CoastAdapt

Planning approaches and instruments for adaptation

Information Manual 5

3rd Edition

www.coastadapt.com.au

Published by the National Climate Change Adaptation Research Facility 2018

ISBN: 978-0-9946054-6-7

Please cite this Manual as:

Norman, B., and N. Gurran, 2018: Adapting to long term coastal climate risk through planning approaches and instruments. CoastAdapt Information Manual 5, 3rd edn, National Climate Change Adaptation Research Facility, Gold Coast.

Acknowledgement

This work was carried out with financial support from the Australian Government (Department of the Environment and Energy).

In this the third edition of this Information Manual, we have updated information and links where resources have changed or additional information was provided to the authors. Appendix 1 was updated to reflect changes in planning and legislative arrangements for individual states.

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CoastAdapt

Adapting to long term coastal climate risks through planning approaches and instruments

Information Manual 5

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National Climate Change Adaptation Research Facility

Australian Government
Department of the Environment and Energy

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Preface

In 2014, the National Climate Change Adaptation Research Facility (NCCARF) was commissioned by the Australian Government to produce a coastal climate risk management tool in support of coastal managers adapting to climate change and sea-level rise. This online tool, known as CoastAdapt, provides information on all aspects of coastal adaptation as well as a decision support framework. It can be accessed at www.coastadapt.com.au.

Coastal adaptation encompasses many disciplines ranging from engineering through to economics and the law. Necessarily, therefore, CoastAdapt provides information and guidance at a level that is readily accessible to non-specialists. In order to provide further detail and greater insights, the decision was made to produce a set of Information Manuals, which would provide the scientific and technical underpinning and authoritativeness of CoastAdapt. The topics for these Manuals were identified in consultation with potential users of CoastAdapt.

There are ten Information Manuals, covering all aspects of coastal adaptation, as follows:

1. Building the knowledge base for adaptation action
2. Understanding sea-level rise and climate change, and associated impacts on the coastal zone
3. Available data, datasets and derived information to support coastal hazard assessment and adaptation planning
4. Assessing the costs and benefits of coastal climate adaptation
5. Adapting to long term coastal climate risks through planning approaches and instruments
6. Legal risk. A guide to legal decision making in the face of climate change for coastal decision makers
7. Engineering solutions for coastal infrastructure
8. Coastal sediments, beaches and other soft shores
9. Community engagement
10. Climate change adaptation planning for protection of coastal ecosystems

The Information Manuals have been written and reviewed by experts in their field from around Australia and overseas. They are extensively referenced from within CoastAdapt to provide users with further information and evidence.

NCCARF would like to express its gratitude to all who contributed to the production of these Information Manuals for their support in ensuring that CoastAdapt has a foundation in robust, comprehensive and up-to-date information.

1 Planning for climate change in coastal Australia

1.1. A summary of the state of play and the purpose of this manual

1.1.1. Purpose

The purpose of this information manual is to provide a readily accessible manual to users on planning for the impacts of climate change including sea level rise, extreme events (storms, fire, flood,) and some of the challenges of living with a warmer coastal environment (heat, drought).

The report outlines the state of play, the national context, the current key approaches and planning instruments that can be employed when developing coastal adaptation strategies at the sub national level (state, regional, and local). It also describes case studies that point to leading strategies for building coastal resilience and adaptation options. The report concludes with some key messages for planning for coastal climate in coastal Australia.

1.1.2 State of play

Australia is a highly urbanised coastal nation with over 85% of the population living within 50 km of the coastline. Planning for future urban coastal growth in the context of climate change will continue to be a significant challenge.

The science on climate change is now certain that humans are having a significant impact on global warming (Reisinger et al. 2014), so the primary focus must remain on mitigation. However, there are significant consequences from global warming already 'locked in' and the coastal community will need to prepare for environmental change. Even a 2 °C increase in warming in the future will have impacts we need to plan for (CSIRO and Bureau of Meteorology 2015). The Paris Agreement recognized this in 'pursuing efforts to limit the temperature increase to 1.5 °C above preindustrial levels' (UNFCCC 2015).

The world's population could reach 10 billion by 2050 (World Bank 2014). Most people will live in cities. To accommodate an additional three billion people, we will need to build the equivalent of one new city that can support one million people every five days between now and 2050. Cities consume 75% of the world's energy and produce more than 76% of all carbon and experience very substantial impacts to life and property with extreme weather events (Norman et al. 2018, p. xv).

In recent years there have been some very significant commitments by the USA and China at the national and city level with a focus on renewable energy and green transport. The Compact of City Mayors (Ban Ki Moon and Michael Bloomberg Special Envoy for Cities and Climate Change), C40, the International Council of Local Environmental Initiatives (ICLEI), are part of a growing international network of cities working together on cities and climate change. Cities and urban centres are therefore vital to the response to climate change. In Australia, the majority of urban centres are located on the coastline.

Planning for climate change in coastal Australia is critical to minimise future risk (defined as 'a situation involving exposure to danger' by the Oxford English Dictionary) to our coastal communities and the coastal environment. Preparing our coastal urban settlements to be *climate ready* will require a change in how we plan and design our cities and regions. Clear targets on emission reductions will mean very significant investment in renewable energy options, public transport, green buildings and green precincts. Adapting to a warmer environment will mean 'landscaping' will play a critical role in 'cooling the city'; for example, bigger cities will need more extensive networks of naturally vegetated recreation areas and parks.

Following the adoption of the United Nations Sustainable Development goals and the 'Paris Agreement' on climate change (UNFCCC 2015), the focus is now on implementation. Urban planning has been identified as a key strategy (United Nations 2015). In Australia that means ensuring our planning systems provide the necessary strategy and statutory tools to be climate ready. An example is the City of New York (with significant coastal exposure) where Local Law 42 (2012) establish the New York Panel on Climate Change as an ongoing body providing advice to the Council on the latest IPCC climate science to be incorporated into the New York City Plan (NYC 2018a).

As a highly urbanised nation, with most of the development on the coastline, Australia has very substantial risks from the impacts of climate change and, in turn, very significant opportunities to respond. The federal government has prepared a National Climate Resilience and Adaptation Strategy (Commonwealth of Australia 2015). This builds on significant work at the national level over the last 10 years including:

- House of Representatives Report: Managing our coastal zone in a changing climate 'the time to act is now' (Australian Parliament 2009)
- National Climate Change Adaptation Framework (2010)
- Adaptive Capacity and Governance in the Pacific (2011)
- Productivity Commission Inquiry into Barriers to Effective Climate Change Adaptation (2013)
- Climate Adaptation Outlook (2013)
- COAG Select Council on Climate Change 'Roles and responsibilities for Climate Change Adaptation' in Australia (2013)
- The National Climate Change Adaptation Research Facility (2018).

The national reports and inquiries have placed strong emphasis on governance and decision-making processes recognising that adapting to climate change is as much a process as a suite of policy responses/actions. We cannot predict all the changes that affect the coasts but we can lay down the foundations for preparing our coastal plans for change. During 2012, the COAG Select Council on Climate Change (SCCC) adopted a statement outlining the roles and responsibilities for climate change adaptation in Australia, which includes guiding principles for the management and allocation of climate change risks (COAG 2012). These guiding principles provide a useful context for any discussion at a sub-national level on planning for coastal climate change. The principles include 'taking account of climate change risk in policy and planning', 'making information accessible and usable' and that:

'Government decision-making and adaptation actions should:

- Be based on the best available science
- Be cost-effective
- Be regularly reviewed to meet changing circumstances
- Enhance social inclusion' (COAG 2012 p10).

Subsequently, the Australian Government has worked with local and regional bodies to develop adaptation pathways. An example is the Local Adaptation Pathways Program that funded local government projects across Australia (Round 1 and 2) (Department of the Environment 2015). The outcomes of such projects are potentially a rich resource for other local governments considering developing adaptation strategies. Other national programs have included the former Department of Climate Change and Energy Efficiency program (Streams 1 and 2): the Natural Resource Management Climate Change Impacts and Adaptation Research Program – Climate Change Adaptation for Natural Resource Management. Over the last ten years, NCCARF and CSIRO have undertaken a considerable body of research on adaptation options that has provided an important underpinning to the national programs (Low Choy et al. 2012, Norman et al. 2013).

Coastal planning and coastal adaptation is an evolving policy space in Australia. The Victorian, New South Wales and Queensland governments have all undertaken recent coastal reforms relevant to policies on coastal planning and climate change. Consequently, this manual is prepared recognising both current approaches and new approaches in train, but not yet adopted, in order to provide a fuller picture of future developments in this policy space.

1.2 Climate risks for cities, coasts and climate change in coastal cities and regions

The Intergovernmental Panel on Climate Change 5th Assessment Report concluded that climate change will have significant implications for cities and coastal development (IPCC 2014). For Australia, the impacts include warmer coastal futures, including drier coastal environments in the south east and southwest regions, extreme weather events, stress on coastal and marine biodiversity and ecosystems and stress on vulnerable coastal communities.

