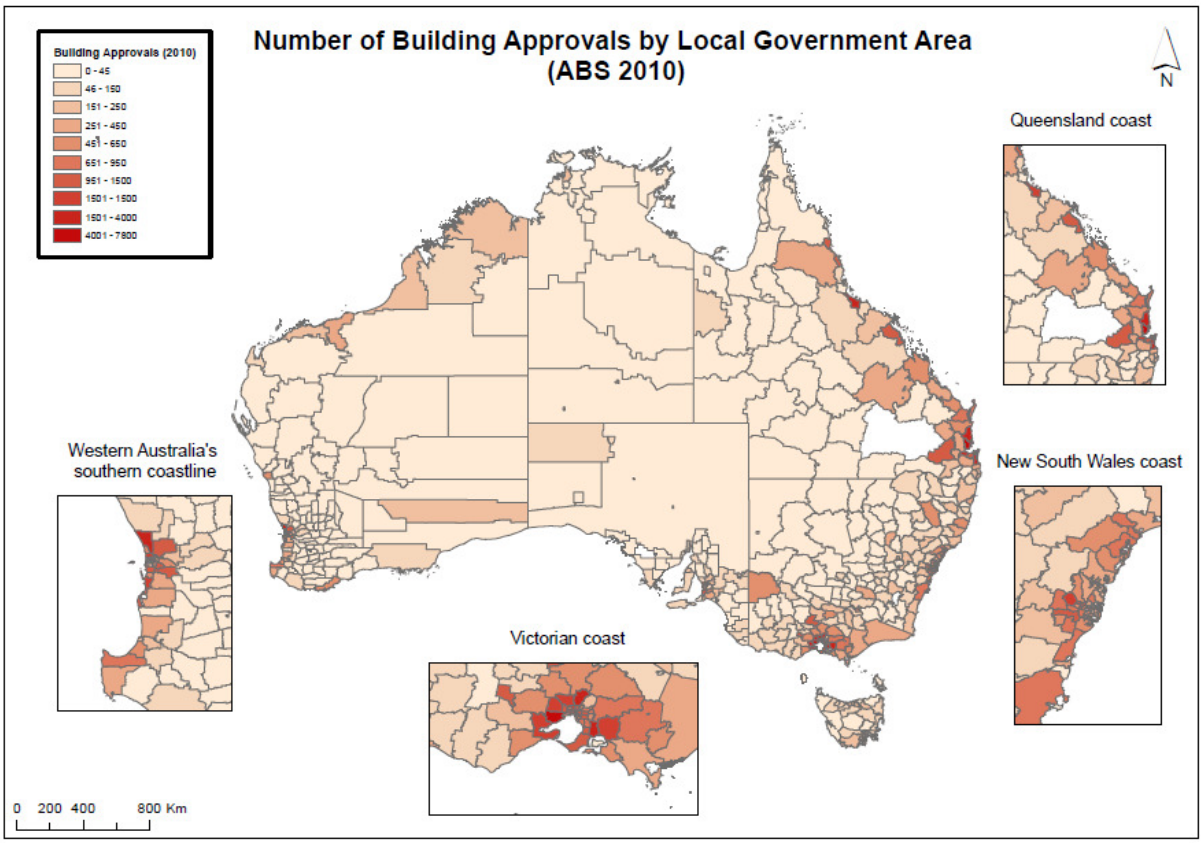
Latest data from the first pass national assessment of risks to Australia's coasts quantify implications for coastal communities, particularly beyond the major capital cities. Using a plausible, upper end sea level rise scenario (up to 1.1 meters by 2100), the Department of Climate Change and Energy Efficiency estimates that more than $226 billion in commercial, industrial, road, rail and residential assets are exposed to hazards associated with inundation and erosion (Department of Climate Change and Energy Efficiency 2011). More targeted localised risk assessment reveals that many of these risks are concentrated beyond the main population centres. For instance,

- In Western Australia, the coastal towns of Bunbury, Mandurah, Busselton and Broome face multiple risks, with over 400 commercial buildings exposed in Bunbury and Mandurah; and over 200 light industrial buildings at risk in Busselton; as well as nearly 2000 kilometres of roads potentially affected in Broome;
- In Victoria there is significant exposure across commercial and light industrial buildings as well as roads, with some 350 commercial buildings at risk in Surf Coast and Gippsland shires and over 400 kilometres of road threatened across East Gippsland, Greater Geelong, and Wellington shires;

- In New South Wales, Clarence Valley, Port Stephens, Shoalhaven, Greater Taree, Great Lakes, Kempsey, Tweed and several other north coast local government areas face significant damage to local and regional roads exceeding 200km in each locality. Wollongong, Newcastle, Eurobodalla and Lake Macquarie all have over 100 commercial buildings situated in areas of potential exposure;
- In Queensland, road damage is predicted to be particularly significant in Mackay and the Fraser Coast (affecting around 450km of road), although potential road damage stretches across most of the coastline. More than 200 commercial buildings will potentially be affected in the Gold Coast, Moreton Bay, the Fraser Coast, Townsville, and Mackay.

Despite this existing exposure to climate risk, ongoing pressure for new development continues. As shown in Figure 1, Australian Bureau of Statistics (ABS) building approvals data demonstrates the persistent demand for new coastal development, which continues to focus on high amenity coastal regions surrounding the major capital cities, particularly the New South Wales South, central, and mid north coast; South East Queensland; the south west coast; and Victorian coastal destinations.

Figure 1: Volume of building approvals, Australian Local Government Areas 2010

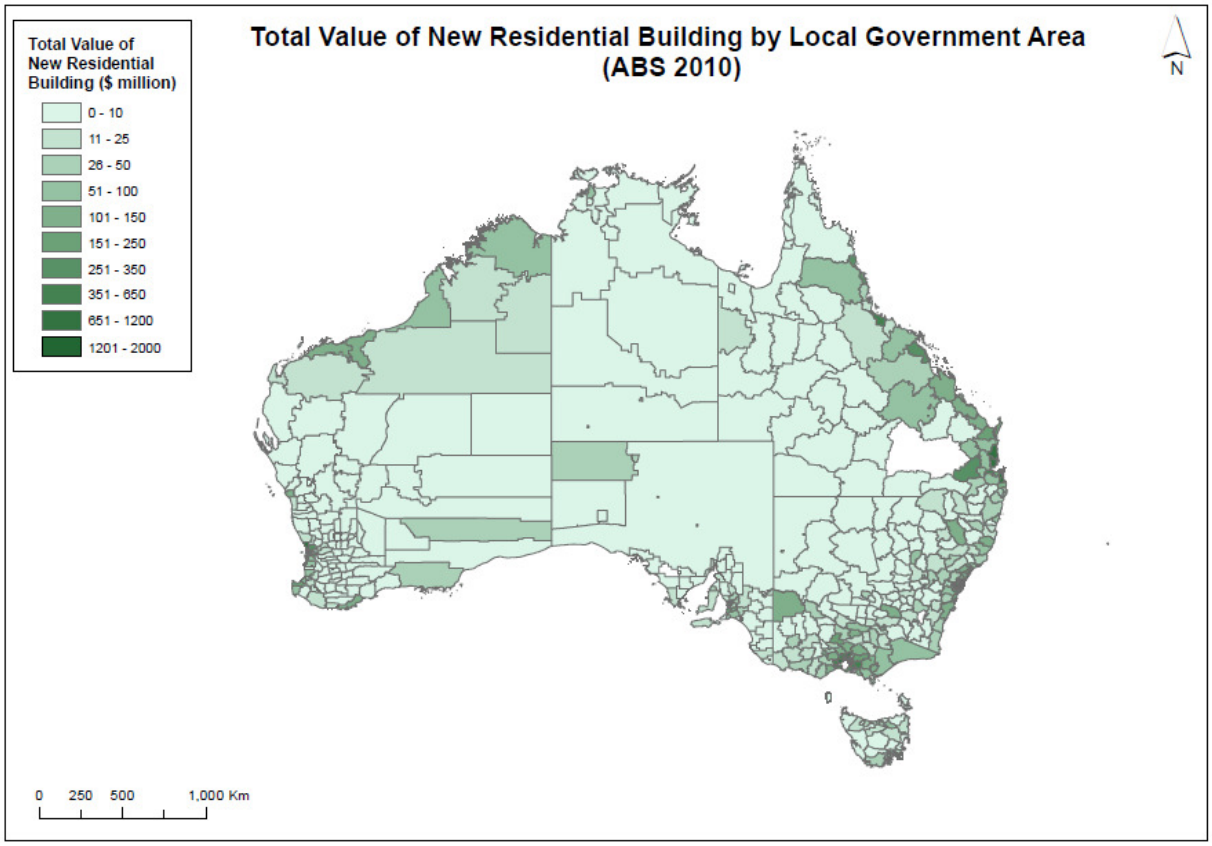


(derived from Australian Bureau of Statistics 2010)

A similar picture emerges through spatial analysis of the value of residential building approvals by local government area in 2010. As shown in Figure 2, new residential development is predominantly concentrated in coastal local government areas, meaning that local government in these locations are making decisions regarding hundreds of millions of dollars of new homes, many of which will be expected to have an operational life of between 40-80 years, well into the period in which significant

climate impacts are anticipated. The proportion of these new developments situated within potentially vulnerable locations is not known, nor is the extent to which climate risk has been an explicit consideration during the process of land allocation, development assessment and approval. However given that many local government areas remain subject to spatial plans prepared many years before climate change became a significant policy consideration, it is likely that many coastal local government areas will continue to experience pressure to approve development in vulnerable locations for the foreseeable future.

Figure 2: Value of building approvals, Australian Local Government Areas 2010



(derived from Australian Bureau of Statistics 2010)

Responses to climate change are often categorised in relation to approaches that seek to reduce or 'mitigate' greenhouse gas emissions, and measures designed to reduce or 'adapt to' the impacts of climate change and variability that are already underway (Solomon et al. 2007; Tol, Klein, and Nicholls 2008).

Research on levels of local government engagement in climate change adaptation initiatives is limited. Internationally, a bias towards mitigation, rather than adaptation has been observed, although this is beginning to shift (Tang et al. 2010; Martinez et al. 2011; Tompkins et al. 2010). In Australia, the New South Wales Local Government and Shires Association and the Municipal Association of Victoria have both undertaken member surveys to assess levels of engagement in climate change planning overall (Australian Local Government Association 2010). In their benchmark study of the engagement of Australian organisations in climate adaptation planning, Gardner et al. (2010) found varying levels of adaptation planning activity across government and the private sector, with differences linked to levels

of climate change awareness and understanding; access to external support; and the extent to which the organisation undertakes long term strategic planning (Gardner, Parsons, and Paxton 2010). The 2008 study undertaken for the NSCT highlighted important local government initiatives which directly or indirectly supported greenhouse gas reduction or promote climate change adaptation across environmental, community, economic, and incrastructure sectors (Gurran, Hamin, and Norman 2008).

Principles for climate change planning

In the 2008 study for the NSCT, the following overarching principles to guide climate change planning in coastal Australia were identified:

- The need to uphold the principles of ecologically sustainable development in designing adaptation and mitigation approaches, including environmental integrity, social equity and participation, economic viability and the precautionary principle. This is critical for coastal amenity communities whose populations include higher proportions of lower income and socially disadvantaged groups.
- The need to prioritise actions worth doing anyway, which for coastal amenity communities mean actions that have multiple benefits for the environment, for managing coastal processes, for the affordable and efficient provision of infrastructure, for nature based amenity and tourism and for more socially cohesive settlements.
- The importance of a sound evidence base, for identifying and justifying planning responses to climate change. Many smaller coastal government areas will need assistance in accessing, interpreting, and applying consistent and reliable sources of scientific information about climate change scenarios.
- The need to plan now, to prevent further risks associated with climate change. Coastal amenity communities experiencing rapid population growth will experience pressure for rapid development approval, before climate change considerations have been factored into planning and assessment frameworks (Gurran, Hamin, and Norman 2008, pp. 5-6).

Since this time, the impetus for imediate planning intervention has strengthened, to prevent further exposure to climate change impacts and to support rapid adoption of new approaches if and when required (House of Representatives 2009; Coasts and Climate Change Council 2010; Department of Climate Change 2009). There is a growing emphasis on the need to 'mainstream' climate change alongside broader environmental sustainability criteria, as a platform for evaluation alongside other considerations when undertaking land use planning as well as across other key sectors - from coastal management; to emergency services, community planning, public health, and economic development (Durrant 2010; Swart and Raes 2007).

To facilitate this mainstreaming of adaptation considerations, a wholistic climate change adaptation planning strategy – drawing together existing sources of data on specific, local level climate risks and vulnerability; as well as a set of strategies for future action – may provide a useful starting point (Tang et al. 2010). Given the variable characteristics of local governments – which have different geographic, population, and climate risk profiles, external support for the development and implementation of local responses will be required in many situations. Furthermore, a strong policy and legal framework is needed to inform, guide, and legitimise local adaptation action and decision making (Tol, Klein, and Nicholls 2008; Department of Climate Change and Energy Efficiency 2010; Coasts and Climate Change Council 2010).

The following sections of this report examine the policy, and legal support frameworks for local government in undertaking climate change adaptation in coastal Australia, as well as the range and scope of emerging local adaptation initiatives.

1.2 Policy and legal framework for climate change adaptation in coastal Australia

The policy and legislative framework for adapting to climate change in coastal Australia has developed rapidly over the past three years.

The House of Representatives Inquiry into climate change in coastal Australia (House of Representatives 2009) was a key trigger for action. The Inquiry made a number of recommendations relating to coastal based climate change research and policy, including the need for adaptation strategies and actions to promote resilience through funding and resourcing, disaster mitigation projects; revision of land use planning policies and building codes; and the need for greater clarity regarding insurance and legal liability. It recommended that Australia adopt a nationally consistent sea level rise planning benchmark and advocated a series of other interventions to promote greater certainty and consistency in the planning and management of coastal settlements and ecosystems; improved governance; inter jurisdictional cooperation; and community awareness about issues facing the coastal zone. The Australian Government has agreed in principle to many of these recommendations, including a commitment to investigate local government resourcing and other needs (Australian Government 2010).

The *First Pass National Assessment on Climate Change and Coasts* (Department of Climate Change 2009) provides a broad analysis of risks to coastal settlements and infrastructure, ecosystems and industries in the coastal zone, including a quantitative, spatial analysis of risks to residential buildings (at 2100). It is being progressively extended with a series of more detailed thematic assessments.

A Coasts and Climate Change Council was established in late 2009 to assist with stakeholder community engagement and to advise the Commonwealth Government. The Council has called for a 10 year national agenda for coastal adaptation, aligned "with regional development and population sustainability agendas to reduce the potential for perverse outcomes or maladaptation actions"; and including national regulatory reform, with an "agreed set of planning standards that form a hierarchy of risk to define possible land uses in areas affected by inundation, storm surge invasion, shoreline erosion, or other effects, over the next 50 to 100 years"; partnerships between public and private sectors (property, insurance, scientists, public authorities); and the development of information tools underpinning national standards for risk assessment to communicate risk (Coasts and Climate Change Council 2010).

In 2010 a forum to develop a national coastal adaptation agenda brought together local, state and federal decision makers (Department of Climate Change and Energy Efficiency 2010). The forum emphasized the need for a nationally consistent planning framework, including benchmarks for sea level rise, legal liability and property rights, building codes and design frameworks; as well as information to support decision making. The need for cooperative government leadership and early communication and community engagement was also emphasised.

The Commonwealth government has also developed its own overarching position paper on climate change adaptation: *Adapting to Climate Change* (Australian Government 2010). The paper emphasizes the need to "embed" climate change impacts in policy development and institutional frameworks, while measuring the efficacy of policy measures over time.

Alongside these initiatives, in 2008 the Commonwealth government funded the National Climate Change Adaptation Program, resourcing many research and capacity building initiatives. Specific grants under the Local Adaptation Pathways Program have provided a key impetus to many of the adaptation strategies undertaken by local governments in coastal Australia. As shown in Table 1, 16 non metropolitan local government areas were funded in the first round of the program, with five projects each in New South Wales and Queensland; and the remaining six spread across South Australia, Tasmania, Victoria and Western Australia. The majority of these projects were risk assessments and or adaptation action plans, almost all of which have now been completed.

Table 1: Non-metropolitan coastal areas funded under the Australian Government's *Local Adaptation Pathways Program*: Round 1 (2009)

Council	State	Project
Byron Shire Council and Tweed Shire Council	NSW	Assessing Climate Change Risks Adaptation Strategy Development in the NSW Northern Rivers Region
Kiama Municipal Council	NSW	Illawarra Climate Change Risk Planning – Kiama Component
Port Stephens Council	NSW	Planning within a Climate for Change in Port Stephens
Shellharbour City Council	NSW	Illawarra Climate Change Risk Planning – Shellharbour Component
Wollongong City Council	NSW	Illawarra Climate Change Risk Planning – Wollongong Component
Cairns Regional Council	QLD	Positive Change – FNQ Climate Risks and Opportunities
Gold Coast City Council	QLD	Strategy Development - Council Adaptation
Redland City Council	QLD	Risk Management Process and Climate Adaptation Plan
Sunshine Coast Council	QLD	Sunshine Coast Council Climate Change Infrastructure Risk Assessment and Adaptation Strategy
Townsville City Council	QLD	Townsville City Council's Operation Activity (Planning, Engineering, Community)
City of Onkaparinga	SA	Understanding Climate Change Risks and Managing Uncertainty
Cradle Coast Authority	TAS	Cradle Coast Regional Climate Change Risk Assessment and Action Plan
Launceston City Council	TAS	Creating a Pathway to a Sustainable Future – Risk Management for Climate Change
Borough of Queenscliffe	VIC	Preparing for Climate Change in the Borough of Queenscliffe
Shire of Broome	WA	Integration of Climate Change into Shire of Broom's Risk Management Strategy
City of Mandurah	WA	Coastal Zone Climate Change Risk Assessment and Adaptation Action Plan

(Authors, derived from Department of Climate Change and Energy Efficiency 2011)

The second round of the program promoted regional collaboration, funding groups of local governments from New South Wales (the Hunter and mid North Coast areas); the Northern Territory (Belyuen, Wagait, and Comalie shires; East and West Arnem and the Tiwi Islands shires); and Western Australia (Batavia and the Mid-West Regional Organisations of Local Governments) (Table 2). These projects resulted in the preparation of regional risk assessments and or adaptation plans.