The most recent national projections by the CSIRO and the Bureau of Meteorology (2015) confirm the IPCC projections and highlight a number of potential impacts for coastal regions. These include 'harsher fire weather in southern and eastern Australia, less frequent but more intense cyclones in the northern regions, and sea level is projected to continue to rise beyond 2100' (CSIRO and Bureau of Meteorology 2015, p8). The impacts of climate change will differ around the Australian coastline due to local conditions, which makes it important to consider local knowledge as well as regional and global projections. This is particularly so when planning for coastal climate change in relation to foreshore management, estuaries, coastal development and infrastructure planning.

2 Current approaches and instruments in planning and climate change

This section discusses the different approaches to planning for coastal climate change throughout Australia. This outlines the suite of options available for decision-makers at the local level. Section 3 includes case studies of leading practice to illustrate how these various options have been successfully employed. Draft proposals are also included where they flag new directions in planning for coastal climate change.

2.1 Coastal planning legislation

Coastal planning legislation provides the basis for most planning actions at the local level. Across the states there is a range of legislation that influences planning for coastal climate change adaptation planning (Appendix 1). This should be read in conjunction with the Information Manual 6: Legal Risks.

At the national level, the most important legislation is the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). It specifies matters of national environmental significance and can be triggered in relation to sensitive coastal environments, for example, Ramsar wetlands, Commonwealth marine areas and the Great Barrier Reef. More recently, there has been a move towards 'approvals' bilateral agreements relating to environmental approvals, although the drafts have yet to be approved. These types of agreements do not require Commonwealth approval and enable delegation of environmental approvals to the state level under the EPBC Act including significant coastal developments. However, most of the Commonwealth influence continues through various intergovernmental agreements, ongoing bilateral strategic environmental assessments, many of which are based on significant coastal areas (e.g. Great Barrier Reef, the Perth-Peel region in Western Australia). The Commonwealth also provides national guidelines and scientific information as tools for local decision makers (NCCARF 2015).

At the state level, some jurisdictions have dedicated coastal and climate legislation while others have coastal and climate planning considerations under planning legislation. Examples of the former include the *Coastal Management Act 1995 (Vic)* and *Climate Change Act 2017 (Vic)*, the South Australian *Coastal Protection Act 1972*, and the South Australian *Climate Change and Greenhouse Emissions Reduction Act 2007*. In New South Wales there is the *Coastal Management Act 2016*. In Queensland, the Northern Territory and Tasmania and Western Australia, coastal planning is predominantly through the respective planning legislation *(Queensland Planning Act 2016 (Qld), Land Use Planning and Approvals Act 1993 (Tas) and Tasmanian Planning Commission Act 1997, the Planning Act (NT) and Planning and Development Act 2005 (WA)* (see Appendix 1).

Some of the state legislation that applies to coastal planning has been in place for decades. Due to both longevity and political change, a number of states have undertaken significant coastal planning reviews over the years. In New South Wales an extensive review resulted in a new Coastal Management Act 2016 which includes consideration of climate change impacts and responses. The reforms also resulted in a new coastal management manual and State Environmental Planning Policy (SEPP) (Coastal Management) 2018 (see Figure 1). All emphasise climate change impacts and responses as a consideration in local planning and in assessing developments within the coastal zone. These instruments are discussed in greater detail as a case study in Section 3.3.

In Queensland, there is a *Coastal Protection and Management Act 1995*. Under this there is a Coastal Management Plan (2014) that 'provides non-regulatory policy guidance to coastal land managers. Key management policies dealt with by the plan include: maintaining coastal landforms and physical coastal processes; conserving nature; maintaining access to coastal resources for Indigenous cultural activities; maintaining or enhancing public access; management planning; knowledge sharing and community engagement' (Department of Environment and Science, 2018). However, most of the coastal planning decisions are now made under the new Planning Act 2016. Under this Act climate change considerations have been reintroduced following the earlier 'rollback' of policies on planning for coastal climate change under the previous government (Norman 2013).

In addition to dedicated state legislation, there

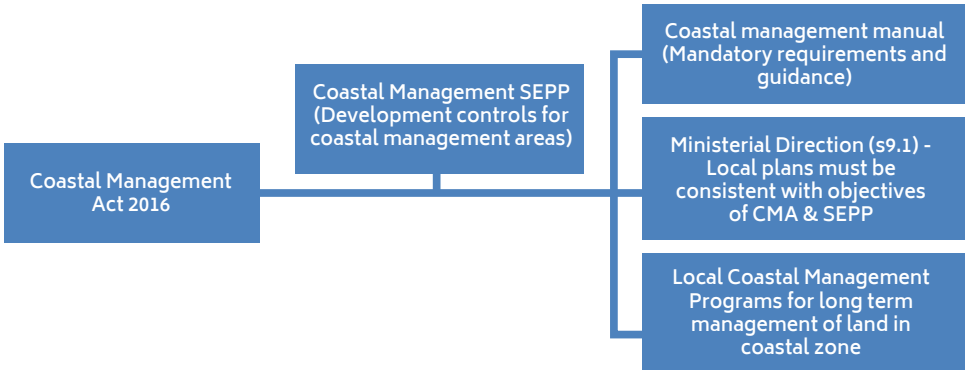

Figure 1: NSW Coastal Management. Source: the Authors.

are important governance arrangements in place in some jurisdictions. These include the South Australian Coast Protection Board, the Victorian Coastal Council and the NSW Coastal Council. These coordinating councils and advisory bodies play an instrumental role in providing expert and community advice to their respective governments and monitoring policy implementation. In Victoria, there is an extension to the state Coastal Council with three regional coastal boards comprising expert and community advice on coastal planning matters. Some of the most innovative planning for coastal climate change research and engagement has occurred through these bodies, including the mapping of coastal risks (discussed below).

2.2 Strategies, plans and policies

The Paris Agreement on climate change in (2015) will have a significant influence on national policy in relation to strategies to adapt to long-term climate risks in coastal Australia. The reasons are twofold: firstly, implementing the emission reduction national targets will be delivered in part through the future design of our urban settlements (renewable energy, public transport, green infrastructure, design and siting of the built environment). Secondly, impacts on the coastal environment will be experienced (even with a target to limit warming to a 2°C increase) and this is where most Australians live.

There are a range of coastal strategies, plans and policies predominantly at the state level around Australia (see Appendix 1). They vary in statutory weight from guidelines, which are often advisory such as coastal design guidelines, to statutory planning laws such as the location of development. Examples include the Victorian Coastal Strategy, the WA Statement of Planning Policy 2.6 State Coastal Planning Policy 2003, and the NSW State Environmental Planning Policy (Coastal Management) 2018 (summarised in Appendix 1). The Victorian coastal strategy is discussed in depth in Section 3.1 as a leading case study.

State level coastal policies and planning provisions in Australia have been significant in that they set a framework for local level planning and development assessment decisions. For instance, South Australia's state planning framework provides guidance for local governments in identifying a range of coastal zones to apply to different ecological contexts. They include criteria for ensuring that important ecosystems such as mangroves and estuaries are buffered to allow for habitat retreat under future climate change scenarios. Avoiding further exposure to future climate risk and providing for planned retreat in areas currently exposed, are key themes in recent state-wide coastal policies. However, local strategies and plans tend to remain the most important instruments for implementing climate adaptation on the ground.

This presents local government with a significant challenge when reviewing their local statutory planning schemes and assessing major developments in the coastal zone. To review their existing environmental planning controls, they require detailed data on climate enhanced natural hazards (primarily sea level rise, storm surge, flooding, and fire risks). Social vulnerability and integrated risk assessment is also critical. Perhaps more challenging is the

need to build community acceptance of such risks and support for adaptation policies to address them, especially if implementing these policies has significant implications for affected landowners. The potential legal liabilities are a very real consideration for local councils (see also Information Manual 6: Legal Risks).

These challenges require councils to develop community engagement and education programs as well as technical responses to adaptation planning for climate risk (see also Information Manual 9: Community Engagement).

State coastal policies have variously required local councils to develop detailed coastal management plans which include explicit provisions for adapting to climate risks. This has been complicated by significant policy changes and reversals over a short period of time in a number of States (Queensland, New South Wales and Victoria) that has understandably made it difficult for local councils to take a longer-term approach on coastal planning and climate change. At the time of writing (March 2016), the New South Wales Government was working with local councils on the preparation of comprehensive coastal management plans, which will provide a basis for identifying the full scope of risks and management options.

Whether prepared under a mandatory framework, or on a voluntary basis, coastal management plans can also be undertaken by a single council in some jurisdictions, or prepared in partnership with neighbouring or regional groupings of councils. While broadly their real function is to manage the threats to natural values in the coastal zone, coastal management plans may also be relevant considerations when assessing proposed development.

Land use planning controls are important tools for preventing inappropriate development in areas vulnerable to coastal hazards. While state planning laws delimit the types of regulations that can be implemented by local governments, councils often have capacity to devise customised approaches to managing risk associated with coastal erosion, sea level rise, and coastal flooding; this is provided that they follow state requirements (see Appendix 1). One example of the ways in which a coastal management framework can inform land use controls is provided by the Eurobodalla Shire Interim Coastal Hazard Adaptation Code 2015. Eurobodalla has long undertaken work on coastal hazard management, and recently developed a significant framework for addressing increased coastal hazards, arising from projected sea level rise, in collaboration with neighbouring Shoalhaven Council (discussed further below). The Eurobodalla Interim Coastal Hazard Adaptation Code 2015 adopted by Council provides an interim measure to inform land use planning decisions, pending the completion of the comprehensive Eurobodalla Coastal Zone Management Plan (being developed in partnership with the New South Wales State Government).

The Interim Code aims to 'facilitate economic and residential use of the coast and foreshore over the maximum period possible under conditions of sea level rise' and 'provide a precautionary risk based approach to managing the impacts of coastal hazards' (p. 1). It applies to investigation areas (land within the coastal zone for which a comprehensive study of potential risk has not yet been accepted by Council), and applies a 50-year horizon for all residential and commercial development within the identified areas and up to 85 years and beyond for major infrastructure.

Rather than preventing development within potentially vulnerable areas, the policy requires proponents to prepare a statement of environmental effects, consistent with the requirements of the NSW Coastal Planning Guideline: Adapting to Sea Level Rise (2010). In most areas, this requirement is removed by the finalisation of stage 2 of the Eurobodalla Coastal Management Program that included a detailed assessment of coastal hazards in key urban areas of Eurobodalla. While avoiding development on sites subject to sea level rise is the preferred option, the Interim Code provides for mitigation strategies to be considered in certain circumstances, as well as planned retreat:

> *'Planned retreat involves the design and construction of buildings that can be easily removed following the risk from coastal hazards reaching a certain "trigger point". Trigger points are linked to events such as beach erosion reaching a critical point or tidal inundation reaching a property on a regular basis. Planned retreat allows development to occur and the land to be utilised for as long a period as possible in view of the potential future exposure to hazards. Planned retreat is an affordable pathway to achieving*

development approval that avoids unnecessary sterilisation of the land or expensive mitigation works.' (Eurobodalla Interim Coastal Hazard Adaptation Code 2015).

In addition to coastal management approaches, some local governments have opted to prepare new strategies to provide a more cohesive approach to climate change that extend beyond considerations about natural hazards to the wider social and economic implications of global warming for coastal communities. Examples include the *Gold Coast Climate Strategy 2009-2014,* which includes a comprehensive range of objectives and levers for reducing air pollution and car dependency as mitigation while also addressing the impacts of climate change and coastal planning.

2.3 Regulations, processes and planning guidelines

Planning for coastal climate change at the local level can rely on the effectiveness of regulations, processes and guidelines. Policy at higher levels often leaves some discretion for local decision makers. Illustrating the policy outcomes intended through design guidelines, for example, can assist local planning processes. Coastal guidelines for foreshore management are common and increasingly there are guidelines for the adjacent coastal development. Local guidelines within the context of State policy can provide more place-based solutions.

In Byron Shire, in northern New South Wales, the wider strategic planning framework for climate change is implemented by its *Development Control Plan 2014*, which includes a specific section on managing climate risk (particularly within the context of coastal flooding). This includes provisions for siting development on areas of the site not subject to flood risk (defined with reference to climate change forecasts set out in the strategic planning policy); and for requiring elevation in other cases.

2.4 Collaboration

Collaboration between local governments, regional organisations and between governments can facilitate better coastal planning. This is even more so when planning for coastal climate change given the risks and uncertainties involved. There are three leading case studies that showcase different kinds of collaboration discussed in Section 3. Collaboration through involving the private sector, infrastructure providers, and coastal organisations all adds to a deeper understanding of the challenges and opportunities. Importantly regional collaboration can often lead to new sources of federal funding for coastal adaptation (e.g. Regional Development Australia Fund 2014 Grants program) (see also Coast Adapt: Partnerships for adaptation).

These collaborations often feature innovation through interesting partnerships, such as coastal planners and climate scientists working with cultural practitioners. An example of this is the South East Coastal Adaptation project (Norman et al. 2013) funded by NCCARF which won the national Planning Institute of Australia research award (2014). In this project, the initial research findings—developed with seven local coastal councils and three universities—were further explored by artists through a six month field studies program. This culminated in a regional coastal art exhibition engaging school students, community groups and coastal visitors that built awareness and understanding on potential climate change impacts and ways to improve resilience through forward planning.

2.5 Direct planning investment and/or pricing policy

Financing adaptation efforts is particularly challenging for coastal local governments, especially where significant housing or infrastructure is situated. Many state jurisdictions have, or have had, special purpose funding schemes which support local adaptation planning efforts, and previous Commonwealth programs such as the Local Adaptation Pathways scheme have also financed planning efforts (as distinct from funding for direct adaptation action) (see also CoastAdapt: Resources for adaptation).

The Queensland Government's Climate Change (Coastal Hazards) Adaptation Program (CHAP) provides funding to councils to undertake climate hazard adaptation work within the broader framework of 'resilience'. Facilitated by the Queensland Local Government Association, the scheme funds hazard assessment research as well as the development of strategic planning responses (QCRC - http://qcrc.lgaq.asn.au).

In addition, the different states and territories have their own mechanisms for increasing open space in coastal areas, such as the New South Wales' Coastal Acquisition scheme or Western Australia's requirements for foreshore reserves. Queensland's land surrender provisions under the Coastal Protection and Management Act is another example. To date, the concept of 'tradeable development rights'—whereby hypothetical development rights are transferred from a vulnerable site to a more appropriate development location—have not been implemented in Australia. However, such quasi market models might be considered in the future if the development opportunities for significant tracts of privately owned urban land are to be quarantined as part of a wider adaptation strategy.

3 Towards climate resilience

Planning for climate change in coastal environments will require more than scientific evaluation and planning guidelines. Cities and regions within Australia and overseas (e.g. New York) that have experienced extreme events have found that building resilience is a key long-term solution to planning for coastal climate change. This is primarily focused on strengthening communities as well as physical adaptations. An example is the neighbourhood resilience plans developed by New York City post Hurricane Sandy (NYC 2015). The Resilient Neighbourhoods program 'was launched in 2013 to work directly with floodplain communities to re-examine questions of land use planning, and development in light of a new understanding of coastal flood risk' (NYC 2018b, p.1).

Below are what we consider to be 'leading practice' case studies in coastal Australia. We have identified them as having:

- taken a more integrated and innovative planning approach to the impacts of coastal climate change
- stood the test of time
- used a collaborative approach
- achieved good outcomes for the goals established within each organisation.

3.1 Strategic plans (Victorian Coastal Plan)

Each jurisdiction across Australia will develop its own response influenced by local conditions and the level of support by higher levels of government. A good example of such an approach over a sustained period is the Victorian model of strategies, plans and policies. The coastal planning framework has survived changes of government and has been consistently reviewed and updated every five years with active stakeholder input. The strategies, plans and polices have importantly been supported by a supportive coastal governance arrangement led by the Victorian Coastal Council. The approach outlined below is an example that other jurisdictions could consider if appropriate.

Strategies, plans and policies

The Victorian Coastal Strategy (VCS) and South Australia's Policy on Coastal Protection (1991) are the longest running continuing strategic planning processes in coastal Australia. The VCS was first produced in 1997 and has been reviewed every five years since. The series of state coastal strategies provides a very interesting timeline of the approaches to coastal climate change strategies, plans and policies in Victoria.

The Victorian Coastal Strategy is required under the *Coastal Management Act 1995.* Originally produced in 1997, the VCS was subsequently reviewed in 2002, 2008 and 2014. The consistency and regular review of the approach to coastal planning in Victoria has been a key strength. The content of the strategy has developed over time to reflect new issues such as climate change and planning for rapid coastal growth.

The current structure of the VCS (2014) is outlined in Figure 2 and includes some important elements that could be applied elsewhere in coastal Australia. The most important element is the concept of a hierarchy of principles, shown below, which provide clear guidance to the multiple stakeholders involved in implementation of coastal policy.

The most important aspect is that the environmental health of the coast is the first priority, followed by integrated planning, and then activity and land use. Ministerial intervention has also been exercised in complex situations where there is a legacy of existing uses that need to be reconciled with future risks (Glenelg Planning Scheme Amendment C38).