Table 2: Non-metropolitan coastal areas funded under the Australian Government's *Local Adaptation Pathways Program*: Round 2 (2010)

Council(s) / Regional Organisation	State	Project Description
Hunter Local governments (including Gloucester Shire Council, Upper Hunter Shire Council, Muswellbrook Shire Council, Singleton Shire Council, Dungog Shire Council, Cessnock City Council, Greater Taree City Council, and Maitland City Council)	NSW	Focus: *Increased threats to the region, including risk of flooding, sea level rise and storm surges, reduced water supply, bushfires and added pressure on emergency services.* Outcomes: *Establish a more consistent approach for responding to climate change amongst the local governments and work together to engage stakeholders.*
Nambucca Shire Council, Bellingen Shire Council, and Kempsey Shire Council	NSW	Focus: *Vulnerability of the local economy, Council services and assets to the threat of flooding and sea level rise, as well as storm surges.* Outcomes: *Climate Change Adaptation Plan*
Belyuen Shire Council, Wagait Shire Council, Coomalie Shire Council	NT	Focus: *Vulnerability of communities in far-north Australia to the impacts of climate change, considering socio-economic factors, the effect of isolation and physical threats such as cyclones and storm surges.* Outcomes: *Community level risk assessment, climate change adaptation action plan, development of a community awareness program*
East Arnhem Shire Council, West Arnhem Shire Council, and Tiwi Islands Shire Council	NT	Focus: *Vulnerability of Indigenous communities to the impacts of climate change* Outcomes: *Risk assessment and adaptation action plan, development of a community awareness program*
Batavia Regional Organisation of Local governments (including the City of Geraldton-Greenough, Shire of Chapman Valley, Shire of Northampton and Shire of Irwin)	WA	Focus: *Coastal communities' vulnerability in the event of sea level rise, and the vulnerability of the wider region to the threat of drought.* Outcome: *Regional Level Climate Change Adaptation Action Plan*
Mid-West Regional Organisation of Local governments (including the following Shire Local governments : Carnamah, Coorow, Mingenew, Morawa, Mullewa, Three Springs, and Perenjori)	WA	Focus: *Vulnerability of coastal communities (where the majority of the region's population is located) to sea level rise, as well as the region's vulnerability to drought.* Outcomes: *Regional Level Climate Change Adaptation Plan*

(Authors, derived from Department of Climate Change and Energy Efficiency 2011)

The Australian Local Government Association (ALGA), which represents local governments across the states and territories and their respective organisations, recognises climate change as a key priority issue. It released a position paper on climate change in late 2010 (Australian Local Government Association 2010). The paper recognises the significance of climate change and the need to both mitigate greenhouse gas emissions and adapt

to climate change impacts that cannot be avoided, with local government playing an instrumental role, particularly in relation to the protection and management of local infrastructure and public assets, in leading and facilitating community awareness of climate change and its impacts, and through its land use and planning and development activities. ALGA has called for greater policy alignment and coordination across the Commonwealth, states and territories in addressing greenhouse gas emissions and emphasises the need for "accelerated" actions for climate change adaptation.

The States and Territories

At the state and territorial level, progress on climate change mitigation and adaption policy and legislation is at different stages of development (Table 3).

Sea level rise has been addressed through the South Australian planning system since 1992, under the Coastal Erosion, flooding and sea level rise standards and protection policy, which is invoked through provisions in local Development Plans. South Australia's *Living Coast Strategy* (2004) explicitly recognises the risk of climate change and implications for sea level rise and coastal hazards. Additionally, specific state planning targets for climate change mitigation (emissions reduction) and adaptation are contained in the South Australian Planning Strategy. South Australian Development Plans must promote this strategy, providing a means of bringing explicit emissions reduction targets and policies for adaptation to the sphere of local planning (Durrant 2010). In late 2010 the state government released a draft climate change adaptation framework (Government of South Australia 2010), which emphasises a regional approach to identifying and addressing climate risk. Regional "integrated vulnerability assessments" (IVAs) are proposed to inform regional collaborative agreements on adaptation action.

Victoria's *Climate Change Act 2010* requires decision makers to consider climate change when making specified decisions under several pieces of legislation relating to environmental protection, catchment and coastal management, but, curiously, not the principle *Planning and Environment Act 1987.* The *Climate Change Act* also requires a state Climate Change Adaptation plan to be prepared every four years and provides for "Climate Covenants" between the Government and community or industry stakeholders.

The *Victorian Coastal Strategy* 2008 includes a specific focus on climate change. It establishes a sea level rise planning benchmark of 0.8 by 2100 (to be reviewed if circumstances change), and emphasises the need to avoid development beyond existing settlement boundaries in the coastal zone, which has been interpreted as discouraging further development in areas exposed to climate change risks associated with inundation, erosion, and storm surge (Environmental Defender's Office NSW 2010). The Victorian State Planning Policy Framework covers coastal hazards and coastal impacts of climate change, reinforcing the sea level rise planning benchmark setting and requiring new developments to address potential climate change impacts including coastal erosion, storm tides, and inundation.

Victoria's *Coastal Management Act 1995* established the Victorian Coastal Council and three Regional Coastal Boards. Although the Act itself makes no reference to climate change, these structures have been extremely influential in the Victorian context in progressing climate change adaptation action, particularly in relation to addressing potential sea level rise.

Coastal risk has been a particular emphasis of evolving planning policy and coastal management law in NSW, with the release of a specific coastal planning policy statement (Department of Environment 2009), and guideline (Department of Planning 2010). The policy statement articulates sea level rise benchmarks of 40cm above 1990 levels by 2050, rising to 90cm in 2100. Again, these benchmarks are subject to review and updating. The Coastal Planning Guideline identifies eight criteria for consideration by proponents when selecting sites for coastal development, which relate to exposure to immediate

coastal risks (on-site and adjoining the site); public safety; infrastructure capacity; capacity to maintain coastal processes, and the maintenance of public beach, foreshore and waterfront access and amenity. The Guideline has been criticised by the Environmental Defender's Office for failing to make these factors legally binding (Environmental Defender's Office NSW 2010).

In 2010, the former Department of Environment, Climate Change and Water (DECCW), released two guides for incorporating the sea level rise benchmarks in coastal hazard and flood hazard assessment processes, although again, the guidance is of an advisory nature only. Later that year, changes to the *NSW Coastal Protection Act 1979* established provisions for property owners to undertake emergency coastal protection works under certain conditions without development approval *(Coastal Protection and Other Legislation Amendment Act 2010*). Under provisions operationalised in February 2011, local government areas are now required to include information on planning certificates (associated with individual sites) regarding any applicable planning controls relating to coastal hazards or flooding. Local government is also encouraged to provide a wider notation about exposure to projected sea level rise.

An important innovation of NSW coastal and climate change law has been the limitation of local council liability for advice or actions undertaken in good faith, under Section 733 of the NSW *Local Government Act 1993,* as amended (Baker & McKenzie 2011).

Queensland is the first jurisdiction to mandate the consideration of climate change during plan making and development assessment under its primary planning legislation (*Sustainable Planning Act* 2009 (s5(1)(c)). The *Queensland Coastal Plan* (2011) (adopted but not yet formally commenced) incorporates the *State Policy for Coastal Management* (to guide coastal land managers) and the *State Planning Policy for Coastal Protection* (to guide plan making and development assessment). The state planning policy specifies a sea level rise factor of 0.8 metres by 2100, and an increase in maximum cyclone intensity of 10 per cent. It provides for the review of these benchmarks within six months of the release of new data on temperature or sea level trends by the United Nation's Intergovernmental Panel on Climate Change (IPCC), or the adoption of any Australian intergovernmental agreement on sea-level rise or storm intensity thresholds for planning and development assessment. In turn, the policy is supported by a more detailed development assessment code, which will operate in situations where local planning schemes have not yet been amended to reflect the State Planning Policy.

The State Planning Policy for Coastal Protection makes provision for identifying designated erosion prone and storm-tide inundation areas, with specific planning periods for development type and anticipated asset life identified as a basis for managing risk. For instance, short term tourist accommodation is anticipated to have an asset life of 40 years, and therefore proposals must address projected sea level rise of 0.3 metres (to the year 2050). Specific storm tide event levels are identified to protect essential community service infrastructure.

Table 3 summarises the key policies, strategies, and laws relating to climate change adaptation across the states and territories, focusing particularly on climate change policy, strategy, and legislation applying to coastal areas.

Table 3: State policy and law for climate change adaptation planning relevant to coastal Australia

State / Territory	Key Policies / Strategies	Key legislation / regulations
NSW	NSW Sea Level Rise Policy Statement (2010) NSW Coastal Planning Guideline (2010) NSW Coastal Policy (1997) NSW Coastal Design Guidelines (2003) Coastal Risk Management Guide (2010) Flood Risk Management Guide (2010)	*Coastal Protection Act 1979 and Coastal Protection Regulation 2011* SEPP 71 Coastal Protection (under *Environmental Planning and Assessment Act 1979*) *Environmental Planning and Assessment Regulation 2000* (amended in early 2011 to require that coastal hazards affected by sea level rise be noted on 'section 149' planning certificates)
Northern Territory	Climate Change Policy (2009) Coastal Management Policy (and) Implementation Strategy 2001, under review	Northern Territory Planning Scheme (addresses flooding and storm surge, as well as 'Primary' and 'Secondary' storm surge areas)
Queensland	*Queensland Coastal Plan 2011* (adopted, not yet commenced) *Climate Smart Adaptation: 2007-2012 Action Plan* *State Coastal Management Plan* (2002) (nb: to be superseded by the *Queensland Coastal Plan 2011* when it comes into effect)	*Sustainable Planning Act 2009* (refers to climate change and sea level rise) *State Planning Policy for Coastal Protection* (provisions for addressing potential climate change impacts; nb: part of the *Queensland Coastal Plan*) *Coastal Protection and Management Act 1955*
South Australia	South Australian Planning Strategy (includes climate change adaptation) *Coastline: Coastal erosion, flooding and sea level rise standards and protection policy* (1992); source of sea level rise provisions included in all SA Local Development Plans Living Coast Strategy (2004) (recognises the risk of climate change, sea level rise, and coastal hazards, and the need to incorporate in local planning. Draft Climate Change Adaptation Framework (2010) (proposes regional vulnerability assessments, agreements and adaptation plans)	*Coast Protection Act 1972* (established Coastal Protection Board) which develops coastal planning policy and is a referral body for coastal development
Tasmania	Framework for Action on Climate Change (2008) (under review) Climate Change Impact Statements Draft State Coastal Policy 2008	State Coastal Policy Validation Act 2003

Victoria	Victorian Coastal Strategy 2008 Coastal Action Plans and Coastal management Plans (West Coast, Central Coast, and Gippsland Coast) – mechanism for implementing the coastal strategy	*Coastal Management Act 1995* (established the Victorian Coastal Council and 3 regional Coastal Boards, influential in promoting climate change adaptation in coastal Victoria). *Climate Change Act 2010* (requirement to consider climate change in developing coastal strategies / actions plans under *State Planning Policy Framework* addresses coastal hazards and coastal impacts of climate change
Western Australia	Draft Coastal Zone Management Policy for Western Australia (June 2011)	*Statement of Planning Policy 2.6 State Coastal Planning Policy 2003*

(updated fromGurran and Squires 2008; Environmental Defender's Office NSW 2010)

In its review of Australian local government liability for climate change related decisions and actions, environmental lawyers Baker and McKenzie draw attention to the significant variability across the states and territories both in terms of statutory protection for local government acts and decisions, as well across legal "guidance, policies and plans to respond to the impacts of climate change" (Baker & McKenzie 2011 p. 4). Key legal risks to local governments identified in this report, primarily arise in relation to their land use planning and development assessment functions, including the risk of negligence claims arising from approving development in locations where "harm is foreseeable" and for failing "to include protective standards in planning schemes" (Baker & McKenzie 2011, p.5). Conversely, local government is also exposed to the risk of merits or judicial reviews of planning decisions on the basis that guidance material used in decision making was either inappropriate (brought by landholders seeking a development outcome) or insufficient (brought by community or advocacy groups seeking to overturn a development decision). Statutory compensation claims may relate to compulsory acquisition or the effective quarantining of development potential arising from planning scheme amendments. Other potential liabilities relate to the provision of information about climate risk; and the failure to undertake or maintain coastal protection works.

Summary and implications

As the evidence base on climate change risk grows, and new information on potential risks for coastal areas comes to light, there is a clear need for climate change considerations to be incorporated across all aspects of local decision making. The research, literature, and policy on planning for climate change emphasises the need to situate adaptation within an overarching sustainability framework (Swart and Raes 2007; Davoudi, Crawford, and Mehmood 2009); having particular regard to the special needs of more vulnerable members of the population (Nelson 2011). It is also important to integrate climate change considerations across the different sectors of local government responsibility (from strategic spatial planning and development assessment, to emergency services, community health, coastal management and economic development) (Department of Climate Change and Energy Efficiency 2010);

and to undertake immediate action to prevent further exposure to climate risk, while maintaining the capacity to respond swiftly as new information comes to hand (Australian Local Government Association 2010). There is much variability in levels of adaptation awareness and planning across Australian private and public sector organisations, including local government, with access to external information, support and guidance strongly associated with action (Gardner, Parsons, and Paxton 2010).

In Australia the policy and legislative framework for climate change is evolving rapidly, with particular developments in the provision and dissemination of information about climate risk in coastal areas. These developments have particular implications for local governments, who have specific legal obligations to draw on relevant information in preparing land use plans, assessing development, providing advice, and maintaining coastal assets. However, there are significant uncertainties and variations in climate change policy and legislation across the states and territories, and issues of legal liability for many such local decisions and actions remain unsettled (Baker & McKenzie 2011). Such uncertainties, combined with major variability across coastal Australia in terms of the magnitude of existing and potential climate risks, pressure to accommodate future development, and staff capacity and financial resources to respond, will have profound repercussions for the future vulnerability or resilience of coastal Australia.

In this context, the next section of this report looks more closely at the ways in which local government in peri and non metropolitan coastal Australia perceive climate risk, the extent to which they have begun to address these risks, and the factors supporting or impeding this action.

2. Planning for climate change adaptation in coastal Australia: local government survey and expert round tables

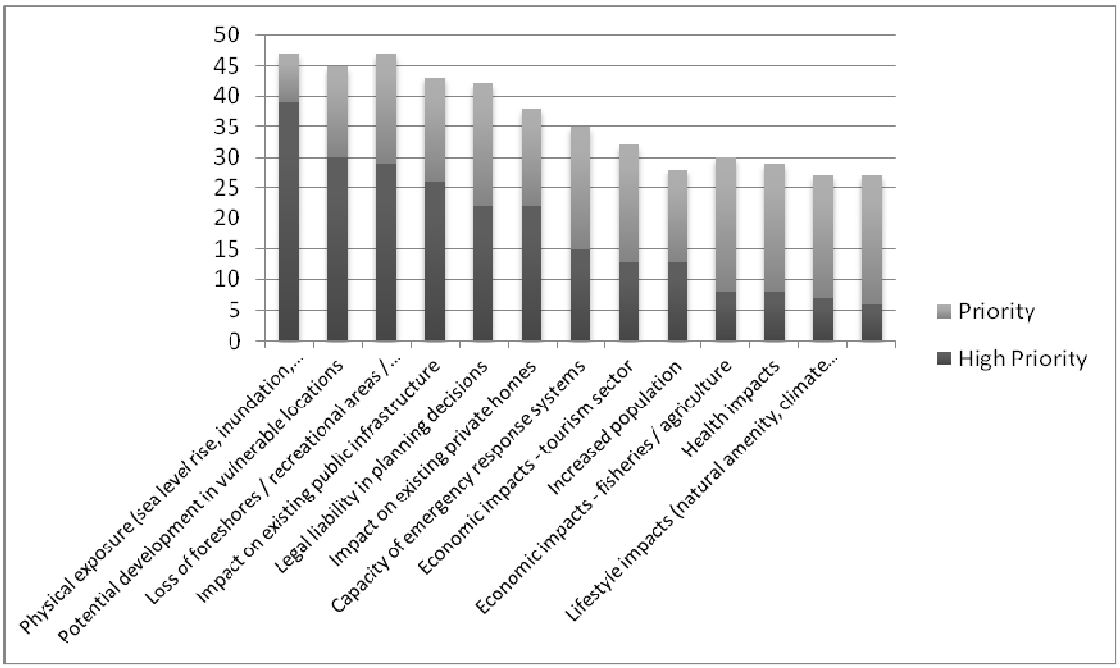
This section of the report presents results of the survey and the expert round tables, focusing on the key issues affecting coastal areas; the range of local council initiatives undertaken to date in adapting to climate change; and, the adequacy of Commonwealth, State and local government policy and legislative frameworks. It also highlights priorities for external support.