Climate change has been a consistent theme in the VCS since 2008. Planning for sea level rise is clearly outlined in the Plan for possible sea level rise of not less than 0.8 metres by 2100. The Plan allows for the combined effects of tides, storm surges, coastal processes and local conditions such as topography and geology, when assessing risks and coastal impacts associated with climate change (VCS, p52). The 2014 VCS includes considerations of the *Climate Change Act 2010* and the subsequent publication of the Victorian Climate Change Adaptation Plan (2013). Sea level rise remains a primary consideration and applies across the coastline with the exception of infill areas where an increase of 0.2 metres over current 1 in 100 year flood levels by 2040 applies. This has been

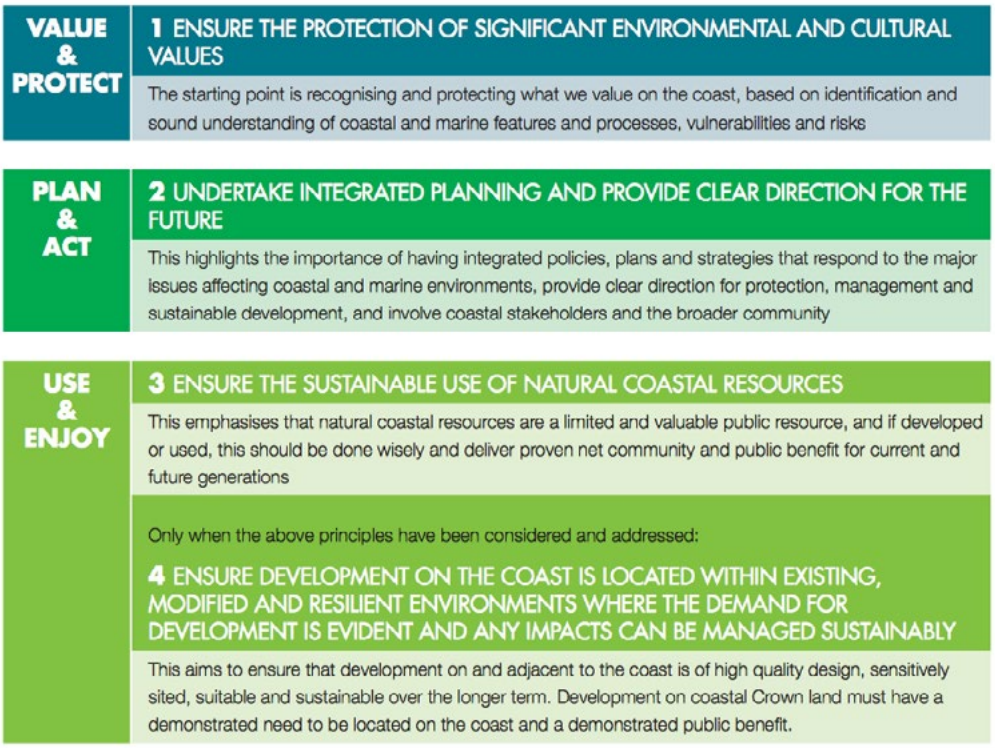

Figure 2: Hierarchy of Principles, Victorian Coastal Strategy 2014. Source: Victorian Coastal Strategy 2014. © The State of Victoria Department of Environment and Primary Industries Melbourne 2014.

applied successfully in Lakes Entrance Victoria (East Gippsland Shire Council 2014 – Coastal Inundation and Erosion Planning Policy 2014).

The VCS 2014 recognises the broader impacts of climate change and its consequences including a drier coastal environment and with that significant bushfire risk, coastal storms, changing sea temperatures and ocean acidification (see Figure 3). In other words, climate change is embedded throughout the VCS 2014 and seen as a mainstream consideration in planning for coastal Victoria.

The other very important contribution by the VCS is the regional approach introduced by the *Coastal Management Act 1995*. The dividing of the coast into three specific regions, supported by regional boards including professional and community leaders, has been a consistent plank to the successful strategy. The governance structure has enabled continuing community input to the development of policy and, it is suggested, an emergent ownership of the strategy to the point that it would be very difficult to take away.

The VCS including its policies and regional coastal plans is presented here as a case study for other jurisdictions. The key elements of an inclusive governance structure and a consistent strategy over time, supported by policy and regional coastal plans, can provide a positive framework for decision-making. The regional coastal boards enable a level of policy development that is closer to the communities than to the state government and wider than the interests of just one local council. Coastal action plans have been developed by the regional boards on a number of issues supported by research, e.g. the Coastal Caravan and Camping case study (Western Coastal Board), the Gippsland Estuaries Coastal Plan (Gippsland Coastal Board) and the Boating Coastal Action Plan (Central Coastal Board).

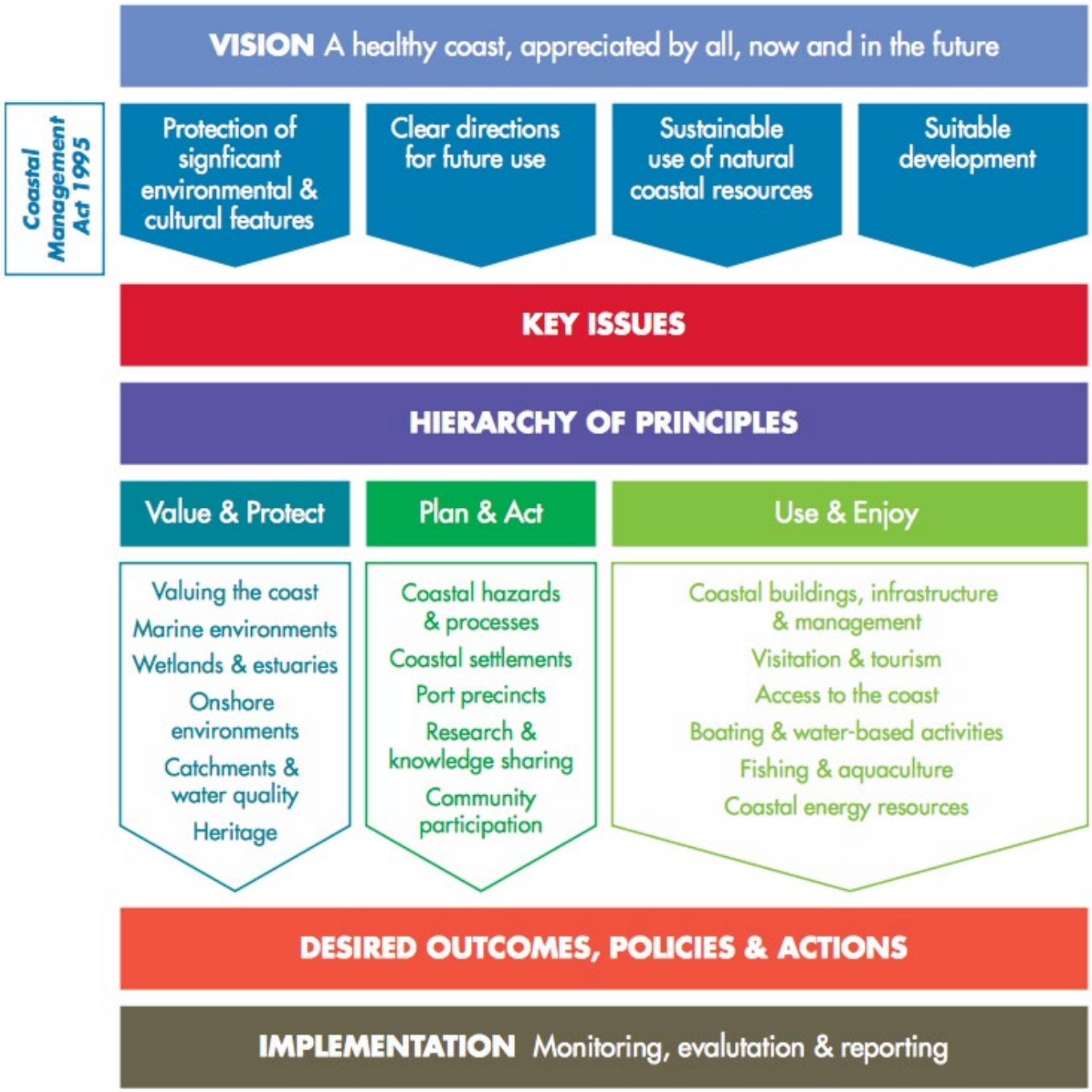

Figure 3: Strategy at a glance, from Victorian Coastal Strategy 2014. Source: Victorian Coastal Strategy 2014. © The State of Victoria Department of Environment and Primary Industries Melbourne 2014.

3.2 Guidelines for regulations (local councils)

Possibly, planning for sea level rise is the most contentious issue for coastal climate change. Guidelines vary significantly between jurisdictions making it challenging for local councils to develop effective responses. Nearly all jurisdictions have state-wise policies. These vary in nature ranging from guidelines (Tasmania) to detailed strategies and plans (SA, Vic, NSW, WA). The Northern Territory is in the process of developing a 'Coast and Marine Management Strategy'.

An example in New South Wales provides a good illustration. The collaboration of two councils on the south coast of New South Wales, namely Shoalhaven and Eurobodalla, developed an innovative approach for tackling planning for sea level rise in the absence of state policy at the time. This prize-winning project (National Coastal Awards 2015) is an example where, in the absence of any state government sea level rise policy at the time, the two councils worked together to develop a more place-based approach to sea level rise based on a risk assessment and evaluation (*South Coast Regional Sea Level Rise Policy and Planning Framework*).

Working within the series of evolving coastal guidelines (at the time the NSW Coastal Guidelines 2015), the Sea-level Rise Policy and Planning Framework for Eurobodalla and Shoalhaven is based on the following principles: integrity, responsibility, flexibility, consistency, communication and transparency, and avoiding complexity — which is possibly the most challenging. A distinction is made between 'areas already developed', 'areas where rezoning is proposed to allow development' and 'critical community utility' and applied against a hazard framework to establish risk and an appropriate action.

Since the above was developed, the New South Wales Government has commenced the Coastal Management Act 2016 and released a new State Environmental Planning Policy (Coastal Management) 2018 and the coastal management manual to provide guidance to local councils preparing Coastal management programs. In many ways the approach developed by Eurobodalla and Shoalhaven paved the way for a broader application of a risk management approach. The proposed New South Wales system is discussed below in Section 3.3.

It should be noted that there are many other related standards that can apply to coastal planning and management. Standards Australia is a good source of information on the array of approved standards that may be relevant (http://www.standards.org.au/)

3.3 Integration with planning system

Integrated coastal management is a concept that requires a strong connection between environmental and planning policy. In every jurisdiction in Australia, both environmental and planning policies are at work side by side and often, it is that level of integration that influences on the ground implementation. Most states have developed frameworks to 'integrate with the planning system' with a number of lessons learned. These include the durability of policies, the role of the relevant Minister and the relevant court or tribunal with jurisdiction to hear applications for review or appeals and very importantly the role of local councils.

New South Wales coastal reforms

During November 2015, the New South Wales Government introduced a package of new measures for coastal management and planning. These included measures to respond to the projected impacts of climate change on the coastal environment. The measures are part of a staged process of reforms—Stage 1 focused on interim measures for coastal hazards, and Stage 2 introduced a major reform package.

The New South Wales management framework now includes the Coastal Management Act 2016, the Coastal Management Statement of Environmental Planning Policy (SEPP) and a coastal management manual. A Ministerial Direction requires new local plans to be consistent with the objectives of the Coastal Management Act, and the SEPP provides specific development criteria for development in the coastal zone. Local Environmental Plans (LEPS) and Development Control Plans (DCPs) continue to identify permissible land use and set more detailed rules governing development, and so are important tools in implementing climate adaptation in the coastal zone.

The Coastal Management Act 2016 divides the coast into four management areas—coastal wetlands and littoral forests, coastal vulnerability, coastal environment and coastal use. This is designed to be a more refined approach to coastal management, recognising differences in coastal environment

along the New South Wales coastline. The coastal management manual sets out requirements and guidance for preparing and developing coastal management programs at the local level (Clause 21).

The Coastal Management State Environmental Planning Policy draws together long-standing SEPPs for the coastal area, consolidating the development controls applying to particular forms of development or within particular coastal management areas. It also sets out the approval pathway for coastal protection works for public authorities and private individuals. Importantly it recognises the cumulative impact of coastal development.

Integration with the planning system is a key objective of the NSW framework (see Figure 4).

The Local Planning Direction on Coastal Management requires a proposals (amending local environmental plans) to give effect to, and be consistent with, the objectives of the Coastal Management Act, the coastal management manual and any coastal management program, and relevant guidelines and strategies including the Coastal Planning Guidelines: Adapting to Sea Level Rise and the Coastal Design Guidelines (p7).

In summary, the coastal policy reforms in New South Wales include a coastal management framework with proactive strategies for managing the coastal zone as well as regulatory development controls for undertaking new development and coastal protection actions. While the reforms build on existing and long standing coastal planning and hazard management activities undertaken at state and local government level for many decades, it is premature to assess the outcomes of the most recent changes as outlined here, which are yet to be fully implemented. Indeed, a decision to remove state benchmarks for sea-level rise (originally specified in 2010) has been controversial, because it requires local councils to establish more sensitive, site based parameters for measuring and responding to risk. Nevertheless, the framework is intended to provide a basis for local government to undertake this type of detailed risk assessment and mapping, drawing on the enhanced coastal management manual and access to technical expertise within the New South Wales government.

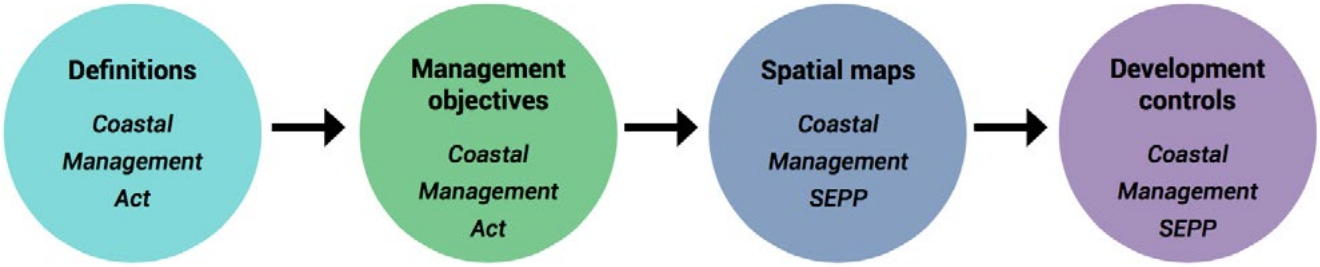

Figure 4: Proposed NSW Coastal State of Environmental Planning Policy. Source: © NSW Department of Planning and Environment 2015.

3.4 Mainstreaming across government

Mainstreaming planning for coastal climate change across governments is challenging in the best of circumstances. There have been numerous documented attempts to achieve an intergovernmental approach to planning; the most comprehensive example is the national Parliamentary Inquiry into coastal climate change (Australian Parliament 2009) and the subsequent National Framework for Climate Change Adaptation (2010).

At the state level, nearly every jurisdiction introduced state coastal climate change policies during the period 2005 to 2010 that subsequently were largely wound back in response to political and community reaction (Norman 2013). Most recently there has been a renewed effort for planning for coastal climate change in a more integrated way particularly with draft polices being developed in Queensland and New South Wales (discussed in Section 3.3).

3.4.1 Western Australia

Western Australia has a vast coastline extending over 20 000 km including nearly 8 000 km of island coastline. Planning for coastal climate change in Western Australia involves climates from the southeast corner of Esperance to Wyndham in the north east of the country. The Western Australian planning system recognises the impacts of coastal climate change in its state policy, regional plans and at the local level. It also has a state planning commission, a comprehensive system of regional planning and an expert state coastal advisory committee. That does not mean that all is well on the ground, as implementation in any coastal environment requires consistency in policy and supportive funding. However, the framework is comprehensive and has been in place for some time.

The City of Mandurah provides a leading example to demonstrate what can be achieved across government. The City of Mandurah was one of the earliest local councils to seriously tackle the complexity of planning for coastal climate change at the local level within the policy context of higher levels of government (NCCARF 2013). It is a good example of mainstreaming across local government.

With an initial focus on the impacts of sea level rise and coastal storms, the Council over a period of five years has developed a very comprehensive approach covering a wide range of risks. The initial risk assessment was undertaken during 2008-9 with the assistance of federal funding at the time. This assessment has now grown to include the impacts of extreme heat on fire risk, human health and biodiversity with adaptation responses developed right across Council.

Mainstreaming or integrating climate change action across the Council's operations has included coastal flood risk assessments, water sensitive urban design, groundwater and biodiversity strategies, revised planning and building controls incorporating new floodplain mapping and, more recently, a focus on raising community awareness. An example of community outreach is the WA Peron Naturaliste Partnership where nine local councils collaborate between Cape Peron and Cape Naturaliste in the south west of Western Australia - https://www.peronnaturaliste.org.au/ (Figure 5). The 'vision of this award winning initiative "is to empower a resilient regional community to reduce risks and optimise opportunities presented by climate change". Their current Coastal Values Project 'is to gain a better understanding of what communities currently value on the coast and how these values may be impacted as a result of climate change' (PNP 2018).

3.5 Collaboration

Not all coastal planning and management is achieved through law and policy. Plenty of activity occurs outside this framework through goodwill and collaboration. Some of the most outstanding examples of coastal planning are achieved through collaboration between local councils, Indigenous land councils, and non-government activity.

Two different examples of collaboration are discussed below: the South East Climate Change Alliance (Victoria) and the Dhimmiru Arnhem Land Sea Country Plan. These examples consider planning for coastal climate change.

3.5.1 South East Climate Change Alliance (SECCA)

The South East Climate Change Alliance (SECCA) is a collaboration of eight councils in the southeast region of Melbourne (see map, Figure 5). Established in 2004 it has undertaken a significant amount of coastal adaptation work over the last 10 years.

SECCA is largely project based undertaking works of over $9 million in the region, working both with individual councils and as a region (see Figure 6).

Figure 5: South East Councils Climate Change Alliance. Source: South East Councils Climate Change Alliance. © SECCA Inc.

A good example for planning coastal climate change at a regional scale is its project on local coastal assessment hazards in Western Port Bay, Victoria. Western Port Bay is a strategic priority for the government in terms of future port options at the same time as being a declared RAMSAR site. Its location on the urban edge of metropolitan Melbourne means is also subject to significant coastal development pressures.