2.1 Priority issues and emerging concerns

As noted, substantial volume of work has begun to document the key challenges associated with climate change in coastal Australia (Department of Climate Change 2009; House of Representatives 2009; Coasts and Climate Change Council 2010). As outlined above, this work has pointed to a spectrum of significant environmental, social and economic issues with particular implications for coastal communities beyond the major capital cities. These challenges have the potential to exacerbate existing pressures associated with population growth and change, inadequate or declining infrastructure, and economic instability.

In asking participants to rank priority issues associated with climate change adaptation in their areas, the survey undertaken for this study aimed to recalibrate these themes (Figure 2.1). It also probed for new issues that may have arisen over time at the local level as the understanding of climate change implications for coastal areas has deepened.

Figure 2.1: What are the main issues for your Local Government Area, in adapting to climate change?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=49

Responses indicated that physical exposure associated with sea level rise, shoreline loss, storm surge, and coastal erosion continues to dominate local government concern. Respondents also expressed the view that development is continuing to occur in vulnerable locations, highlighting their potential legal liability in making planning decisions (with over 90 per cent of respondents identifying this as a priority or high priority issue).

The expert round table discussion focused on the dilemma that local government may be challenged in court for refusing a development solely on the basis of potential climate change impacts while also liable in the future for damages if development in vulnerable locations is approved.

> "Our role is to provide approvals for people but not to put them at risk"(local government participant, March 2011).

Other high priority issues related to potential loss of coastal foreshores, recreational areas, and terrestrial biodiversity. This theme was echoed in the expert round table discussions where participants emphasised that many coastal amenity communities face particular issues because of their older demographic profile.

> "We've got so many pensioners, retirees, and the main thing they do is walk … It's becoming difficult for them to get to the beach anyway. When the storm surge comes through … all of a sudden, you know, you've got thirteen beach access tracks that [need restoring]. We've got two sets of significant stairs already now that we've had to shut off. For a coastal council just that simple thing of getting access to the beach, the beach that they've walked on for the last forty years, becomes a problem"(local government participant, March 2011).

The prohibitive costs of maintaining, renewing, and installing new coastal infrastructure were emphasised. Some expressed the view that vulnerability assessments undertaken by higher levels of government were focused on heavily populated areas leaving smaller towns without any protective adaptation work.

> "The attention has been where the major infrastructure is [but] we've got small towns of a few hundred people which are likely to never have any physical adaptation work to protect them…" (local government participant, March 2011)

> "People will be worried about the city … but they're not going to be worried about the coastal towns." (local government participant, March 2011)

A number of respondents highlighted the potential risk to existing private homes and the possibility of future depopulation and disinvestment in exposed locations. Similarly, local planners expressed difficulties in evaluating decisions that may quarantine future development potential on private land.

> "There's a big social dilemma - how do you tell someone their land is worthless and they can't develop it?" (local government participant, March 2011).

One climate change consultant described a bifurcation whereby site based assessments fail to consider issues of transport and services. This means that individual sites might be approved for development due to their elevation, but lack secure provisions for road access via existing or planned road reservations. It was suggested that servicing these sites may become a future liability for local government areas.

> "The house might be safe but the road's going to be underwater and it's going to be unsafe for access. If local governments are going to accept development in the areas where this additional service cost to maintain access or service [will arise], they'll have to have a strategy to suggest

that they impose that additional cost on the residents who choose to live in these places, but that's not yet been resolved" (private sector consultant, March 2011)

Other priority issues

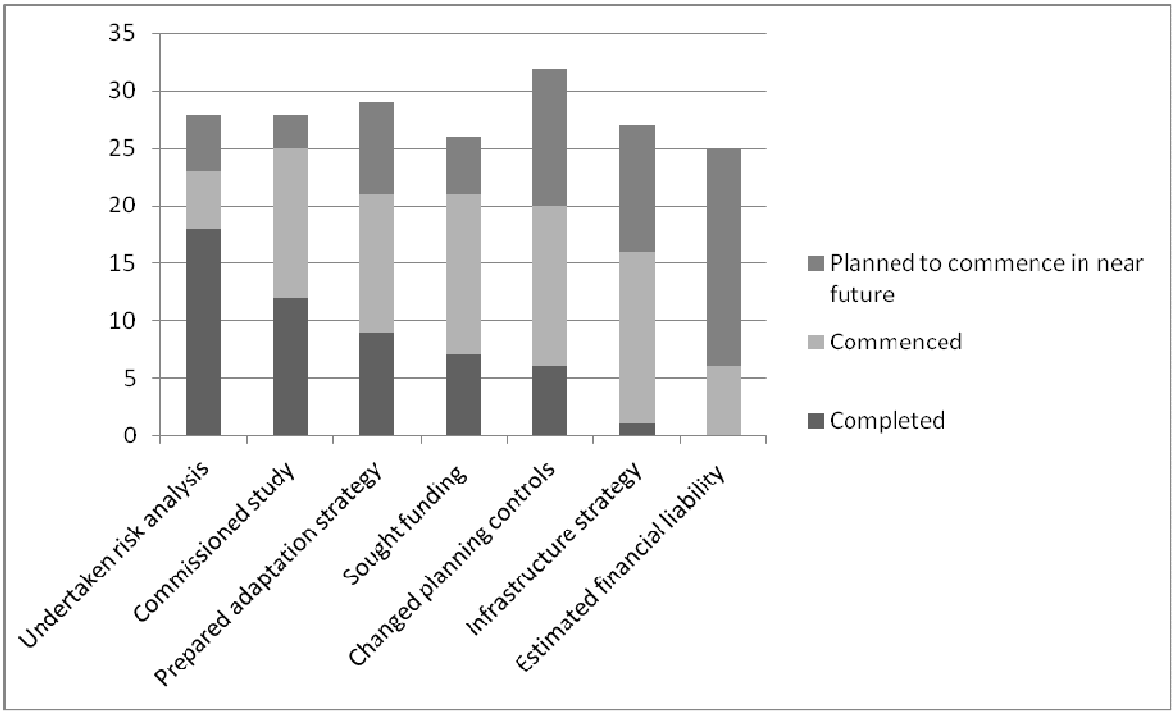
In the context of the wider socio-economic challenges affecting coastal communities beyond the major cities, potential economic impacts associated with climate change for local tourism operators, fishery, and agricultural industries continue to concern local government respondents.

Finally, several respondents called attention to the increased risks of bushfire, emphasising that their local government areas lacked experience in planning for bushfire scenarios. This was also raised during the round table discussion. More widely, and in line with previously documented concerns, a number of survey respondents and round table participants pointed to inadequate data for modelling and assessment of potential climate risks at the local level, a theme discussed further in the sections below.

2.2 Local climate change adaptation initiatives

A key objective of the survey was to ascertain the range of climate change adaptation initiatives being undertaken by coastal local government areas, particularly in non metropolitan contexts. The survey included questions about the types of climate adaptation activities local governments had undertaken or planned to undertake. As shown in Figure 2.2, more than half of the survey respondents reported that their council had undertaken a study or formal climate change risk analysis.

Figure 2.2: Which of the following initiatives, if any, has your Council completed, commenced or planned?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=34

Nearly a third of respondents have prepared a climate change adaptation strategy, with remaining survey respondents in the process of preparing a strategy or planning to commence one in the near future.

Although only four local governments reported that they had already changed their local planning controls to provide a basis for climate adaptation, nearly 90% had commenced action to change planning controls or intended to make changes in the near future. Similarly, most respondents intended to change their approaches to infrastructure design and decisions about investment and capital works.

Climate risk analyses

Participants in the round tables revealed much variability in climate change adaptation practice. For instance, there are considerable differences across the states and at the local government level in approaches to climate change risk analysis. Approaches range from:

- site based studies required to accompany development proposals in certain locations;
- targeted analyses of sea level rise and associated natural hazard impacts associated with climate change at the local government area scale;
- regional studies of risks associated with climate change undertaken by groups of local governments ; and,
- more comprehensive analyses of social and economic impacts alongside issues such as sea level rise, storm surge and other natural hazards

While it is difficult to generalise, the discussions and survey returns suggest that site based studies are a particular focus of risk analyses in Victoria. More targeted analysis of sea level rise, natural hazards, and inundation are frequently undertaken by local governments in New South Wales. Regional studies have been undertaken by groups of local governments in Western Australia and are anticipated for South Australia, although there are examples of regional collaboration in each of the states. Comprehensive climate change risk analyses and strategies are an emerging feature of climate adaptation practice in South East Queensland.

A continuum of climate change adaptation planning responses

In examining the range of initiatives reported by survey respondents, a continuum of stages in developing climate adaptation responses was evident, beginning with risk analysis (completed by the majority of survey respondents), moving through the preparation of an adaptation strategy through to changing planning controls (commenced or planned to be undertaken by most respondents). This finding is consistent with previous research identifying the conduct of a climate risk analysis as a precondition for further adaptation action in Australian public and private sector organisations (Gardner, Parsons, and Paxton 2010).

A round table participant described this as an iterative process whereby a risk assessment provided a basis for attracting funding for a comprehensive planning response:

> "We've got a few stages in what we've done. First of all in 2000 we did a natural disaster risk management study [when] there was a lot of disaster funding available … A later study was our climate change adaptation plan not just looking at natural hazards but looking at the other [social and economic and emergency] responses" (local government participant, March 2011)

Others described moving simultaneously on several fronts, from addressing potential risks to council infrastructure and assets to strengthening local planning controls:

> "We seem to be moving in two directions. We have started (rather half heartedly in my view) to look at what's vulnerable in council infrastructure. We are moderately well advanced with a

development control plan which sits under our local environment plan for taking on board work done before the state Department of Planning in NSW issued their coastal planning guidelines which set a hazard line. We engaged [a consultant] to do some hazard mapping for us and … our council professional staff, resolved that we should not have any future development in front of that hazard line. We have that as a development control plan. So you can turn up at the counter, push your application across the counter and get something back that says yes you can build there or you can't" (local government participant March 2011).

Community education and engagement

In the round tables the need for effective community communication and engagement was emphasised. Some described a community 'pushback', with potential to erode local political support for existing planning measures addressing climate change adaptation, given the potential implications for local property values and development:

> "The political sense … is that there has been a pushback in the community. We have significant wealth invested in properties of a million and a half price range. [The introduction of hazard] lines drawn on these maps, [means the] potential development [of these properties might be] sterilised to a very substantial degree and that's where the massive push back is coming from. And the sense politically is well why should we do that when the science is uncertain?" (local government participant, March 2011)

Other participants spoke about needing to change their language as a basis for communicating with community members about potential risks.

> "Often the difficulty with sceptics is [they won't engage about climate change].... if you talk climate variability [instead] there's so much information that you can get from people cause they know droughts, they know floods, they know storms. If you start with climate change so many of these people with good knowledge just clam up and go, "Oh no, no, no, you know, [we] don't believe in it." You say, "Well what about your history with storms and floods and cyclones?" Wealth of information to lay on the table. So the softest way has been to talk about climate variability because that resonates with people who might not believe in climate change" (Local government participant, March 2011).

There was also round table discussion about the triggers for undertaking action. Aside from the issue of funding (which was strongly associated with climate change adaptation action, and is discussed further below), participants spoke about the 'politics' of climate change, such as the importance of a 'catalysing' event:

> "Local governments [need to] react to something. The drought two years ago really brought forth climate as a major issue. Then that instigated a regional approach with all of the local governments around Western Port." (Local government participant, Victoria, March 2011)

Others indicated that the present political composition of their council made any climate change response unlikely:

> "The … shire has over 70 kilometres of coastline, several coastal towns, and [council] puts their head in the sand and says not in my backyard." (Local government survey respondent, March 2011).

Professional standards, quality and expertise

Finally, in the round table discussion, reservations were expressed about the quality of some of the vulnerability or risk assessment work being undertaken by the private sector. This was a particular issue in Victoria, where individual developments in the coastal zone require a site based vulnerability assessment to accompany proposals. Participants expressed the view that these assessments were often expensive, of questionable rigor, and likely to be drafted in a way that favours the development.

> "There are very few consultants trained, it's costly, and they're going to write it up in a way to favour the development. I don't know that it's a very independent way of going about things" (local government participant, March 2011).

Others indicated concern about their own capacity to assess these reports, given the lack of formal training or established criteria for review.

> "It basically landed on my desk and … how do I assess this, I've not been trained, I have no background in it. We need to have the technical capability or we need to at least engage a peer review of the consultant's report and a peer review costs a lot of money" (local government participant, March 2011).

2.3 Financial implications of climate change for local government

A series of questions were asked about the financial implications of climate change for local governments. Respondents were asked:

- whether their local government had undertaken a risk or financial audit to estimate potential losses associated with climate change, and, if so, the magnitude of these losses;
- the amount of money that had been spent by the local government area on climate change adaptation measures to date;
- the amount of money, if any, that had been budgeted for climate change adaptation measures in the financial year between 2010-2011; and,
- the amount of funding allocated for climate change adaptation measures in the following financial year.

As anticipated, responses to these questions varied. Firstly, only six respondents (of 34) indicated that their local government had commenced an analysis of likely financial liability arising from climate change risk, although 19 advised that such an analysis was anticipated in the near future (Figure 2.2 above).

Of those who had commenced this analysis, the scope and methodology of the analysis varied greatly. Further, the scale of exposure and the nature and value of assets potentially exposed to climate change risk will differ significantly according to local context.

Responses indicated that the major areas of financial exposure relate to infrastructure, insurance, and legal liability. Local governments in areas with significant local infrastructure (particularly roads, water and sewer facilities) and regional facilities (particularly airports, hospitals, emergency services), located in low lying areas faced obvious financial exposure in the short to medium term, with estimates in the hundreds of millions of dollars over time.

Another issue associated with financial liability relates to risk and insurance against risk to life and property, with some local governments having commenced discussions with the insurance industry to scope potential exposure. A third issue concerning financial exposure relates to potential litigation in relation to decisions about development in potentially vulnerable locations.

Resources expended and areas of expenditure

Expenditure on climate change adaptation is related to the level of activity already underway in each local government area, the amount of overall resources available to the council, and the nature and immediacy of climate risk.

Estimations of expenditure ranged from approximately $3,400 spent on staff education activities to over $10 million on coastal protection works relating to sea level rise. Responses indicated that:

- some local governments have isolated climate adaptation spending in relation to specific projects or works, while others used a climate change fund to provide ongoing resources for strategic programs beyond capital works expenditure;
- a number of local governments have begun to integrate climate change adaptation as one of the outcomes needing to be demonstrated as part of their capital works programs, with one respondent likening this to the way in which "occupational health and safety considerations" have been mainstreamed across council planning;
- therefore it can be difficult to separate out the funding commitment relating specifically to climate change adaptation; and,
- smaller local governments tended to spend considerable resources on consultant studies and on the preparation of adaptation strategies or plans, in addition to imputed resources in staff time on these projects.

In sum, the main areas of expenditure to date have been on risk analyses, the preparation of adaptation strategies or plans, and legal opinions, as well as capacity building (staff education and development), community information and engagement, and infrastructure upgrading / coastal protection works.

Estimations of financial expenditure budgeted by the local government area for climate change adaptation in the current financial year were surprisingly definitive, suggesting that some are beginning to identify specific funding for climate adaptation. Amounts budgeted ranged from nothing, through to $1.25m, with more typical amounts relating to the development of adaptation strategies (in the vicinity of $20,000-$50,000).

Estimates for the following financial year were less concrete, although a distinct cluster of local government respondents indicated projected expenditure of over $100,000, largely to carry out projects arising from risk adaptation strategies or to fund more assessment of risk.

2.4 Resources and financial assistance for climate change adaptation

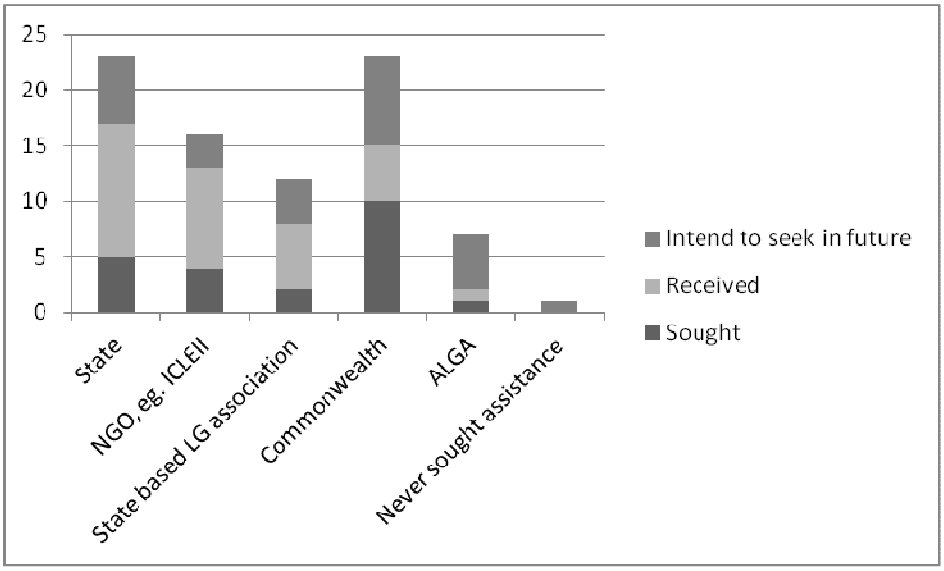
Previous research and policy development work has emphasized the importance of access to additional resources in helping local governments build capacity for climate change adaptation, particularly in local government areas already struggling with resource constraints (Australian Local Government Association 2010; Tompkins et al. 2010; Gardner, Parsons, and Paxton 2010). Consequently, survey respondents were also asked whether their council had sought or received any government or non-government assistance for climate change adaptation activities (Figure 2.3).

Twelve respondents had already received funding for climate adaption activities from their state government, and nine from a non-government organisation, primarily from the international group

Local Governments for Sustainability (ICLEII). Others had won funding under the Commonwealth's *Local Adaptation Pathways Program* (LAPP) which, as noted, provided funding for adaptation initiatives between 2009-2010.

State based local government associations have also been an important source of funding for climate adaptation in coastal areas.

Figure 2.3: Has your LGA sought or received any government or non-government support or assistance for climate change adaptation activities?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=27

The importance of funding for climate change adaptation initiatives was underscored by both successful recipients and those who had so far been unsuccessful in securing external resources:

> "It also depends on resources, the capacity of the council and the officers to know about the money, be able to go for the money, have the [capacity to undertake funded projects] – some people in a small council, they've got half a person doing environment. So I think there are equity issues in terms of funding." (local government participant, March 2011)

The difficulties in seeking competitive funding were emphasised:

> "A lot of funding is competitive funding. When it's competitive funding there's a lot of energy that goes into going for grants and funding and time … [and often] you've got to match the funding. It would be great to have more strategic funding which gets everyone to the same benchmark" (Local government participant, March 2011).

While overall levels of application for funding to Commonwealth and state government schemes are similar, responding local governments have been far more successful in securing money from state sources than from the Commonwealth (which had funded five of the respondent local government areas but attracted applications for funding from more than 50 per cent of the sample). This finding is significant, because consistent with previous research (Gardner, Parsons, and Paxton 2010), those local government areas who have received external funding towards climate change initiatives are more likely to exhibit engagement in climate change adaptation.

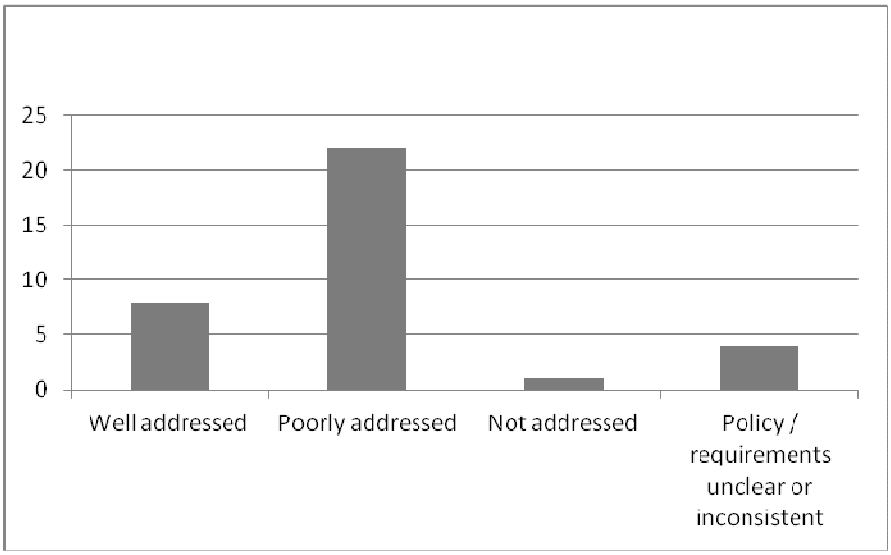
2.5 Perspectives on state and local legislation and policy for climate change adaptation

To assess perspectives on current and prospective legal and policy responses to climate change adaptation, the survey included a series of questions about the adequacy of state and local legislation, regulation, and policy in relation to sea level rise, infrastructure design standards, building design standards, and inundation. Overall, the majority of survey respondents expressed the view that each of these areas were either poorly addressed, or that policy requirements were unclear or inconsistent (Figures 4 and 5).

> "The legislative and policy framework is variable. I don't think there's been any serious attempt to update the actual legislation … there's nothing in the planning Act" (local government participant, March 2011).
>
> "There's a whole range of tools and planning and legal tools that need to be developed" (local government participant, March 2011).

Given the non representative nature of the sample, it is difficult to assert particular satisfaction or dissatisfaction with certain jurisdictions, with many respondents expressing vehement dissatisfaction with their state level planning framework.

Figure 2.4: How adequate do you think the state planning framework is in relation to sea level rise and climate change adaptation?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=27

Open ended responses to the survey addressed particular aspects of the perceived shortcomings in state and local planning systems, such as a lack of guidance for determining when a development application should be refused. Several round table participants called for a firmer set of mandates to guide local government planning.

> "Stronger planning policy is required from a state government level as to what to do with this information, when to say "no more" (local government participant, March 2011).

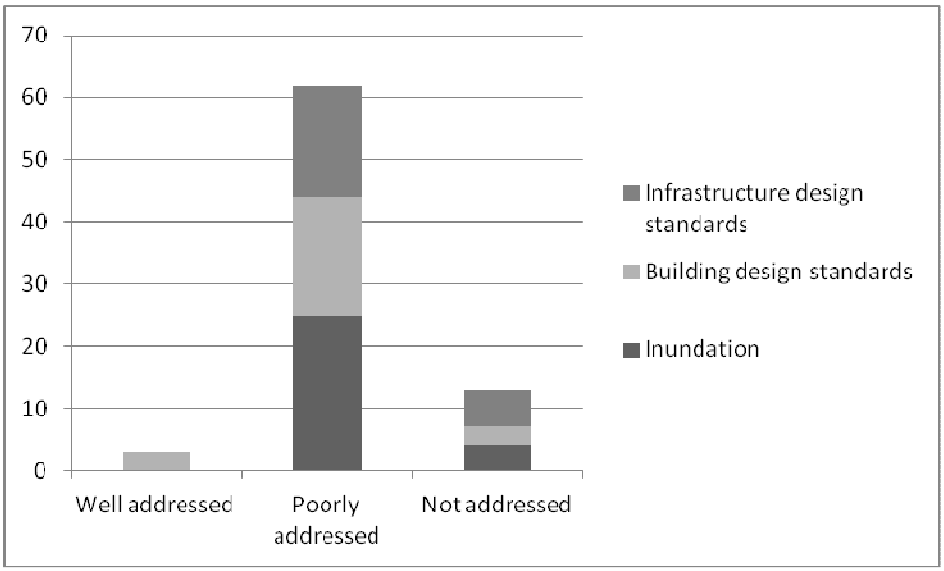
In the context of Victoria, survey respondents and round table participants expressed the view that despite weaknesses in the overall policy framework for coastal policy and climate change, the benchmark sea level rise threshold (of 0.8 meters by 2100) had provided a major step forward in planning for climate change:

> "We've got a stake in the ground at 0.8 of a meter which we must plan for. I think the way that we're arguing is, how do you do that, not is it a good idea. So we've actually got a major victory in terms of trying to progress the debate about planning. I think it's better to have a figure in than not, it's better to be having a conversation around are the tools adequate rather than still trying to argue over a number" (former councillor, March 2011).

Others commented that the sea level rise benchmark provides a flexible tool to allow local responses to emerge:

> "The theory is that it needs to go back to local levels and you need different solutions for different places. So, you know, a heavily built up area that's got a huge amount of asset that sits behind it whether it be public or private, may call for a different defence response than say a small hamlet where it may in fact be cheaper to help those people relocate in whatever means you choose" (state government participant, March 2011).

Figure 2.5: How adequate do you think the state planning framework is in relation to climate change adaptation?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=34

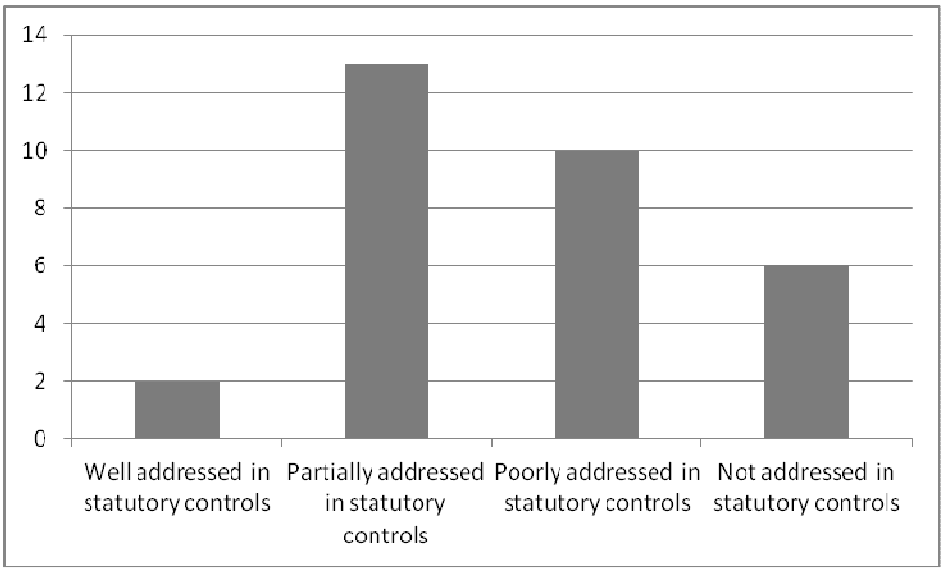
Infrastructure and design standards

More generally, some respondents referred to a potential disconnection between state planning policies for more concentrated development in existing centres, through infill and urban consolidation, and climate adaptation considerations for building design. Others indicated that state government "inaction" meant that local governments have needed to progress responses independently, leading to "inconsistency and duplication" and a "waste of resources" (Survey respondent, March 2011).

Local planning framework

Views about local planning frameworks were slightly more mixed. In some areas, sea level rise is being addressed in local plans, with 13 respondents indicating that sea level rise was partially addressed in their planning framework. However, the majority of survey respondents indicate that sea level rise is not addressed or is poorly addressed in their controls (Figure 2.6).

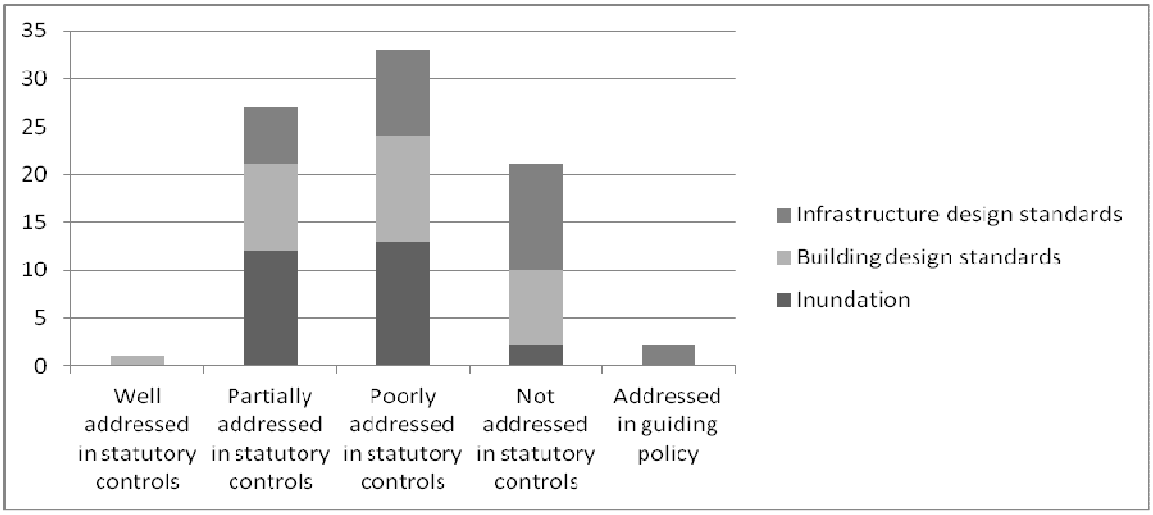
Figure 2.6: How adequate do you think the current local planning framework is in relation to sea level rise?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=34

In relation to other climate adaptation measures, again, most participants indicated that climate change adaptation related considerations for infrastructure and building design and inundation were poorly addressed or not addressed in statutory planning controls (Figure 2.7).

Figure 2.7: How adequate do you think the current local planning framework is in relation to adapting to climate change?



Source: Climate change adaptation planning in Coastal Australia survey 2011, N=34

Several respondents asserted the difficulties in addressing climate change through statutory controls, due to the absence of sufficient mapping data. The issue of building heights is a particular concern in amenity areas. A number of respondents referred to the issue of building heights, which, they argued, should be lifted to provide protection against inundation. However, to do so would undermine existing standards relating to views and amenity. Such issues may be best addressed through the preparation of specific coastal climate change resilience design guidelines and criteria for balancing existing amenity considerations with potential future climate impacts.

Planning, risk management, and property rights

In discussing the adequacy of the planning framework, the issue of risk was a major focus for local government participants. Respondents indicated different, and changing, approaches to advising property owners of climate risk and of associated planning controls or requirements.

> "There was a period in council when we had the map, [but didn't] make that publicly available cause of the risk that there could be for property values. But, there's been a real ... shift in focus because now we're individually identifying properties at risk of storm surge and we're actually in the next couple of months actually putting stickers in the meter boxes of those properties." (local government participant, March 2011)

> "People want to know and once people know there's a risk of storm surge they know that there's sea level rise but they're still going to choose to live in the beach; they're going to take that risk." (Local government participant, March 2011)

The requirement for advice about coastal risk on NSW planning certificates applying to individual properties was regarded as a positive development by round table participants:

> "It's all about risk management, so that the information is there and people have got this if they go and buy a house in an area [that] has been identified as at risk. So it really is just putting the information out to the community. It's just one other piece of information when you go and invest in property." (Local government participant, March 2011)

Others emphasised that the notion of risk in coastal contexts is not yet settled:

> "It might be fine till 2070, so it's OK at this point. Last thirty years it's getting its feet wet but it's had seventy years or sixty years from 2010 to 2070, sixty years where actual risk is below the one in hundred year [exposure]. That's a pretty safe bet for sixty years. So we haven't yet articulated what constitutes acceptable levels of risk." (Local government participant, March 2011)

As previous forums have identified (Department of Climate Change and Energy Efficiency 2010), a more nuanced approach to risk whereby different standards might apply for different development types and timeframes, was advocated by some round table participants.

> "You don't want your emergency control centre to be underwater and inaccessible in a flood so you'd be very safe and put it high and dry for sure. But, there's a classic example of a bar or restaurant ... right down at the prime location right next to the water. It's been wiped out five times and rebuilt in the same spot because it's very profitable to be there as a commercial enterprise. I'm not recommending that but the point is there are values in location. We spend a lot of time emphasising the cost and risk and there's nothing wrong with that, but we haven't yet spent as much effort looking at the value or the rationale or the benefits of some of these hazardous locations." (Local government participant, March 2011)

> "Now, we keep thinking that you've got to have this land, it's got to be dry 100% of the time for another hundred years. I don't know we should take a hundred years, why couldn't it be 60, 40? I think we need to look for some of those other opportunities rather than just saying it's got to be dry." (Local government participant, March 2011)

Several participants described pressure from more affluent newcomers who had purchased sites in vulnerable locations, and now sought to secure approval for new development, despite climate risk.

> "I've got residents who could have bought there in the past and they didn't because they accepted the risk. They watched the waves come in, they watched it all go, you know, the road go out and the jetty go out and the houses go, but now we've got some of the richest people in this country who came and bought it and quite frankly just said we don't give a stuff what the council says, we've got mates in high places. We'll build it if we want." (Local government participant, March 2011)

These conflicting pressures arising from various stakeholder groups are a major concern for local councillors and professional staff.

2.6 Government support

Survey respondents were asked to indicate the key state and Commonwealth initiatives likely to be of most benefit to their own local government area (Table 3).

Table 3: Which of the following state or Commonwealth government initiatives would be most beneficial for your own LGA?

Initiative	High priority	Priority
Stronger state policy	26	4
Stronger Commonwealth policy	26	4
Assistance in undertaking a climate change risk analysis and adaptation planning strategy	21	2
Funding for adaptation measures	20	8
Assistance in reviewing / change land use planning controls	17	12
Understanding / assessing community vulnerability	16	14
Better communication of information from initiatives	15	11
Access to legal advice	12	13
Assistance in developing strategies to assist with community engagement and build community resilience	10	19
A dedicated member of staff to undertake climate change adaptation initiatives	7	16
Staff training	4	20

Source: Climate change adaptation planning in Coastal Australia survey 2011, N=34

As shown in the table, stronger Commonwealth and state policy on climate change adaptation was ranked as the highest priority measure. Also a high priority was state or Commonwealth assistance in undertaking risk analysis, and in reviewing local government planning controls.

Thirty respondents called for assistance in understanding community vulnerability to climate change risk and 29 respondents prioritised assistance in developing strategies for community engagement and resilience.

Respondents also called for better communication of information arising from Commonwealth and state initiatives, both in terms of understanding the outcomes of these initiatives but also knowing opportunities to secure any available external resources.