Figure 6: 10 Years of Climate Projects. Source: South East Councils Climate Change Alliance. © 2016 SECCA Inc.

SECCA is working with several coastal councils on Western Port Bay and the Victorian State Government to provide essential data and risk analysis for planning decisions and climate change adaptation plans at the local, regional and state level.

> The scenarios used in the assessment are consistent with the current Victorian Planning Benchmarks to plan for sea level rise of not less than 0.2m by 2040 for urban infill areas and 0.8m by 2100. The study considers three sea level rise scenarios of 0.2m (2040), 0.5m (2070) and 0.8m (2100) (DELWP, 2015).

The coastal risks assessment hazards project provides a good example of an integrated approach to planning for coastal climate change. It is a collaboration to generate relevant data on coastal risk with two levels of government working together with several local councils and regional organisations. More information can be found on http://www.seccca.org.au/project/western-port-local-coastal-hazard-assessment/ (accessed 25 May 2016).

3.5.2 The Dhimmiru Arnhem Land Sea Country Plan 2015-2022

Most of the Northern Territory coastline is managed by the Aboriginal Land Councils. It is therefore an increasingly important part of integrated coastal management in Australia. The most recent Dhimmiru Arnhem Land Sea Country Plan 2015-2022 is a leading example in the way the plan has been drafted to incorporate the catchment to coastal to marine continuum (Dhimurru Aboriginal Corporation 2015, Norman and Gurran 2017). It is part of the Indigenous Protected Area program funded by the Australian Government and prepared by the Dhimurru Aboriginal Corporation. It covers over 550 000 hectares of sea country in northeast Arnhem Land.

The sea country plan recognises the impacts of climate change concluding that the 'Yolŋu are aware of potential climate change impacts and note the occurrence of rising sea levels and changes to seasonal cycles. The implications will extend to areas of health, education, infrastructure and economic development thus requiring collaboration with local and national agencies' (p. 68). The plan argues that the integrated nature of the sea country positions it to better plan for the coastal impacts of climate change (wetland inundation, cultural sites). It also places strong emphasis on longer term scenario planning and partnerships to build knowledge on the impacts of climate change on heritage management and conservation.

The example of the Dhimurru Sea Country Plan (Dhimurru Aboriginal Corporation 2015) identifies a very important part of planning for coastal climate change for our Indigenous coastal communities of northern Australia. It also offers one model of leading practice that can guide communities in other parts of coastal Australia.

These examples of collaboration demonstrate the benefits that can be gained through regional cooperation and engagement across the sectors. The examples include an area on the urban edge, an area in the southwest temperate environment and an area in the tropical north. The examples highlight that long-term collaborations can be achieved in complex coastal environments in the context of climate change, and that practical methods and projects on adaptation have been delivered successfully on the ground.

4 Future challenges for implementation

This section discusses the challenges for planners that are not neatly covered by planning legislation and policy and often require innovative responses in the absence of any levers/tools. A list of potential actions is provided in Appendix 2.

4.1 Managing potentially competing sources of data and legislative uncertainty

Overall, the data on climate change for planning purposes is improving. The increasing certainty of global and national projections (IPCC, BOM, CSIRO) published over the last five years is providing a better context for decision-making. More localised climate change scenario planning is developing and being applied in regional contexts (e.g. the Victorian coastal inundation data set). See also the Information Manual 3: Available datasets.

The recent move by the New South Wales government to coastal regional planning is, to some degree, acknowledgement that data and projections are sensitive to scale and that some uncertainties may be reduced at this level of analysis. Other important socio economic data may be more accessible at the local level.

Bringing all these different sets of data together can present challenges for decision-makers. Some of these technical issues are explored through the national urban data facility, the Australian Urban Research Infrastructure Network (AURIN). The integration of biophysical data based on pixels, and Australian Bureau of Statistics (ABS) data based on area, make it technically challenging to integrate for climate adaptation modelling. Scenario modelling is nevertheless making progress in advancing techniques in this field and the national coastal Smartline', available on the OzCoasts website (http://www.ozcoasts.org.au) managed by Geosicence Australia remains an important starting point for local mapping.

Indigenous local knowledge and practice is very important to coastal planning in the context of climate change. Incorporating Indigenous knowledge into coastal plans varies widely around Australia; the northern coastal lands are managed by the Aboriginal Land Councils, in contrast to the southern coasts where there is marginal (at best) engagement of Indigenous peoples in the planning process.

4.2 Strategic policy to infrastructure development

Both public and private infrastructure providers are becoming increasingly aware of the need to plan for climate change impacts, particularly long-term investments such as ports and airports, hospitals etc. There is an estimated $266 billion of infrastructure at risk with a 1.1 m sea level rise (DCEE 2011) (see Figure 7).

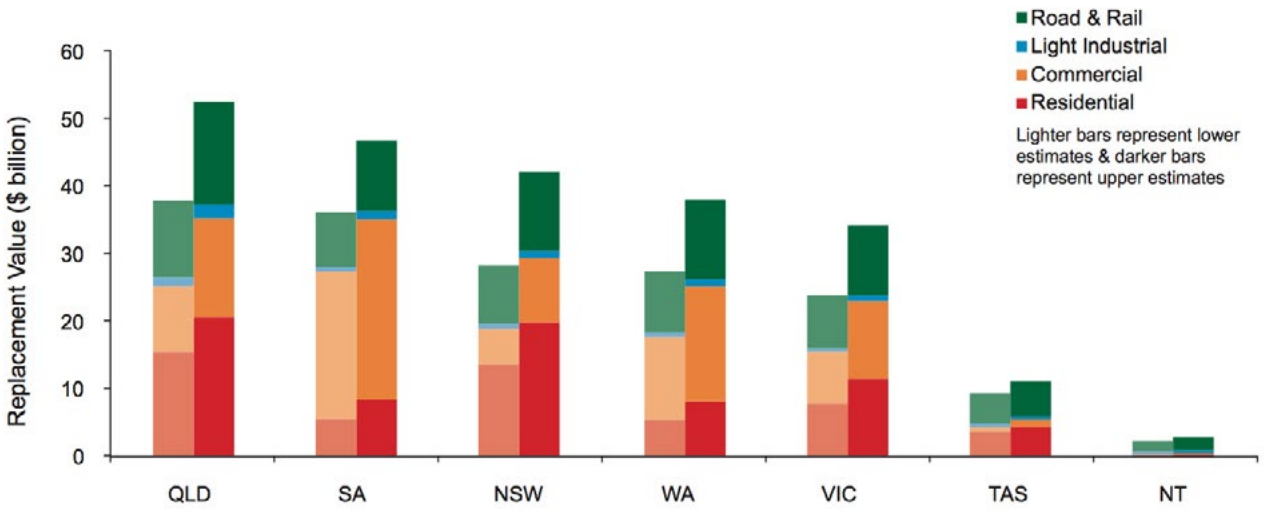

Figure 7: Climate Change Risks to Coastal Buildings and Infrastructure. Source: © Commonwealth of Australia (Department of Climate Change and Energy Efficiency) 2011.

An example is the construction of the new runway at Brisbane airport where sea level has been taken into account (Steffen et al. 2014) (See CoastAdapt: Brisbane airport's new runway).

4.3 Emerging practice in scenario planning and adaptation pathways

The adaptation pathways approach, together with different climate scenarios, is becoming a valuable planning tool. This has also been applied in coastal guidelines for sea level rise developed in Victoria and Tasmania (e.g. by Clarence City Council).

A good example is the national award winning *Regional Climate Change Adaptation Plan for the Eyre Peninsula* undertaken in South Australia. This plan illustrates how climate change adaptation pathways can be developed for different climate scenarios and, in the process, actively engage a rural farming and fishing community (Siebentritt et al. 2014). The Plan was developed by the Eyre Peninsula Climate Change Agreement Committee (EPICCA) comprising diverse membership from natural resource management, regional development, local and state government. Working with CSIRO climate adaptation scientists, EPICCA engaged a wide range of regional stakeholders in developing adaptation pathways for different climate scenarios (Siebentritt et al. 2014, p.3).

It is anticipated that scenario planning for coastal climate change will be increasingly used in coastal Australia where partnerships are developed between local and regional bodies and research organisations.

4.4 Retrospectively improving the resilience of exposed properties after development has occurred

Retrospectively improving the resilience of exposed properties after development has occurred is possibly one of the toughest coastal planning challenges. Enhancing the resilience of private property (such as dwellings exposed to increased risk of coastal flooding) is very difficult to achieve through the land use planning system, which primarily governs future proposals rather than operating in a retrospective way. Therefore, for local governments, introducing measures to protect private property from coastal hazards depends largely on community good will and the availability of funding.