Commonwealth and state mandates

In round table discussions, the wider policy work of the Commonwealth was regarded to be extremely important:

> "The first pass assessment really shifted [thinking]. For instance, in our council it has shifted us from this idea of mitigation to adaptation. There has been an evolution [of this work] over time and that has been deeply influential." (Local government participant, March 2011)

Round table participants also emphasized that strong state policy provided a mandate for local government action:

> "I'm of the view that you do need good legislative frameworks which don't give local governments wriggle room to get out of putting in place good land use policies." (Local government participant, March 2011)

Assistance in interpreting technical vulnerability assessments undertaken to support particular development applications was also raised as a priority in the round table discussions.

> "We're working at the tail end backing up the wrong way. There's been no process of rolling this out, no capacity building for local government, no training people in my role or funding for assistance." (Local government participant, March 2011)

As part of this, a major issue was assistance in addressing problems associated with existing development in locations that are now vulnerable:

> "It's the old stuff; it's the retrospective stuff that was built below sea level. Stuff that was built on reclaimed land that is now naturally getting washed away or whatever. Where the only practical albeit very expensive option [is] to buy these people out [on land that] and should never have been developed." (Local government participant, March 2011)

A similar issue requiring higher level government support, relates to whether damaged homes should be able to be rebuilt in vulnerable locations, such as areas prone to significant flood risk:

> "Common sense and the way in which we've been educated about the imperatives of climate change and adaptation, says that if it's stupid to have done it in the first place [we shouldn't build there again, but] how do we solve this problem for these guys without placing a huge burden on the other [residents] of the region to buy them out?" (Local government participant, March 2011)

Commenting on rebuilding following the Queensland floods, one participant noted the financial hardship faced by home owners who had recently purchased their property:

> "Unfortunately most of these families [are] not the original owners. They didn't build the houses. They bought them two years ago or nine months ago in some cases and so people sold them knowing that they did flood." (Local government participant, March 2011)

This was also seen to be a wider issue requiring government policy and financial support for resolution.

Summary and implications

In summary, the findings of this survey of climate change adaptation planning in coastal Australia reinforce concerns about the physical exposure of coastal areas to climate change risk, as well as concerns about legal liability in making decisions that might unnecessarily quarantine land from development or exacerbate future vulnerability. In the many high amenity coastal areas represented in this study, potential impacts on local infrastructure and future quality of life are a major concern. In response, many local government participants commented that they had commenced formal climate adaptation initiatives. These range from studies of local vulnerability through to specific changes to local planning schemes. Some responses to climate change adaptation are comprehensive, addressing many sectors of local government responsibility and may extend to the regional scale; but others are site based and focus on assessing and ameliorating risk in relation to a specific site or development.

It appears that a continuum of local practice in climate change adaptation planning is emerging, beginning with a climate risk analysis, and extending to a spectrum of other initiatives. Several local government areas are undertaking community engagement strategies to help prepare residents understand and prepare for future impacts.

However, most local government activities are at a very preliminary stage of development. Smaller local government areas in particular face barriers to action associated with their limited financial and human resources. In some cases, pressure from affluent property owners, or community "pushback" arising from climate change scepticism is eroding local political support. This will have implications for the implementation of climate adaptation strategies over time.

3. Climate change adaptation planning in Coastal Australia: Audit of local practice

The following section highlights the range of climate change adaptation initiatives emerging across coastal Australia in more detail. Initiatives were identified through responses to the local government survey, round table discussions, reviewing the projects funded under the former Local Adaptation Pathways program (Tables 1 and 2 above); as well as via targeted reviews of the Australian Local Government Association (ALGA), and state local government association websites; Commonwealth and state climate change websites, and the National Climate Change Adaptation Research Facility (NCCARF) online library of case examples.

Consonant with the need to address climate adaptation across the range of community, economic, and environmental responsibilities of local government, our analysis of initiatives in this section of the report spans several themes and action areas:

- Risks, assets and infrastructure
- Community vulnerability and resilience
- Environment, amenity and lifestyle
- Economic transition and adaptation
- Governance, liability and insurance
- Planning controls

Some local government areas, such as Byron in northern NSW and Cairns in northern Queensland, have a long commitment to natural hazard planning and community engagement, but most initiatives referred to in this report commenced in the past three years. Therefore, as expected, the implementation of actual actions arising through these planning processes is less advanced.

Many of the initiatives identified, notably the climate change adaptation plans and strategies, touch on a range of issues. Consequently, a number of local initiatives are referred to under several thematic areas.

3.1 Risks to Assets and Infrastructure

Initiatives to address risks to infrastructure identified through this study are generally at the scoping and planning phase, rather than fully developed or executed, and date from 2009-2010. While some plans provide a basis for changing existing approaches to managing infrastructure risk, able to be implemented over time as part of already budgeted public works, others refer to different strategies which will require additional research and financial resources if they are to be achieved. The following examples are representative of work being undertaken through climate adaptation planning initiatives, although such work is by no means established practice across the range of local government areas involved in this study.

- Cairns Regional Council's climate change adaptation action plan (2009) establishes a basis for undertaking spatial analysis and mapping of potential climate risks to community infrastructure, local assets and operations. It seeks to establish collaboration with the state government Department of Infrastructure and Planning as well as with local infrastructure service providers.
- The city of Mandurah's climate risk assessment and adaptation plan includes detailed spatial analysis of climate risk to local infrastructure.

- The City of Onkaparinga's Climate Change Strategy (2008-2013) establishes a framework for assessing climate change risk to city assets and for a wider vulnerability assessment across the community.
- Clarence Valley in NSW is proceeding to implement an adaptation plan in association with *Statewide Mutual Liability Scheme;* providing a basis for external support and collaboration in adopting a risk management framework for local operations and future development.
- Lake Macquarie City Council in NSW has identified 37 'risk amelioration actions' for council to respond to specific hazards (such as sea lake level rise and storm surge). Additionally, its website includes a community tool for identifying localised shoreline vulnerability to sea level rise, storm surge, and inundation.
- A regional approach to assessing and managing risks to infrastructure was undertaken by the Batavia Regional Organisation of Councils (in Western Australia), utilising funds provided by the Commonwealth under the Local Adaptation Pathways Program (round 2). The *Batavia Regional Organisation of Councils Climate Change Adaptation Action Plan (2010)* identifies local infrastructure vulnerable to climate exposure and establishes processes for monitoring and auditing the condition of council assets over time.

3.2 Community Vulnerability and Resilience

Community education and engagement initiatives identified through this study tend to focus more on mitigating climate change by encouraging alternative behaviour and consumption patterns, rather than on climate adaptation, although the need to commence adaptation actions is foreshadowed. However, there have been a number of specific community initiatives related to emergency planning and health, including programs to foster community awareness of climate change related risks.

- Onkaparinga's Climate Change Strategy, includes a series of actions for increasing community awareness of climate change through events and forums; as well as for exploring potential for community engagement in new economic opportunities associated with climate friendly technology, such as renewable energy generation.
- Clarence Valley's Climate Change Advisory committee (appointed in 2010) has helped build local awareness of climate change and potential impacts, as well as the need for action.
- A number of local government areas have given particular thought to vulnerable sectors of the community in undertaking emergency response planning and in communicating information to residents. For instance, Cairns Regional Council's adaptation plan includes a section on community health. The draft Climate Change Adaptation Strategy for Geelong in Victoria includes a commitment to reviewing the existing Emergency Management Plan, as well as to collaborate with emergency service and response agencies.
- The Batavia Regional Organisation of Councils has committed to identifying vulnerable community members and to developing a plan to assist them during extreme weather events, such as heat waves. The climate adaptation strategy also contains important commitments to developing early warning and reporting systems for extreme weather events, ensuring that council buildings and facilities can double as community shelters.

- The Greater Taree Climate Change Risk Assessment and Adaptation Plan (November 2010) includes specific actions for community education about risks and preparation for extreme weather events such as floods.

3.3 Environment, Amenity and Lifestyle

Several of the plans and strategies identified through this study recognise that climate change is also threatening the natural amenity of coastal areas, with corresponding lifestyle implications. A key goal is to reduce other, non climate related stresses on coastal environments to improve overall resilience.

- The Sunshine Coast Regional Council's Climate Change Infrastructure Risk Assessment and Adaptation Strategy Project (2009) includes assessment of 'natural infrastructure' such as beaches, dunes, creeks and waterways as these provide buffers against climate impacts or are part of the drainage network.
- The adaptation action plan for the Batavia Regional Organisation of Councils includes provision to manage foreshore area in relation to long term climate risk and to engage the community in undertaking biodiversity remediation works.
- The City of Geelong's draft Climate Change Adaptation Strategy recognises the potential economic impacts associated with the loss of coastal habitats and consequent impacts for local amenity and tourism appeal, although ameliorating actions are less developed.
- Taree's Climate Change risk assessment and adaptation plan includes a commitment to addressing risks associated with siltation and pollution of waterways as well as potential beach and foreshore erosion.

3.4 Economic Transitions and Adaptation

Many coastal amenity areas are already under economic pressure, and potential climate change impacts on agriculture, fishery and tourism sectors mean that strategies to assist local industries adapt to potential climate change impacts are particularly important.

- The City of Onkaparinga's Climate Change Strategy 2008-2013 establishes a basis for working with natural resource development industries (including wine and food producers) in conjunction with the state government's Department of Water Land and Biodiversity Conservation on climate change adaptation;
- The Batavia Regional Organisation of Local Governments intends to work with stakeholders to identify potential alternatives uses for marginal agricultural land, perhaps including the production of renewable energy, aligning climate change mitigation goals with an economic adaptation strategy;
- The Sunshine Coast promotes economic as well as environmental resilience through its "localisation" strategy for food production and consumption.

3.5 Governance

Governance is increasingly emphasised as central to effective climate change adaptation (Norman 2010). Several coastal amenity communities have included a specific governance focus to their

adaptation plans. For instance, Cairns Regional Council aims to foster capacity and leadership through a dedicated climate change response team. Greater Taree City Council emphasises the importance of regional collaboration to climate change adaptation.

Several of the adaption plans and strategies reviewed identified the need for clearer understanding of liability and insurance issues as well as scope for relief funding in the event of extreme weather and natural disasters.

Collaboration at the regional level is demonstrated by emerging models such as that demonstrated by the Batavia Regional Organisation of Councils, which has developed a joint climate risk and adaptation strategy.

3.6 Planning regulations

While climate change adaptation requires a holistic response across local government sectors of responsibility, establishing an appropriate planning framework to minimise future climate risk is a major priority. However, given the lag time between policy and state level legislative change, it takes time to amend spatial planning documents and development controls to reflect new environmental or other considerations. Therefore, although many of the climate adaptation strategies and frameworks discussed above emphasise the need to revise planning regulations and controls, in many cases these commitments are yet to be fully implemented.

In examining how climate change issues are being addressed through strategic spatial land use plans and development criteria, the planning instruments of coastal, non-metropolitan Local Government Areas that received funding under the Commonwealth's Local Adaptation Pathways Program were reviewed, as were documents referred to by respondents to the survey and round table discussions. Our review focused on plans that have been adopted, amended or released in draft form since 2008.

In considering New South Wales planning instruments, it is important to note that the new Standard instrument Local Environmental Plan (LEP) for New South Wales (which must be followed by local governments when preparing their own plans), includes a standard clause that must be adopted by all coastal councils. This clause (5.5), which reflects NSW Coastal Policy, states that development consent should not be granted for development of land wholly or partially within the Coastal Zone unless the consent authority has reviewed the effect and impact of coastal processes and coastal hazards, including sea level rise, both on and arising from the proposed development (clause 5.5). Climate change impacts are partially covered in the standard objectives pertaining to flooding, which aim "to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change" (clause number varies by LEP). These are significant steps forward in supporting local planning responses to climate change.

- Kiama Municipal Council addresses climate change related risks including sea level rise, under section 7 of its new LEP (2011), which pertains to flooding. A Foreshore Building Line is defined under Clause 7.6 of the LEP. The demarcation is as set out in the Foreshore Building Line Maps which accompany the LEP. Clause 7.6 sets parameters for development on the coastal side of the Foreshore Development Line. This includes limiting development to specific activities, such as alterations or extensions to existing buildings, boatsheds and retaining walls. It states that development consent must not be granted unless the consent authority is satisfied that climate change impacts, including sea level rise and changing flood patterns, have been considered (clause 7.6).

- The Northern Territory Planning Scheme does not include any reference to climate change in its area-wide policies, but makes provision for climate change adaptation consideration in specific areas. For example, in Francis Bay, development must adapt to the likely effects of climate change on storm surge levels by: constructing all marina and sea walls to a minimum top level of 6.5 AHD; and by siting the lowest floors of all commercial and residential development at a minimum of 6.5m AHD.

- The *Cairns Plan*, which is the Consolidated Planning Scheme for the Cairns Region, identifies climate change risk mitigation under the Desired Environmental Outcomes of the plan. Recognising that 'global warming' and impacts such as sea level rise could potentially exacerbate the effects of storm surge and tidal inundation in the region, one of the outcomes identified under 'risk management' is to minimise risk to the health and safety of the community as a result of flooding or storm surge. The following performance indicator is identified to support the desired outcome:

  > Where development has occurred, have the threats to the safety and health of the community which may result from flooding, slope instability, bushfire, contaminated land, reduction in air quality, or increase in noise levels been minimised? (clause 2.2.4)

- The Onkaparinga (City) Development Plan includes Council-wide 'Coastal Areas' planning policies. One of the objectives is to encourage "development that can accommodate anticipated changes in sea level rise due to natural subsidence and probable climate change during the first 100 years of the development". Amongst other requirements, the plan specifies that "Development should be set back a sufficient distance from the coast to provide an erosion buffer which will allow for at least 100 years of coastal retreat for single buildings or small scale developments, or 200 years of coastal retreat for large scale developments (ie new townships)" unless the development incorporates appropriate private coastal protection measures to protect the development and public reserve from the anticipated erosion or the council is committed to protecting the public reserve.

Summary and implications

In reviewing emerging local practice in climate change adaptation planning, this section of the report has demonstrated the significant efforts being undertaken by many local governments in coastal Australia, particularly in relation to risk analysis; the preparation of adaptation strategies; and, increasingly, planning scheme amendments. A number of wider initiatives not mentioned here (particularly in relation to climate change mitigation, biodiversity conservation, sustainable agriculture, and coastal hazards) also represent important, ongoing strategies for long term community and environmental resilience and was detailed in the NSCT 2008 study (Gurran, Hamin, and Norman 2008). However, despite the clear potential for local government to lead climate change adaptation efforts, only a small proportion of local government in coastal Australia have so far engaged in significant climate change adaptation planning. Given the close relationship between external funding for climate change adaptation work, it appears likely that wider local government engagement to date has been limited by resource constraints.

Conclusion: Enhancing local practice in planning for coastal climate change adaptation

Two years after the landmark House of Representatives inquiry into managing the coastal zone in a changing climate (House of Representatives 2009), this study sought to:

- recalibrate the multi-dimensional issues associated with climate change adaptation faced by local representatives and local government professional staff in coastal Australia;
- review the scale and scope of established and emerging responses to climate change adaptation at local and regional scales in coastal Australia; and,
- identify priorities for further policy, practice, research development and external support.

A survey of local governments in peri and non metropolitan coastal Australia, and two round table discussions with local and state government planners, political representatives, and private sector consultants undertaken between February and July 2011, as well as a review of legislation and policy and an audit of existing practice in planning for climate change adaptation in coastal Australia were the main sources of information for the study. In this concluding section of the report, we summarise our main findings in relation to each research foci: the recalibration of priority issues; the audit of local and regional responses; and priorities for policy development, research, and external support.

Recalibration of priority issues

Since the publication of the NSCT's benchmark study on climate change planning in coastal Australia in 2008 (Gurran, Hamin, and Norman 2008), climate change adaptation issues concerning local government in peri and non metropolitan coastal Australia have gained significant policy attention (House of Representatives 2009; Coasts and Climate Change Council 2010; Department of Climate Change and Energy Efficiency 2010). Not surprisingly, participants in this study confirmed that the major areas of concern continue to relate to physical exposure to sea level rise, storm surge and inundation; the exacerbation of existing risk profiles due to ongoing development in vulnerable locations; and loss or damage to important coastal environments such as foreshore and recreational areas, with implications for coastal ecosystems, biodiversity and amenity.

Local government participants in this study also expressed significant concern regarding existing and potential future impacts to public infrastructure, buildings, and private homes, as well as the legal liability of local government in making planning decisions regarding the location and nature of future development given uncertainty surrounding potential climate impacts.

The capacity of local emergency services to cope with increases in the frequency and or severity of coastal storms and floods, as well as the community health implications of extreme weather events concerned all local government participants in this study.

Potential impacts for agriculture and fishery sectors, as well as uncertain implications for the tourism industry, exacerbate the vulnerability of smaller coastal communities beyond the major capital cities to ongoing processes of economic restructure and transition.

Overlaying these primary concerns are a number of additional factors with particular resonance for local governments in coastal Australia. These include:

- *Uncertain legal liability for spatial planning and development assessment decisions, the provision of information about climate risk, and activities relating to coastal management and protection.* Legal uncertainty regarding local government's liability for advice and decisions relating to climate change and risk, undermines capacity for action. Survey respondents and round table participants emphasised the need for new planning tools for climate change adaptation as well as much firmer state planning mandates to support local decisions.
- *The particular challenges associated with meeting the needs of ageing populations.* Maintaining community infrastructure and continuity of community services is particularly important in the context of ageing populations who face higher risks may have reduced mobility and require additional assistance during extreme weather events. Even ensuring ongoing beach and foreshore access for older residents can become an expensive undertaking for smaller local government areas facing ongoing beach erosion and storm surge.
- *The emergence of new risks associated with natural hazards such as bushfire is likely to become a major issue for smaller coastal areas.* Local government participants expressed particular concern about the lack of capacity and experience in planning for and minimising bushfire risk in their areas.
- *The quality of professional expertise and standards in undertaking climate vulnerability and risk assessments is a potential problem in some jurisdictions.* A number of participants in this study pointed to concerns about the lack of effective monitoring of the quality of private sector risk analyses being undertaken, particularly work being commissioned by developers to support a planning application. In part, these concerns are associated with the lack of clear industry standards and technical criteria governing data sources and analytical methods used in this rapidly evolving area of practice.
- *The full financial implications for adapting to climate change impacts remain unclear, but all local governments are already experiencing increased budgetary pressure associated with managing climate risk.* The major areas of expenditure include increased costs associated with obtaining legal opinions and, in some cases, defending planning decisions; meeting insurance premiums; and, coastal protection works. Other expense areas relate to staff education and time, as well as consultant studies and expert advice.
- *Local community "pushback" and scepticism towards climate change and potential impacts for coastal areas is emerging in many localities.* Local government participants in this study reported a new level of resistance towards climate adaptation strategies and planning provisions, amongst certain sectors of their communities. In some cases, landholders and developers have become more vocal in opposing development restrictions associated with climate risk management; while in other areas, general community "pushback" regarding the overall phenomenon of climate change, may undermine political support for climate action. In this context, new approaches to community engagement and awareness about climate change and potential impacts are particularly important.

Audit of local and regional responses

The results of the local government survey shows that many local governments in coastal Australia have begun to engage in climate change adaptation activities. Our round table discussions and review of initiatives funded under the Commonwealth's Local Adaptation Pathways program and the other

examples of adaptation practice identified through this study suggests that a continuum of climate change adaptation responses is emerging at the local level.

- *While local governments have begun to undertake climate change adaptation initiatives, for the most part these remain at the level of risk analysis, and in some cases, the development of strategic frameworks for climate change adaption.* Most of these adaptation initiatives are very new, having been undertaken in the past two years.
- *"Early adaptors" have commenced climate planning with detailed risk or vulnerability analyses before proceeding to comprehensive adaptation plans, covering a range of initiatives to build resilience across many areas of local government responsibility.* However, in most cases, these initiatives remain prospective rather than underway or fully implemented.
- *Less than a fifth of local government areas represented in the study had changed their planning controls to reflect climate change adaptation considerations.* Nevertheless, more than half of respondents reported that they had commenced the process of reviewing and amending their planning schemes and almost all intended to do so in the near future.
- *While considerable resources have been set aside in some larger local governments to provide for climate adaptation, in smaller areas, adaptation action is limited by resource constraints.* In these smaller local government areas in particular, there are reservations about the quality of professional climate risk analyses being undertaken and the capacity of local planning staff to adequately assess development proposals in vulnerable locations. Some government areas are addressing resource constraints by collaborating with neighbouring areas through a regional approach to risk analyses and strategic planning.

Priorities for policy development, research, and external support

Concern regarding the inadequacy of the current policy and legislative framework for addressing climate change, across all levels of government, was the major theme to emerge through the local government survey and round table discussions. However, participants acknowledged the significant work already undertaken, particularly the First Pass National Assessment of climate risks to coastal areas (Department of Climate Change 2009). Some participants reported that the assessment report had been extremely influential in expanding local government understanding of climate change beyond the need for greenhouse gas emissions reduction towards the potential impacts of changes already underway.

- *Many participants emphasised the need for a strong, integrated, and consistent policy framework for climate change adaptation stemming from the national level.* More than two thirds of survey respondents indicated that strengthened government policy would be of greatest benefit to their local government area.
- *Support for understanding and responding to specific areas of climate vulnerability within the community, in building collaboration, in disseminating information and in building engagement in climate adaptation initiatives.* Many respondents indicated that assistance would be best provided through a dedicated staff member.
- *Government funding and other resources (for instance, the capacity building activities of the Australian Local Government Association and the state local government associations) have been extremely important in helping coastal areas develop climate adaptation responses, particularly those without the rate base or professional staffing profile of larger capital city*

local government areas. However, many emphasised that competitive funding programs, the major sources of support to date, are resource intensive and may disadvantage smaller local government areas with fewer professional staff able to prepare grant applications and implement funded programs. Accordingly, local government capacity building remains a major priority, particularly in smaller local government areas with smaller professional staff and extremely limited resources.

- *Major inconsistencies and weaknesses across the spectrum of commonwealth, state and territorial climate change policy and law undermine local adaptation action.* However, several jurisdictions demonstrate approaches that might provide a basis for wider emulation. For instance, Queensland's new climate change adaptation framework appears to represent the new 'generation' of policies, not only by identifying sea level rise benchmarks for different time periods but also by graduating standards for different types of coastal development. The New South Wales action to limit local government liability for acts or advice undertaken in good faith enables a more constructive approach to local planning in coastal areas and facilitates information sharing with local communities.
- *A major priority for many local government areas in addressing potential climate impacts relates to the management of areas with existing development potential in areas now known to be affected by climate risk.* Participants called for higher level government support in delivering and resourcing schemes for compulsory acquisition or relocation, or to prevent rebuilding of assets in locations now situated in areas of climate risk. Some respondents referred to the need for new research and policy development on perceptions and expectations around climate risk.

This study has focused on assessing existing and emerging practice in adapting to climate change in peri and non metropolitan coastal Australia. While overall, Australian coastal government staff and representatives appear to demonstrate relatively high levels of awareness and willingness to act, particularly in comparison to international counterparts (Tang et al. 2010), the lack of a clear and consistent national level framework for integrated coastal planning and management, as well as inadequate and uncertain state and territorial policy and legislation for climate change adaptation, combined with significant resource constraints, continue to impede this work.

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Appendix 1: Description of local climate adaptation initiatives

Table A.1.1: Risks to assets and infrastructure

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets[1]
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west region of Western Australia
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Climate Change Adaptation Action Plan (May 2010)
Description:	The Batavia Region local governments are concerned about sea level rise as the majority of the region's population and vital infrastructure is located in ports and coastal towns. A risk assessment was undertaken as part of the regions Climate Change Adaptation Action Plan. The Plan identifies infrastructure as the Local governments ' operational area with the highest risk exposure to climate change impacts. A number of actions to manage these risks are identified in the Plan, including monitoring and auditing council assets and ensuring that council is up-to-date with technological innovations.
Council / Government/ Area:	**Cairns Regional Council**
Description of Area / Typology	Coastal City
Population:	164,356 (est. for June 30th 2009)
Location:	Far north Queensland
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Positive Change – Climate Change Risks and Opportunities for the Cairns Region: Climate Change Adaptation Action Plan (June 2009)
Description:	This Plan identifies the need to assess and map council assets and operations that may be vulnerable to climate change. It recognises that adapting to climate change may mean, for example,: • Upgrading transport and drainage infrastructure to cope with heavier

[1] Coastal area typology based on descriptive classifications developed through analysis of coastal amenity communities; see Appendix 2 ((Gurran, Squires, and Blakely 2005)

	rainfall. Consider climate change impacts when assessing major projects • Considering climate change impacts when making decisions about maintaining, upgrading and / or replacing current assets. The Plan suggests that an approach be developed through engagement with the Department of Infrastructure and Planning, as well as infrastructure service providers in the region.
Website / Reference:	http://www.cairns.qld.gov.au/__data/assets/pdf_file/0003/7860/ClimateChangePlan.pdf
Council / Government/ Area:	**City of Greater Geelong**
Description of Area / Typology	Coastal City
Population:	216,330 (est. for June 30th 2009)
Location:	75km west of Melbourne
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Climate Change Adaptation Strategy (October 2010) (draft for public consultation)
Description:	This strategy proposes that Council's asset management and maintenance planning documents be reviewed and a survey of existing assets be undertaken to determine potential risks to assets from climate change (considering location, design and / or building material). In addition to keeping up-to-date with technological improvements and operational standards, the strategy highlights the need to consider the procedures and costs required for upgrading infrastructure so that the real cost of upgrading versus rebuilding can be assessed.
Website / Reference:	http://www.geelongaustralia.com.au/common/Public/Documents/8cd335ac6e42864-DraftStrategy03.pdf
Council / Government/ Area:	**City of Mandurah**
Description of Area / Typology	Coastal City
Population:	68,269 (est. for June 30th 2009)
Location:	South of Perth
Planning Theme:	Risk Assessment
Resource / Planning Document:	*Coastal Zone Climate Change Risk Assessment and Adaptation Plan: Summary Document* (2009)
Description:	This risk assessment was undertaken in two stages. The first stage assessed the range of climate change related risks across the council area while the

	second stage, a site specific analysis, looked at where risks are highest and how they vary within the coastal zone. As a coastal council with a growth rate in excess of 5% per annum, the highest risk to Council is uncertainty in long term planning and infrastructure design.
Website / Reference	http://www.mandurah.wa.gov.au/HBItem_79614.PDF
Council / Government/ Area:	**City of Onkaparinga**
Description of Area / Typology	Coastal Commuter
Population:	160,404 (est. for June 30th 2009)
Location:	35km south of Adelaide
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Climate Change Strategy: 2008-2013 (Community Plan 2028 initiative)
Description:	Under Strategy 2: Prepare for Change and Manage Uncertainty, the *Climate Change Strategy* sets out a number of actions to better understand and mitigate the risks associated with climate change. These include: - implementing the Assessing Climate Change Risk Foundation Project to ensure risks to Council's assets are minimised, - conducting a study to assess the vulnerability of the City more broadly, and - advocating for a state-wide assessment of the vulnerability of key infrastructure.
Contact person:	Maggie Hine (Group Manager, Sustainability) maghin@onkaparinga.sa.gov.au (08) 8384 0666
Website / Reference:	http://www.onkaparingacity.com/onka/living_here/our_environment/climate_change_energy/climate_change_strategy.jsp
Council / Government/ Area:	**Clarence Valley Council**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	52,054 (est. for June 30th 2009)
Location:	Mid North Coast, NSW
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Climate Change Adaptation Plan (underway)
Description:	Clarence Valley's is preparing a Climate Change Adaptation Plan in association with Statewide Mutual Liability Scheme and Echelon Pty Ltd. The Plan will

	include a prioritised list of measures to mitigate the adverse effects of climate change, based on a risk management assessment.
Website / Reference:	http://www.clarence.nsw.gov.au/cmst/cvc009/view_doc.asp?id=4948&cat=198
Council / Government/ Area:	**Lake Macquarie City Council**
Description of Area / Typology	Coastal Getaway
Population:	199,277 (est. for June 30th 2009)
Location:	Central Coast, NSW
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	*Lake Macquarie Sea Level Rise Preparedness and Adaptation Policy;* *Schedule of Activities Leading to Preparedness for Sea Level Rise*; eShorance tool; NCCARF Adaptation Action Stories
Description:	Lake Macquarie is located around a coastal estuary where about 75% of the shoreline is developed. The Council was one of the first in Australia to adopt a sea level rise policy (in 2008) and has been singled out as a good practice example by NCCARF in its 'Adaptation Action Stories'. The Council's future planning and risk management strategy is based on the assumption that sea levels will rise 0.91m by 2100 (NSW Dep. Of Environment and Climate Change projection). The Council's *Schedule of Activities Leading to Preparedness for Sea Level Rise* identifies 37 risk amelioration actions for identified hazards (such as sea lake level rise and storm surges). eShorance (Estuarine Shoreline Response to Sea Level Rise), a tool which is available through the Council's website, can be used by community members to assess how their shoreline may respond in the event of sea level rise (including effects such as flooding and erosion). This assists with adaptation planning at the community level.
Contact person:	Sustainability Project Co-ordinator Climate Change Adaptation at ggiles@lakemac.nsw.gov.au or 02 4921 0365
Website / Reference:	http://www.lakemac.com.au/page.aspx?pid=109&vid=10&fid=1454&ftype=True http://www.lakemac.com.au/page.aspx?pid=109&fid=1555&ftype=File&vid=1&dlp=True; http://www.lakemac.com.au/eshoreance/; http://www.nccarf.edu.au/node/685
Council / Government/	**Sunshine Coast Regional Council**

Area:	
Description of Area / Typology	Coastal Getaway
Population:	323,423 (ABS 2009)
Location:	South East Queensland
Planning Theme:	Risk Assessment and Management
Resource / Planning Document:	Climate Change Infrastructure Risk Assessment and Adaptation Strategy Project (2009)
Description:	The purpose of this project is to provide a climate change infrastructure adaptation strategy based on an assessment of climate change risks to the Sunshine Coast infrastructure. The Climate Change Infrastructure Adaptation Strategy is based on an assessment of climate change risks to council controlled infrastructure with respect to construction and maintenance. The analysis included 'natural infrastructure' such as beaches, dunes, creeks and waterways that provide buffers against climate impacts or are part of the drainage network, while water supply and sewage infrastructure were not included as these functions were shifting to a regional water entity. The project was funded by a grant provided by the Commonwealth Department of Climate Change and Energy Efficiency under the Local Adaptation Partners Program.

Source: local government websites; ABS National Regional Profiles

Community Education and Engagement

Table A.1.2 Community Education and Engagement

Council / Government/ Area:	**City of Onkaparinga**
Description of Area / Typology	Coastal Commuter
Population:	160,404 (est. for June 30th 2009)
Location:	35km east of Adelaide
Planning Theme:	Community Education and Engagement
Resource / Planning Document:	Climate Change Strategy: 2008-2013 (Community Plan 2028 initiative)
Description:	Strategy 4, Build Knowledge and Support Action, outlines the Council's strategy for increasing community awareness of climate change issues. Actions include, for example, events, forums, and support from Council for community level initiatives which respond to climate change, such as investigating the potential for community owned renewable energy generation. Building on established initiatives, the Strategy reinforces the Council's continued commitment to providing environmental grants for community initiatives.
Website / Reference:	http://www.onkaparingacity.com/onka/living_here/our_environment/climate_change_energy/climate_change_strategy.jsp
Council / Government/ Area:	**Clarence Valley Shire**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	52,054 (est. for June 30th 2009)
Location:	Mid North Coast, NSW
Planning Theme:	Community Education and Engagement
Resource / Planning Document:	Climate Change Adaptation Plan (underway)
Description:	In 2010 the Clarence Valley Shire Council appointed a community-based climate change advisory committee to recommend strategies for responding to climate change, as well as education strategies to engage the community.
Website / Reference:	http://www.clarence.nsw.gov.au/cmst/cvc009/view_doc.asp?id=4946&cat=198
Council / Government/ Area:	**Sunshine Coast Council**
Description of Area /	Coastal Getaway / Coastal City

Typology	
Population:	323,423 (est. for June 30th 2009)
Location:	South eastern Queensland
Planning Theme:	Community Education and Engagement
Resource / Planning Document:	Climate Change and Peak Oil Strategy 2010-2010
Description:	This strategy takes an integrated approach to climate change mitigation and adaptation. It aims to reduce future greenhouse gas emissions by, for example, developing a community emissions reduction plan and promoting sustainable living through programs such as ecoBiz and TravelSmart. However, it also identifies a need to build partnerships and think tanks to support initiatives which increase adaptive capacity.
Contact person:	mail@sunshinecoast.qld.gov.au
Website / Reference:	http://www.sunshinecoast.qld.gov.au/sitePage.cfm?code=cc-strategy

Source: local government websites; ABS National Regional Profiles

Disaster Planning, Relief and Emergency Services

Table A1.3 Disaster Planning, Relief and Emergency Services

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west Western Australia
Planning Theme:	Disaster Planning, Relief and Emergency Services
Resource / Planning Document:	Climate Change Adaptation Action Plan (May 2010)
Description:	This action plan addresses the need to identify vulnerable persons in the community and to generate a plan to assist those people during extreme weather events, such as excessive heat waves. To protect the wider community, the Plan sets out a number of actions, including continued development and maintenance of early warning and reporting systems for extreme weather events and ensuring that council buildings and facilities can double as emergency shelters. Council will also continue to work with emergency services to educate the community about climate change risks, such as bushfires.
Council / Government/ Area:	**Cairns Regional Council**

Description of Area / Typology	Coastal City
Population:	164,356 (est. for June 30th 2009)
Location:	Far north Queensland
Planning Theme:	Disaster Planning, Relief and Emergency Services
Resource / Planning Document:	Positive Change – Climate Change Risks and Opportunities for the Cairns Region: Climate Change Adaptation Action Plan (June 2009)
Description:	This plan identifies the need to improve Council's disaster response and coordination capacity for example, by developing a flood-immune disaster co-ordination centre. Actions identified in the Plan include engaging organisations involved in forecasting and emergency / disaster response, as well as educating the community about natural hazards to reduce their vulnerability.
Website / Reference:	http://www.cairns.qld.gov.au/__data/assets/pdf_file/0003/7860/ClimateChangePlan.pdf
Council / Government/ Area:	**City of Greater Geelong**
Description of Area / Typology	Coastal City
Population:	216,330 (est. for June 30th 2009)
Location:	75km west of Melbourne
Planning Theme:	Disaster Planning, Relief and Emergency Services
Resource / Planning Document:	Climate Change Adaptation Strategy (October 2010) (draft for public consultation)
Description:	This strategy highlights the need to identify residents who may be particularly vulnerable in weather related emergencies. More broadly, the Strategy calls for a review of the Council's Emergency Management Plan, as well as continued work with emergency services and emergency response agencies to ensure climate change issues are addressed in planning for emergencies and recovery.
Website / Reference:	http://www.geelongaustralia.com.au/common/Public/Documents/8cd335ac6e42864-DraftStrategy03.pdf
Council / Government/ Area:	**Greater Taree City Council**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	48,503 (est. for June 30th 2009)
Location:	North Central Coast NSW