Statutory frameworks that govern the capacity for individual property owners to undertake their own coastal protection actions are becoming more sophisticated. These frameworks outline a range of criteria for ensuring that engineered works to protect private property from coastal hazards and sea level rise comply with State policy and legislation, and do not adversely affect: coastal processes or significant ecosystems, adjoining properties, the local built and natural environment, amenity, values, of, or long term public access adjoining beaches and foreshores (e.g. see Eurobodalla Interim Coastal Hazard Adaptation Code 2015).

Beyond these engineering approaches governed by coastal protection laws, a range of other important practices are emerging.

The first practice is the recognition that, in many places, 'soft' barriers rather than 'hard' barriers may provide a more workable and cost effective solution. Replanting of native vegetation, stabilisation of dunes etc. is being explored as local councils grapple with the realities of the (often prohibitive) costs of hard defences. Potential use of leasehold tenure in areas subject to risk is certainly worth considering where appropriate.

The second practice discussed earlier is the development of neighbourhood resilience plans. These offer a more comprehensive approach by working with the community and applying a more integrated approach to improving resilience. A formative example of this is the coastal adaptation strategies developed with the community in Clarence in coastal Tasmania. Comprehensive community-wide strategies provide a basis for recognising that different households will have different levels of vulnerability, and potential resilience, to the range of increased coastal risks associated with climate change. (See also, CoastAdapt: Vulnerable communities/community organisations).

Lessons can be learned from New York City following Hurricane Sandy in 2012. The New York City is now considering back zoning areas of risk so you can continue to live there but they will not allow any further increase in density. In New South Wales, similar provisions have been signalled by the South Coast Regional Sea Level Rise Policy

and Planning Framework (described above), which sets out a basis for identifying areas subject to immediate, medium term, and longer range hazards. No new development will be permitted in areas subject to immediate hazard; and no new subdivisions or developments involving increased residential density will be permitted within planning areas subject to medium term (15-35 years) risk. However, repairs and renovations to existing dwellings may be permitted under certain circumstances.

Overall, implementing a policy of planned retreat from the coast will involve balancing the costs and benefits associated with potential mitigation efforts in light of the wider economic values associated with private and public infrastructure subject to coastal risk.

4.5 Enhancing the public realm and active tourism

If there is one key message that is emerging in climate adaptation, it is that the role and quality of open space is critical. Open space will assist in cooling the heat island effect, providing shade and shelter for humans and a habitat for coastal biodiversity. This aspect is recognised in adaptation strategies for our capital cities, for example, the City of Melbourne Forest strategy 2012 – 2032 (City of Melbourne 2012). As the Chair of Landscape Architecture at Harvard University recently argued—with bigger cities, there needs to be bigger parks (Foreman 2015).

Two projects in this field received 2015 national coastal awards. The Philip Island Nature Park and the Augusta Margaret Shire Council: Surfers Point Redevelopment Project received recognition for the ability to provide improved facilities for local and tourists as well as improving the coastal amenity of the areas through enhanced natural habitats (Australian Coastal Councils Association 2015).

5 Key messages for planning for local coastal climate change

From the above discussion, we distil 10 key messages for preparing coastal planning regimes in the context of climate change.

1. The impacts of climate change on coastal Australia will vary considerably depending on the climate, the region, the topography and coastal environment. Planning for coastal climate change will need to be able to adapt to these different local and regional circumstances. This will involve drawing on a suite of planning tools and instruments (see Section 2).
2. The regulatory environment for planning for coastal climate change also varies considerably around Australia relying heavily on state planning and environment legislation, local planning policies and regulations.
3. There is a range of planning policy instruments that can be used for coastal adaptation by governments ranging from state coastal strategies, climate adaptation strategies, to more detailed local guidelines. These planning instruments need to work in concert to achieve the best outcomes.
4. Leading practice examples of collaboration (see Section 3.5) are a valuable tool for local adaptation planning to illustrate practical, contextual on-the-ground solutions.
5. Collaboration between local and regional stakeholders is supporting some the more innovative coastal adaptation planning in both northern and southern Australia.
6. Indigenous peoples' involvement in planning for coastal planning and climate change is essential and needs to become universal in coastal Australia. For example, there is active engagement through Aboriginal Land Councils in northern Australia with relatively less opportunity in southern Australia (see Section 4.1).
7. Scenario planning is emerging methodology as a useful tool for planners and scientists to work together with local and regional communities in developing adaptation responses to changing circumstances. The approach to scenario planning can vary according to the coastal risk being assessed (fire, storms, sea level rise).
8. Place-based planning to strengthen communities at climate risk is a strategy that is being implemented internationally (e.g. New York Resilient Neighborhoods) particularly after extreme weather events and at the local neighbourhood level and could be a useful model to strengthen responses in Australia. Strengthening community capacity to adapt is an important long-term action.
9. Planning instruments for adapting to coastal climate change are still evolving to meet the future impacts of climate change on the coastal environments. More nuanced regional responses— regional collaboration and well-developed coastal guidelines—are contributing to increasing resilience for coastal communities. Planning for coastal adaptation needs to consider the wide range of coastal land tenures including public and private lands, native title and Indigenous land interests, and marine zonings.
10. Work by local government on coastal planning and climate change operates within a political context of much uncertainty, with policy shifts having significant implications for long term planning frameworks. The most effective strategy for long range planning is to undertake and maintain accessible data on projected impacts and the options for mediating risks; such considerations will remain salient criteria when assessing all development proposals in coastal zones irrespective of overarching policy adjustments.

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Appendix 1: Summary of state and Northern Territory policy and law relevant to coastal Australia

Source: Bell-James (pers. comm.) and CoastAdapt: Jurisdictional differences.

State/ Territory	Key legislation/ regulations/ documents with binding legal effect	Key policies/strategies	Brief summary
NSW	*Environmental Planning & Assessment Act 1979* (NSW) and *Environmental Planning and Assessment Regulation 2000* (NSW) *Coastal Management Act 2016* (NSW) Coastal Management State Environmental Planning policy (SEPP) 2018 (under *Environmental Planning and Assessment Act 1979*) Ministerial Planning direction – Coastal Management	Coastal Management Manual 2018 NSW Coastal Planning Guideline: Adapting to Sea Level Rise (2010) NSW Coastal Design Guidelines (2003)	The NSW regime consists of a complicated array of legislation and policies. The *Coastal Management Act 2016* (NSW) sets out the underpinning legislative framework for coastal management, whilst the Coastal Management SEPP sets out development assessment requirements, including for coastal protection works, and the Coastal Management Manual sets detailed guidance for management of the coastal zone in the state. By Ministerial Direction, local governments must give effect to the objectives of the Coastal Management Act and SEPP. A Sea Level Rise Policy Statement was introduced in 2009, setting out planning benchmarks. However, this was removed in 2012 following a change of government. The *Environmental Planning and Assessment Regulation 2000* (NSW) was amended in early 2011 to require that coastal hazards affected by sea level rise be noted on 'section 149' planning certificates.
State/ Territory	**Key legislation/ regulations/ documents with binding legal effect**	**Key policies/strategies**	**Brief summary**
NT	*Planning Act* (NT) Northern Territory Planning Scheme		The *Planning Act* (NT) is the main planning legislation for the state. Amongst other things, it provides for a single Northern Territory Planning Scheme to apply to the whole Territory, except where another planning scheme applies. The Scheme is linked to maps of 'primary' and 'secondary' storm surge areas, defined as having a 1% and 0.1% AEP of inundation by storm surge respectively. The Scheme places limitations on development in these areas. The maps incorporate a 0.8m sea level rise by 2100.

QLD	*Queensland Planning Act (2016)* *Coastal Protection and Management Act 1995* (Qld) State Development Assessment Provisions *State Planning Policy* (April 2016) Erosion prone area plans (declared under s 70 of the *Coastal Protection and Management Act 1995* (Qld)	*Coastal Management Plan 2014*	The *Queensland Planning Act 2016* (Qld) sets out the underpinning legislative framework for planning and development assessment in Queensland. The *Coastal Protection and Management Act 1995* (Qld) provides the framework for coastal management. Erosion prone area plans declared under the *Coastal Protection and Management Act 1995* (Qld) incorporates a sea-level rise benchmark of 0.8 m by 2100. The State Planning Policy sets out the State's interests for local governments that must be addressed when amending their planning scheme, and assessing development applications. These policies link development restrictions to the declared erosion prone areas. When the State government has jurisdiction to assess a development application, they apply the State Development Assessment Provisions, and also place restrictions on development in declared erosion prone areas. Given the risk to existing and future development along the coast the QLD Government is supporting local government in the development of coastal hazard adaptation strategies under a program called QCoast 2100. $12M has been allocated over 3 years for this work. It should be noted that new planning legislation has been passed by the Queensland government which will commence in July 2017.