Planning Theme:	Disaster Planning, Relief and Emergency Services
Resource / Planning Document:	Greater Taree Climate Change Risk Assessment and Adaptation Plan (November 2010)
Description:	This plan identifies a number of actions to reduce the vulnerability of the community to climate change, including planning for emergency situations, adapting emergency services and educating people in order to be better prepared for events such as floods.
Contact person:	enviroadmin@hunterlocal governments .com.au
Website / Reference:	http://www.gtcc.nsw.gov.au/files/FP_Strategic_Environment/GTCC_Climate_Change_Adaptation_Plan_2011.pdf

Source: local government websites; ABS National Regional Profiles

Community Health

Table A1.4 Community Health

Council / Government/ Area:	**Cairns Regional Council**
Description of Area / Typology	Coastal City
Population:	164,356 (est. for June 30th 2009)
Location:	Far north Queensland
Planning Theme:	Community Health
Resource / Planning Document:	Positive Change – Climate Change Risks and Opportunities for the Cairns Region: Climate Change Adaptation Action Plan (June 2009)
Description:	This plan addresses the need to educate the community about potential health risks associated with climate change, as well as to clarify the Council's role in community health by determining where community health, urban management and climate change issues intersect.
Website / Reference:	http://www.cairns.qld.gov.au/__data/assets/pdf_file/0003/7860/ClimateChangePlan.pdf

Source: local government websites; ABS National Regional Profiles

Table 1.5 Environment, Amenity and Lifestyle

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west Western Australia
Planning Theme:	Environment and Lifestyle Under Threat
Resource / Planning Document:	Climate Change Adaptation Action Plan (May 2010)
Description:	This plan seeks to ensure that foreshore management plans consider long term climate change risks. Other climate change adaptation actions identified in the plan include, working in partnership and with the community to encourage biodiversity.
Council / Government/ Area:	**City of Greater Geelong**
Description of Area / Typology	Coastal City
Population:	216,330 (est. for June 30th 2009)
Location:	75km west of Melbourne
Planning Theme:	Environment and Lifestyle Under Threat, (also economic considerations)
Resource / Planning Document:	Climate Change Adaptation Strategy (October 2010) (draft for public consultation)
Description:	This strategy recognises that the impacts of climate change on biodiversity could result in loss of amenity and environmental capital for residents. It is also recognised that the loss of unique habitats will have a negative impact on the local tourism industry.
Website / Reference:	http://www.geelongaustralia.com.au/common/Public/Documents/8cd335ac6e42864-DraftStrategy03.pdf
Council / Government/ Area:	**City of Onkaparinga**
Description of Area / Typology	Coastal Commuter
Population:	160,404 (est. for June 30th 2009)
Location:	35km east of Adelaide
Planning Theme:	Environment and Lifestyle Under Threat

Resource / Planning Document:	Climate Change Strategy: 2008-2013 (Community Plan 2028 initiative)
Description:	In relation to Strategy 3: Protect Resources and Ecosystems, the Council aims to explore opportunities to sequester carbon by planting local native vegetation. It is recognised that this approach will have recreational and amenity benefits in addition to improving biodiversity.
Contact person:	Maggie Hine (Group Manager, Sustainability) maghin@onkaparinga.sa.gov.au (08) 8384 0666
Website / Reference:	http://www.onkaparingacity.com/onka/living_here/our_environment/climate_change_energy/climate_change_strategy.jsp
Council / Government/ Area:	**Greater Taree City Council**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	48,503 (est. for June 30th 2009)
Location:	North Central Coast NSW
Planning Theme:	Environment and Lifestyle Under Threat
Resource / Planning Document:	Greater Taree Climate Change Risk Assessment and Adaptation Plan (November 2010)
Description:	Siltation and pollution of waterways as a result of storm water run-off is identified as a risk associated with higher rainfall and storm surges. The plan identifies actions to deal with negative potential impacts of climate change (eg. erosion) on beaches, foreshores and estuaries.
Contact person:	enviroadmin@hunterlocal governments .com.au
Website / Reference:	http://www.gtcc.nsw.gov.au/files/FP_Strategic_Environment/GTCC_Climate_Change_Adaptation_Plan_2011.pdf
Council / Government/ Area:	**Bellingen Shire Council**
Description of Area / Typology	Coastal Lifestyle
Population:	13,369 (ABS 2009)
Location:	Central Coast, NSW
Planning Theme:	Environment, amenity and lifestyle
Resource / Planning Document:	Environmental Levy Projects 2010-2011

Description:	In 2005 Bellingen Shire Council applied to the minister for Local Government for a special variation to General Income for environmental projects. The 4% increase that was approved has contributed to the creation of an Environmental Fund. One of the projects outlined for 2010-11, which will be partially funded through the environmental levy, will model and map inundation of the estuarine reaches of the shire using different sea level rise scenarios. This information will aid Council's in planning for climate change adaptation measures.
Website / Reference:	http://bellingen-new.local-e.nsw.gov.au/index.php?option=com_jentlacontent&view=article&id=47414:environmental-levy-projects-2010-2011&catid=1170:environmental-levy-bellingen&Itemid=1683

Source: local government websites; ABS National Regional Profiles

Improving the Resilience of Current Industries to Climate Change

Table A.1.6 Improving the Resilience of Current Industries to Climate Change

Council / Government/ Area:	**City of Onkaparinga**
Description of Area / Typology	Coastal Commuter
Population:	160,404 (est. for June 30th 2009)
Location:	35km east of Adelaide
Planning Theme:	Resilience of Current Industries to Climate Change
Resource / Planning Document:	Climate Change Strategy: 2008-2013 (Community Plan 2028 initiative)
Description:	To prepare for and manage the effects of climate change on the economy, the City of Onkaparinga is working with natural resource dependent industries, including the local food and wine producing industry, as well as the Department of Water, Land and Biodiversity Conservation, to improve the resilience of these industries to the effects of climate change.
Contact person:	Maggie Hine (Group Manager, Sustainability) maghin@onkaparinga.sa.gov.au (08) 8384 0666
Website / Reference:	http://www.onkaparingacity.com/onka/living_here/our_environment/climate_change_energy/climate_change_strategy.jsp

Source: local government websites; ABS National Regional Profiles

Economic Transitions

Table A1.7 Economic Transition

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west region of Western Australia
Planning Theme:	Economic Transition
Description:	The Batavia Local governments are concerned that increased temperatures and rainfall will threaten farming, fishing and tourism industries (the region's major employers). To mitigate potential climate change related risks to the economy, the Council will work with regional stakeholders to find alternative uses for marginal agricultural land. This could mean, for example, developing alternative food crops or using land for renewable energy production.
Council / Government/ Area:	**Sunshine Coast Council**
Description of Area / Typology	Coastal Getaway / Coastal City
Population:	323,423 (est. for June 30th 2009)
Location:	South eastern Queensland
Planning Theme:	Economic Transition
Resource / Planning Document:	Climate Change and Peak Oil Strategy 2010-2010
Description:	In the context of climate change and peak oil, this plan addresses the need to create new business opportunities for Council, encourage development of low impact businesses, and to secure investment in renewable energy. To support environmental objectives, as well as local economies, the strategy seeks to promote 'localisation' (ie. locally located businesses and services), through planning and economic development initiatives.
Website / Reference:	http://www.sunshinecoast.qld.gov.au/sitePage.cfm?code=cc-strategy

Source: local government websites; ABS National Regional Profiles

Leadership

Table A1.8 Leadership

Council / Government/ Area:	**Cairns Regional Council**
Description of Area / Typology	Coastal City
Population:	164,356 (est. for June 30th 2009)
Location:	Far north Queensland
Planning Theme:	Leadership
Resource / Planning Document:	Positive Change – Climate Change Risks and Opportunities for the Cairns Region: Climate Change Adaptation Action Plan (June 2009)
Description:	This action plan proposes the creation of a climate change team within the Council to co-ordinate the Council's response to climate change. The Council will also provide leadership by developing an assessment and evaluation framework (to be used by relevant departments) to evaluate the relative costs and benefits of adaptation actions.
Website / Reference:	http://www.cairns.qld.gov.au/__data/assets/pdf_file/0003/7860/ClimateChangePlan.pdf
Council / Government/ Area:	**Clarence Valley Shire**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	52,054 (est. for June 30th 2009)
Location:	Mid North Coast, NSW
Planning Theme:	Leadership
Resource / Planning Document:	Climate Change Mitigation Action Plan (underway)
Description:	This Plan, which is currently underway, will set out a prioritised program of actions to reduce or offset Council's carbon footprint. The aim is that this program will provide leadership for the community in addressing climate change.
Website / Reference:	http://www.clarence.nsw.gov.au/cmst/cvc009/view_doc.asp?id=4947&cat=198

Source: local government websites; ABS National Regional Profiles

Collaborative Approaches

Table A1.9 Collaborative Approaches

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west region of Western Australia
Planning Theme:	Collaborative Approaches
Resource / Planning Document:	Climate Change Adaptation Action Plan (May 2010)
Description:	This action plan, which was commissioned jointly by the Batavia Regional Organisation of Local governments, sets out actions for specific LGAs as well as initiatives to be undertaken through regional collaboration.
Council / Government/ Area:	**Greater Taree City Council**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	48,503 (est. for June 30th 2009)
Location:	North Central Coast NSW
Planning Theme:	Collaborative Approaches
Resource / Planning Document:	Greater Taree Climate Change Risk Assessment and Adaptation Plan (November 2010)
Description:	This adaptation plan recommends action to be taken at the Council level, as well as collaboratively at the regional level.
Website / Reference:	http://www.gtcc.nsw.gov.au/files/FP_Strategic_Environment/GTCC_Climate_Change_Adaptation_Plan_2011.pdf

Source: local government websites; ABS National Regional Profiles

Table A1.10 Liability and Insurance

Council / Government/ Area:	**City of Greater Geelong**
Description of Area / Typology	Coastal City
Population:	216,330 (est. for June 30th 2009)
Location:	75km west of Melbourne

Planning Theme:	Liability and Insurance
Resource / Planning Document:	Climate Change Adaptation Strategy (October 2010) (draft for public consultation)
Description:	This strategy identifies a need to better understand liability and insurance issues and to consider these issues in reviewing the Council's Asset Management Strategy.
Website / Reference:	http://www.geelongaustralia.com.au/common/Public/Documents/8cd335ac6e42864-DraftStrategy03.pdf
Council / Government/ Area:	**Greater Taree City Council**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	48,503 (est. for June 30th 2009)
Location:	North Central Coast NSW
Planning Theme:	Liability and Insurance
Resource / Planning Document:	Greater Taree Climate Change Risk Assessment and Adaptation Plan (November 2010)
Description:	This Climate Change Risk Assessment and Adaptation Plan clearly articulates the need to address insurance issues and potential funding for natural disaster relief as part of the assessment of climate change related risks. Examples of future actions identified in the plan are as follows: • Council should approach state government to clarify and simplify the process for declaring natural disaster and relief funding arrangements; • In conjunction with other Local government areas, Greater Taree council should approach Statewide Mutual for advice on the application of insurance cover in relation to flooding; • Council should review the Risk Management Plan to ensure that it adequately addresses key risks to staff, including weather-related risks
Contact person:	enviroadmin@hunterlocalgovernments .com.au
Website / Reference:	http://www.gtcc.nsw.gov.au/files/FP_Strategic_Environment/GTCC_Climate_Change_Adaptation_Plan_2011.pdf

Source: local government websites; ABS National Regional Profiles

Table A1.11 Planning Regulations

Council / Government/ Area:	**Batavia Regional Organisation of Local governments**
Description of Area / Typology	Coastal Hamlets
Population:	45,600 (est. for June 30th 2009 for Shire of Chapman Valley, City of Geraldton-Greenough, Shire of Irwin and Shire of Northampton)
Location:	Mid west Western Australia
Planning Theme:	Addressing Climate Change through Planning Regulations
Resource / Planning Document:	Climate Change Adaptation Action Plan (May 2010)
Description:	This Plan identifies a number of actions which promote adaption to climate change through the statutory planning system. These actions include, for example: - considering an urban growth boundary in the Local Planning Strategy for Geraldton-Greenough (in response to bush fire risk and to conserve vegetation), - solar passive building design and smart lot orientation, - development of a region-specific methodology for determining appropriate setbacks from the coast.
Council / Government/ Area:	**Bega Valley Shire**
Description of Area / Typology	Coastal Lifestyle Destination
Population:	33,481 (est. for June 30th 2009)
Location:	South Eastern NSW
Planning Theme:	Addressing Climate Change through Planning Regulations
Resource / Planning Document:	Bega Valley Local Environmental Plan 2010 (Draft)
Description:	Climate change is acknowledged in the overall aims of the draft Local Environmental Plan (LEP) and climate change risks and related coastal hazards are addressed under local provisions. The draft LEP stipulates criteria that Council will consider when addressing development that is within the 'flood planning area', the 'projected 2050 flood planning area' and the 'projected 2100 flood planning area' (as shown on Council's Flood Planning Map). The criteria also apply to land that is below the projected 2050 and 2100 flood planning levels owing to projected sea level rise. The draft LEP states that consent will only be granted on land within the 'flood planning area' if, for example, it is "not likely to result in unsustainable social and economic costs to the community as a result of flooding". For development within the 2050 and 2100 projected flood area, Council will consider, for example, the intended design life of the development and its potential to be relocated, modified or removed. (See Draft LEP pp.46-47)
Website / Reference:	http://begavalleyviews2030.com.au/clep
Council / Government/ Area:	**Byron Shire Council**
Description of Area /	Coastal Lifestyle

Typology	
Population:	32,126 (Byron) (est. for June 30th 2009)
Location:	North Eastern NSW
Planning Theme:	Addressing Climate Change through Planning Regulations
Resource / Planning Document:	Byron Shire Council's *Climate Change Strategic Planning Policy* (2009)
Description:	Byron Council prepared a Climate Change Adaptation Plan, through the Federal Government's *Local Adaptation Pathways Programme* (LAPP), which explored how infrastructure and services could be adjusted to cope with the impacts of climate change. Following on from the Adaptation Plan, the Council's Project Reference Group developed the *Byron Shire Climate Change Adaptation Implementation Schedule*. The schedule identified the need to: • Review infrastructure design standards for public works; • Review development consent conditions in relation to public and private works; • Integrate climate change considerations into flood amelioration assessment processes; • Forward plan for existing communities at risk of elevated flooding. The Council's Climate Change Strategic Planning Policy outlines flood scenarios for 2050 and 2100 and requires that unless there is an adopted flood study or Floodplain Management Plan for an area, that the 2100 flood planning scenario be considered in land use planning.
Council / Government/ Area:	**Cairns Regional Council**
Description of Area / Typology	Coastal City
Population:	164,356 (est. for June 30th 2009)
Location:	Far north Queensland
Planning Theme:	Addressing Climate Change through Planning Regulations
Resource / Planning Document:	Positive Change – Climate Change Risks and Opportunities for the Cairns Region: Climate Change Adaptation Action Plan (June 2009)
Description:	This Climate Change Adaptation Plan suggests that planning regulations and development assessment processes be reviewed to identify where amendments could be made to better incorporate climate change related impacts. As noted in the plan, this will require monitoring of technical standards and codes and making amendments where necessary.
Website / Reference:	http://www.cairns.qld.gov.au/__data/assets/pdf_file/0003/7860/ClimateChangePlan.pdf
Council / Government/ Area:	**City of Greater Geelong**
Description of Area / Typology	Coastal City
Population:	216,330 (est. for June 30th 2009)
Location:	75km west of Melbourne
Planning Theme:	Planning Regulations
Resource / Planning Document:	Climate Change Adaptation Strategy (October 2010) (draft for public consultation)