State/ Territory	Key legislation/ regulations/ documents with binding legal effect	Key policies/strategies	Brief summary
SA	*Coast Protection Act 1972* (SA) *Planning Development and Infrastructure Act 2016* (SA) *Development Regulations 2008* (SA) *Climate Change and Greenhouse Emissions Reduction Act 2007* (SA)	*Coastline: Coastal erosion, flooding and sea level rise standards and protection policy no 26* (1992) *Policy on Coast Protection 1991* and *Coast Protection Board Policy Document 2012* (revised 2016) *Prospering in a changing climate: A Climate Change Adaptation Framework for South Australia 2012* *South Australia's Climate Change Strategy 2015-2050* *Coastal Planning Information Package: A guide to coastal development assessment and planning policy 2013* *Living Coast Strategy* (2004)	The *Planning, Development and Infrastructure Act 2016* (SA), and the *Coast Protection Act 1972* (SA) provide the essential underpinning legislative framework for coastal development in the state. The *Coast Protection Act* also established the Coast Protection Board, which develops coastal planning policy and is a referral body for coastal development. The Coast Protection Board's *Policy on Coast Protection and New Coastal Development* (1991) is the source of sea level rise provisions included in all SA Local Development Plans. Planning authorities must refer development applications for coastal land to the Coast Protection Board. The Coast Protection Board has decision-making power in limited circumstances, otherwise their role is advisory and the planning authority must have regard to their advice. Referrals are assessed against the Coast Protection Board's *Policy on Coast Protection and New Coastal Development 1991* and *Coast Protection Board Policy Document 2012*, which adopts a sea-level rise benchmark of 0.3 m by 2050, and 1 m by 2100. The *Living Coast Strategy* (2004) recognises the risk of climate change, sea level rise, and coastal hazards, and the need to incorporate in local planning. The *Climate Change Adaptation Framework* released in 2012 sets out guiding principles for entities including local governments to consider in planning
TAS	*State Policies and Projects Act 1993* (Tas) Tasmanian State Coastal Policy 1996 *Land Use Planning and Approvals Act 1993* (Tas)	*Sea-Level rise and allowances for Tasmania based on the IPCC AR5 report (2016)* Tasmanian Coastal Works Manual (includes provisions for climate change) Coastal erosion hazard susceptibility zone mapping for hazard band definition in Tasmania Coastal Hazards Package (2016)	The *Land Use Planning and Approvals Act* sets out the underpinning legislative framework for the planning in the state. It is supplemented by the Tasmanian State Coastal Policy, which is given statutory effect by the *State Policies and Projects Act 1993*. The policy sets out key objectives and outcomes for local governments to consider in planning. The *Sea-level rise and allowances for Tasmania based on the IPCC AR5* report sets out sea level rise planning allowances for each coastal municipality in Tasmania, as well as state-wide averages (http://www.dpac.tas.gov.au/__data/assets/pdf_file/0016/313522/CSIRO_Sea_Level_Rise_Allowance_Report_December_2016.pdf). The coastal erosion susceptibility zone mapping for hazard band definition in Tasmania (2013) sets out the technical basis for assessing the impact of climate change induced sea level rise on the Tasmanian coast. The Coastal Hazards Package (2016) sets out how the sea level rise planning allowances are to be considered in land use planning and building in Tasmania. The package includes policy maps for coastal inundation and erosion.

State/ Territory	Key legislation/ regulations/ documents with binding legal effect	Key policies/strategies	Brief summary
VIC	*Planning and Environment Act 1987* (Vic) *Coastal Management Act 1995* (Vic) *Climate Change Act 2010* (Vic) (requirement to consider climate change in developing coastal strategies /actions plans under *Victoria Planning Provisions – State Planning Policy Framework* *Municipal* statements in local planning schemes *Water Act 1989* (Vic) allows catchment authorities to undertake flood studies and control development adjoining waterways	Victorian Coastal Strategy 2014 Coastal Action Plans and Coastal Management Plans (West Coast, Central Coast, and Gippsland Coast) – a mechanism for implementing the coastal strategy at the regional level	The *Planning and Environment Act 1987* and *Coastal Management Act 1995* set the underpinning legislative framework. The *Coastal Management Act* established the Victorian Coastal Council and three regional Coastal Boards, influential in promoting climate change adaptation in coastal Victoria The Victoria Planning Provisions (VPP) is a set of standard planning scheme provisions, which must be integrated into local planning schemes. Chapter 13 addresses coastal hazards and coastal impacts of climate change. The VPP requires councils to plan for 0.2 m sea level rise by 2040 for infill development, and 0.8 m by 2100 for new greenfield development. The Victorian Coastal Strategy (VCS) is a more detailed document outlining principles for planning and development decision-making. The overarching principles require that decision-makers: 1. ensure the protection of significant environmental and cultural values 2. undertake integrated planning and provide clear direction for the future 3. ensure the sustainable use of natural coastal resources 4. and finally, when the above principles have been considered and addressed—ensure development on the coast is located within existing modified and resilient environments where the demand for development is evident and the impact can be managed Under the *Coastal Management Act 1995*, governments must take all reasonable steps to give effect to the strategy.
WA	*Planning & Development Act 2005* (WA) *State Planning Policy 2.6: State Coastal Planning Policy 2013*	State Coastal Planning Policy Guidelines (2013) (for State Planning Policy 2.6) Coastal Hazard Risk Management and Adaptation Planning Guidelines (2014) Draft Coastal Zone Management Policy for Western Australia (June 2011)	The *Planning & Development Act 2005* (WA) is the overarching planning law. The *State Planning Policy 2.6: State Coastal Planning Policy 2013* (SCPP) establishes a sea-level rise benchmark of 0.9 m to 2110. The SCPP encourages future development to be concentrated in existing settlements, and also encourages local government to undertake coastal hazard risk management and adaptation planning. Local governments are required to have regard to the SCPP when preparing or amending a local planning scheme. The Coastal Hazard Risk Management and Adaptation Planning Guidelines are to be read in conjunction with the SCPP.

Appendix 2: Potential actions

Source: Adapted from: Gurran et al 2008.

Theme	Example
Biodiversity	• Use coastal setback areas to reintroduce and restore local biodiversity, protect important vegetation and coastal habitat within an environmental protection zone or equivalent. • Connect habitat through dedicated habitat protection corridors. • Create planning system incentives and requirements for new developments to retain and restore local biodiversity.
Coastal Processes	• Protect low lying and exposed areas, and reintroduce natural or soft defence measures. • Prohibit development that threatens coastal processes or requires filling of wetlands or mangroves. Require referral to expert agencies for development in particularly vulnerable areas or of a certain scale. • Introduce environmental assessment requirements for areas where existing information is insufficient to determine the impact of potential development scenarios without additional and costly research.
Natural Hazards	• Specify sea level / natural hazard thresholds or indicators (informed by climate projections) as a basis for setting coastline building rules for setback /elevation/ removal of buildings. • Revise land use designations and permitted building forms in the light of natural hazard assessment, informed by climate change projections. • Establish policy framework for re-situating land uses that may become unsafe or unsuitable in the future due to climate change.
Housing/ Infrastructure	• Increase density of homes and mixing of uses. • Assess the location of and design standards for existing and planned infrastructure, and assess vulnerability to sudden or cumulative climate change impacts. • Revise infrastructure capacity plans to take future climate scenarios into account, rather than historical weather events, and adjust settlement thresholds accordingly. • Identify and reserve locations for relocation of major infrastructure and for new decentralised energy, water, or waste management plants. • Prioritise new infrastructure that delivers multiple environmental services while serving basic settlement needs. • Major developments should provide their own basic infrastructure services—energy, water, waste—through strategies such as micro energy generation, water retention, demand reduction technologies, reuse, and recycling; and waste minimisation, reuse, and disposal.
Water	• Emphasise the protection of natural hydrological systems to improve their resilience to possible climate change impacts. • Prioritise water supply options that are associated with minimal contributions to climate change impacts, including water demand management strategies, particularly developments associated with major water needs like tourist facilities. • Maintain spaces for floods and water retention in regions where rainfall patterns are likely to become more volatile.

Theme	Example
Transportation	• Design and reconfigure settlements to reduce the need for trip generation and to maximise viability of public transport. • Assess the transportation impacts of major new developments.
Health	• Tailor urban and building design guidelines to local climatic conditions. • Require shading, shelter, and appropriate vegetation to cool areas of open space and walkways or cycle paths. • Review design standards for manufactured home estates and caravan parks for safety and energy efficiency.
Quality of life and amenity	• Increase coastal setbacks and natural or soft defence measures through land use overlays and planned retreat zones. • Use natural restoration works to increase visitor and recreational opportunities associated with the area. • Link walkways and areas of natural habitat and vegetation. • Use urban shade strategies to improve visitor facilities and outdoor amenity.
Emergency Management	• Maintain space for emergency access, shelter and evacuation; reserve locations for intermediate post emergency recovery (these locations may be multi-function). • Weatherisation program to reduce home energy use and improve resilience to storms for low income families. • Actively plan ahead for settlement reorientation or design following a major natural disaster, and ensure supportive land use decisions.
Governance	• Mainstream climate change across planning and management decisions. Adopt strong objectives for climate change mitigation and adaptation within statutory land use plans. • Collaborate with other local governments at regional level on future climate scenarios and potential responses. • Establish effective and ongoing public involvement processes for identifying and prioritising mitigation and adaptation responses.

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