Description:	The Greater Geelong area was identified in the Australian Government's report, *Climate Change Risks to Australia's Coasts,* as one of the areas most at risk in the event of sea-level rise. This is owing to its soft, erodible shoreline and the location of its housing stock. One of the actions identified in the strategy is to explore ways in which planning tools could incorporate climate change considerations.
Website / Reference:	http://www.geelongaustralia.com.au/common/Public/Documents/8cd335ac6e42864-DraftStrategy03.pdf
Council / Government/ Area:	**Lake Macquarie City Council**
Description of Area / Typology	Coastal Getaway
Population:	199,277 (est. for June 30th 2009)
Location:	Central Coast, NSW
Planning Theme:	Addressing Climate Change through Planning Regulations
Resource / Planning Document:	Lake Macquarie Sea Level Rise Preparedness and Adaptation Policy*;* Development Restrictions Certificate Flooding / Tidal Inundation NCCARF Adaptation Action Stories
Description:	Lake Macquarie's Sea Level Preparedness and Adaptation Policy requires that council staff consider climate change when determining development applications. The Council has restricted development in some areas and requires certain adaptations, such as increased floor heights, for buildings around the shoreline. Floor level (height) requirements are based on the assumption that buildings will have a 100 year life. Development along the shoreline must have a Development Restrictions Certificate Flooding / Tidal Inundation. The Council has also reviewed the provisions in its LEP and DCP and has placed sea level rise notifications on land certificates for properties which may be effect by future sea level rise.
Website / Reference:	http://www.lakemac.com.au/page.aspx?pid=109&vid=10&fid=1454&ftype=True http://www.lakemac.com.au/page.aspx?pid=844&vid=14 http://www.nccarf.edu.au/node/685
Council / Government/ Area:	**Sunshine Coast Council**
Description of Area / Typology	Coastal Getaway / Coastal City
Population:	323,423 (est. for June 30th 2009)
Location:	South eastern Queensland
Planning Theme:	Planning Regulations
Resource / Planning Document:	Climate Change and Peak Oil Strategy
Description:	In order to mitigate and respond to climate change, this plan recognises the need to integrate low emissions and low risk settlement patterns, urban forms, housing, infrastructure and transport strategies into Council's planning framework
Contact person:	mail@sunshinecoast.qld.gov.au
Website / Reference:	http://www.sunshinecoast.qld.gov.au/sitePage.cfm?code=cc-strategy

Council / Government/ Area:	**South Gippsland Shire Council**
Description of Area / Typology	Coastal Getaway
Population:	27,776 (est. for June 30th 2009)
Location:	South-east coast, Victoria
Planning Theme:	Planning Regulations
Resource / Planning Document:	Coastal Climate Change Management Plan, Section 173 and Section 181
Description:	As an interim measure, prior to adapting the South Gippsland Planning Scheme, Council requires that: *1. A planning permit for land in an area below 5m Australian height Datum (AHD) or with access only by a road below 5m AHD shall contain a condition requiring a section 173 agreement that acknowledges a Coastal Climate Change Management Plan in accordance with the attached template and the potential risks as a result of climate change induced sea level rise and associated effects;* *2. A planning permit for land in an area below 5m AHD or with access only by a road below 5m AHD shall contain a condition requiring the preparation and endorsement of a coastal climate change management plan in accordance with the attached template; and* *3. Detailed Coastal Hazard Vulnerability Assessments for planning applications in vulnerable areas where:* *a) The value of development is over $1 million;* *b) Significant infrastructure is required; or* *c) In the opinion of planning officers the risks of inundation or other effects warrant additional assessment and shall be the subject of a report to Council*
Website / Reference	http://www.southgippsland.vic.gov.au/page/page.asp?page_id=842
Council / Government/ Area:	**Tweed Shire Council**
Description of Area / Typology	Coastal City
Population:	88,993 (est. for June 30th 2009)
Location:	Richmond Tweed, North East Coast NSW
Planning Theme:	Planning Regulations
Resource / Planning Document:	Coastal Hazards – Tweed Development Control Plan B25 (draft)
Description:	Tweed Shire Council's Coastal Hazards DCP recognises that development in close proximity to the coast needs to be planned and managed to minimise impacts on coastal resources and to prevent settlement within areas that are at risk of coastal hazards such as erosion. The DCP follows the *Tweed Coastline Management Plan* (2005). It identifies a coastal hazard zone, at present, and for 2050 and 2100. For development in areas seaward of the 2100 hazard line, the DCP sets additional requirements for development

	assessment, including, for example, a Coastal Risk Management Report.
Council / Government/ Area:	**Borough of Queenscliffe**
Description of Area / Typology	Coastal Getaway
Location:	Mornington Peninsula, south west of Melbourne
Planning Theme:	Planning Regulations
Resource / Planning Document:	Point Lonsdale Structure Plan (2009)
Description:	The Borough of Queenscliffe and the City of Greater Geelong jointly prepared the Point Lonsdale Structure Plan in 2009. Because of its location on a small peninsula bordering Lake Victoria, Swan Bay and the Bass Straight, Point Lonsdale will be particularly vulnerable in the event of sea level rise. The Plan aims to ensure that the location and design of new development provides appropriate protection from the risks and impacts of climate change. A precautionary approach will be taken when planning for future growth. Planning will take account of the projections outlined in the Victorian Coastal Strategy 2008 (which is that sea level will rise by not less than 0.8m by 2100). The Structure Plan states that potential growth sites will be tested for compliance against the *Ministerial Direction No. 13 – Managing Coastal Hazards and the Coastal Impacts of Climate Change*.
Website / Reference:	http://www.queenscliffe.vic.gov.au/Downloads/PtLonSP_20100513_PartsABC.pdf
Council / Government/ Area:	**City of Greater Taree**
Description of Area / Typology	Coastal lifestyle
Population:	48,503 (ABS 2009)
Location:	Mid north coast, New South Wales
Planning Theme:	Planning Regulations
Resource / Planning Document:	Greater Taree Development Control Plan 2010
Description:	Section D1 of the Greater Taree Development Control Plan, 'Coastline Management' sets guidelines for development on land in a "coastal zone hazard area" (as mapped). It states that development should be consistent with the Coastal Management Plan, where one is in place. Where a Coastal Management Plan is not in place, or where the Plan does not specify development controls, development applications on land in Coastal Zone Hazard Areas or Coastal Zone Hazard Investigation Areas must be accompanied by an assessment of the impact and suitability of the development (risk assessment), taking into account a number of variables including sea level rise / climate change, coastal recession, erosion, flooding landslip and disposal of stormwater. Development must also comply with setback requirements were they are specified. Where setbacks are not specified, the proposed setback must be justified as part of the risk assessment. Three Coastal Zone Hazard areas are identified in Section D1.

	(p.3-8)
Website / Reference:	http://www.gtcc.nsw.gov.au/page/page.asp?page_id=231
Council / Government/ Area:	**Nambucca Shire Council**
Description of Area / Typology	Coastal lifestyle
Population:	19,186 (ABS 2009)
Location:	Mid north Coast, New South Wales
Planning Theme:	Planning Regulations
Resource / Planning Document:	Nambucca Development Control Plan 2010
Description:	The Nambucca Development Control Plan 2010 includes a 'Climate Change' clause, which states the following: "In accordance with Clause 5.5 of NLEP 2009, areas at risk from the likely effects of sea level rise must address potential issues within the Statement of Environmental Effects. In determining whether to grant consent to development involving the erection of a building or the carrying out of a work at or above the surface of the ground on land, the potential impacts of climate change, including sea level rise, will be considered. Consideration will be based upon Draft NSW DECCW estimates for mean sea level rise of 0.4m by 2050 and 0.9m by 2100 (relative to 1990 levels)." The Coastal Hazards section of the DCP specifies additional controls for land in the following zones: • 2100 Stable Foundation Zone (no engineering controls) • 2100 Zone of Reduced Foundation Capacity (specific controls, eg. no seaward extensions) • 2050 Zone of Wave Impact and Slope Adjustment (no development permitted except for exempt development) Maps which accompany the DCP show the limits of the Zone of Wave Impact and Slope Adjustment and the Zone of Reduced Foundation Capacity at present, in 2050 and in 2100 for three coastal areas.
Website / Reference:	http://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-MUB-23-17-78&c=184

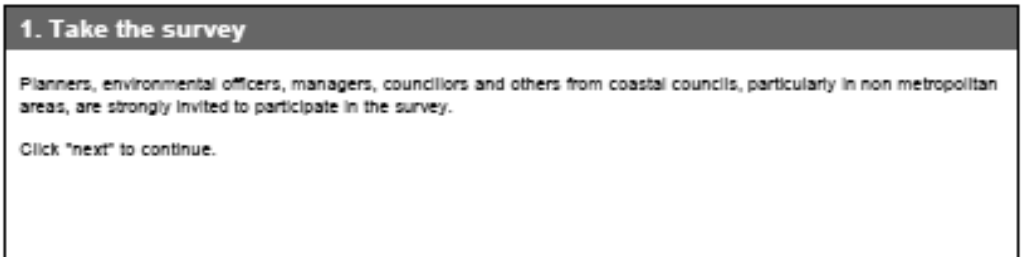
Source: local government websites; ABS National Regional Profiles

Appendix 2: Typology of Australian coastal amenity communities

Settlement Type	Population Categories	Distance Categories (Time)
Coastal Commuter	>15,000 people	0-1.5 hours drive from State Capital City
Coastal Getaway	15,0000-<100,000 people	< 3 Hours drive from State Capital City
Coastal Getaway	15,0000-<100,000 people	> 3 Hours drive from State Capital City
Coastal City	>100,000 people	> 1.5 hours drive from State Capital City
Coastal Hamlet	<15,000 people	> 3 Hours drive from State Capital City

Typology of coastal amenity communities (Gurran, Squires, and Blakely 2005)

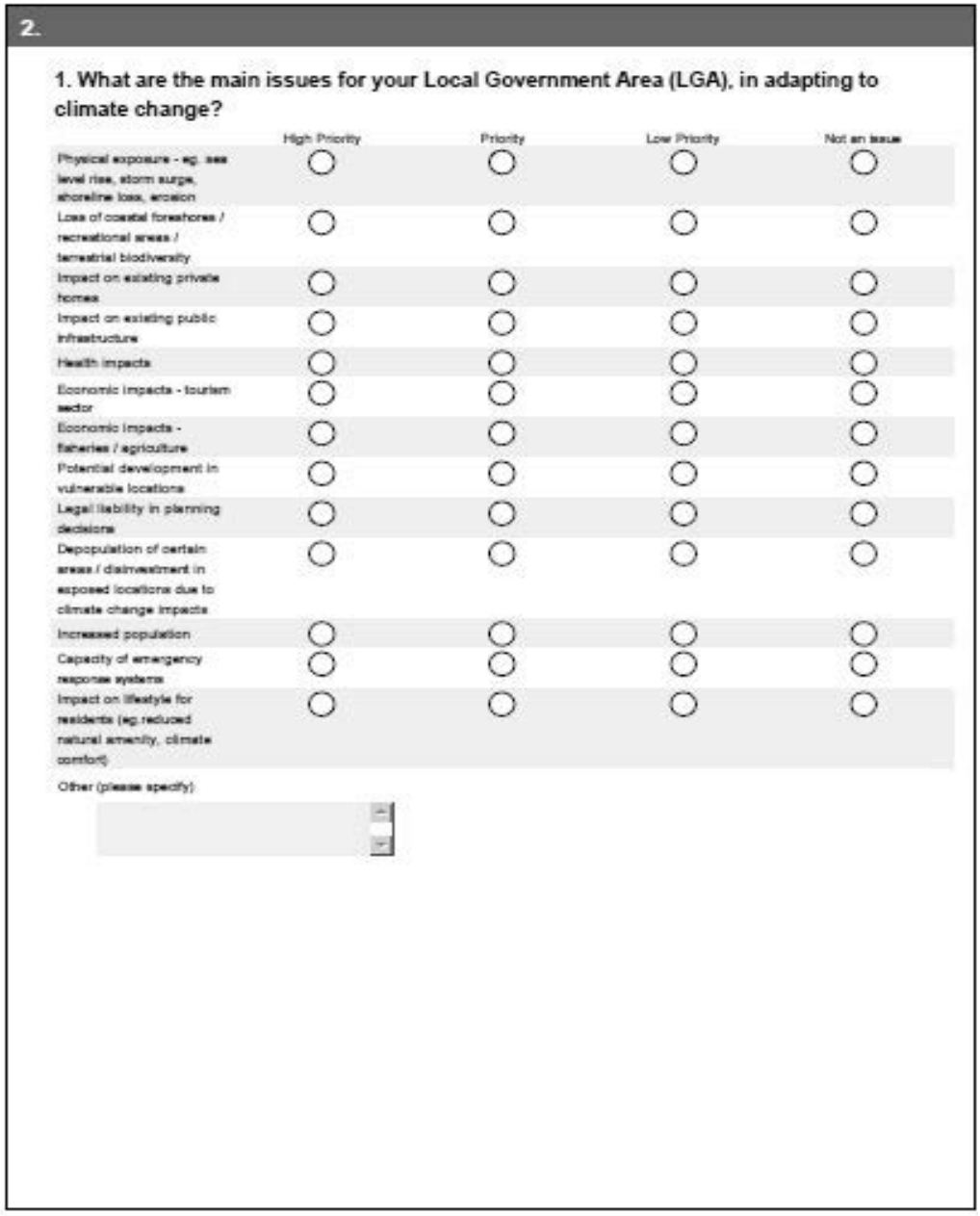
Appendix 3: Local Government Survey



1. Take the survey

Planners, environmental officers, managers, councillors and others from coastal councils, particularly in non metropolitan areas, are strongly invited to participate in the survey.

Click "next" to continue.



2.

1. What are the main issues for your Local Government Area (LGA), in adapting to climate change?

	High Priority	Priority	Low Priority	Not an issue
Physical exposure - eg. sea level rise, storm surge, shoreline loss, erosion	○	○	○	○
Loss of coastal foreshores / recreational areas / terrestrial biodiversity	○	○	○	○
Impact on existing private homes	○	○	○	○
Impact on existing public infrastructure	○	○	○	○
Health impacts	○	○	○	○
Economic impacts - tourism sector	○	○	○	○
Economic impacts - fisheries / agriculture	○	○	○	○
Potential development in vulnerable locations	○	○	○	○
Legal liability in planning decisions	○	○	○	○
Depopulation of certain areas / disinvestment in exposed locations due to climate change impacts	○	○	○	○
Increased population	○	○	○	○
Capacity of emergency response systems	○	○	○	○
Impact on lifestyle for residents (eg.reduced natural amenity, climate comfort)	○	○	○	○

Other (please specify)

2. Which of the following initiatives, if any, has your Council completed,commenced or planned?

	Completed	Commenced	Planned to commence in near future
Commissioned a study(ies)	☐	☐	☐
Undertaken a formal climate change risk analysis	☐	☐	☐
Prepared a climate change adaptation strategy	☐	☐	☐
Changed local planning controls	☐	☐	☐
Changed approaches to infrastructure design / investment	☐	☐	☐
Sought funding for climate change adaptation initiatives	☐	☐	☐
Estimated likely financial liability arising from climate change risks	☐	☐	☐

Other (please specify)

3. As part of this research project, we are seeking examples of exemplary or model climate change adaptation initiatives undertaken by local government. Please provide details of any projects undertaken by your Council that you feel might be of wider interest to other local councils. Please include sufficient details for us to identify additional information about your project, if necessary (eg. project name or a website reference).

4. If your Council has undertaken a risk / financial audit to estimate potential losses associated with climate change, could you specify the total projected exposure, as a dollar amount?

5. Can you advise or estimate how much money your council has spent on climate change adaptation measures to date?

6. How much funding has been budgeted by your LGA for climate change adaptation in the current financial year?

7. How much funding has been budgeted by your LGA for climate change adaptation in the next financial year?

8. Has your LGA sought or received any government or non-government support or assistance for climate change adaptation activities?

	Sought	Received	Intend to seek in future
State	☐	☐	☐
Commonwealth	☐	☐	☐
Non Government Organisation (NGO), eg ICLEI	☐	☐	☐
Australian Local Government Association (ALGA)	☐	☐	☐
Other local government association	☐	☐	☐
Never sought assistance	☐	☐	☐

Additional comments

9. How adeqate do you think the State planning framework is in relation to the following issues associated with climate change adaptation?

	Well addressed in State policy	Poorly addressed in State policy	Not addressed	Policy / requirements are unclear or inconsistent
Sea level rise	○	○	○	○
Inundation	○	○	○	○
Building design standards	○	○	○	○
Infrastructure design standards	○	○	○	○

Comments

10. How adequate do you think the current local planning framework is in relation to adapting to climate change?

	Well addressed in statutory controls	Partially addressed in statutory controls	Poorly addressed in statutory controls	Not addressed in statutory controls	Addressed in guiding policy
Sea level rise	◯	◯	◯	◯	◯
Inundation	◯	◯	◯	◯	◯
Building design standards	◯	◯	◯	◯	◯
Infrastructure design standards	◯	◯	◯	◯	◯

Other (please specify)

11. A number of State and Commonwealth government initiatives have been undertaken or proposed to support regional and coastal councils in planning for climate change adaption. Which of the following would be most beneficial for your own LGA?

	High priority	Priority	Low priority	Already sufficient
Funding for adaptation measures	◯	◯	◯	◯
Assistance in undertaking a climate change risk analysis and adaptation planning strategy	◯	◯	◯	◯
Access to legal advice	◯	◯	◯	◯
Assistance in reviewing / change land use planning controls	◯	◯	◯	◯
Understanding / assessing community vulnerability	◯	◯	◯	◯
Assistance in developing strategies to assist with community engagement and build community resilience	◯	◯	◯	◯
Staff training	◯	◯	◯	◯
A dedicated member of staff to undertake climate change adaptation initiatives	◯	◯	◯	◯
Stronger State policy	◯	◯	◯	◯
Stronger Commonwealth policy	◯	◯	◯	◯
Better communication of information from initiatives	◯	◯	◯	◯

Other (please specify)

12. Please provide some details about your LGA

	State / Territory	Population	Distance from capital city
State / Territory			
Population			
Distance from State / Territorial capital city (driving time)			

13. Position of person completing the survey

14. What is the name of your LGA? (This question is optional, and responses will be used for statistical purposes only. Individual LGAs will not be identified through this survey).

15. If you are willing to be contacted to provide further information / insights into the ways in which your Council is addressing climate change adaptation, please provide your contact details in the box below.