

DECISION SUPPORT FOR ADAPTATION IN THE HUNTER, CENTRAL & LOWER NORTH COAST REGION

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Introduction

Significant population growth, urban and industrial infrastructure and nationally and internationally significant natural assets located in the coastal zone make the Hunter, Central and Lower North Coast region of New South Wales particularly vulnerable to existing coastal processes, and those projected to worsen due to climate change. This is reflected in the findings of the *First Pass National Assessment: Climate Change Risk to Australia's Coast* which identifies that three of the region's councils are among those most affected by sea level rise in Australia (Commonwealth of Australia, 2009).

The need for local action on climate change is therefore well recognised by councils in the region, including the legal and liability imperative to effectively consider and plan for the projected impacts of sea level rise. This recognition is supported by an increasingly significant body of information confirming that, if councils make a genuine and serious attempt to alleviate potential risks, using the best information available, then their duty of care will be satisfied.

Figure 1. Local Council Areas comprising the Hunter, Central and Lower North Coast region of New South Wales



Through the Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS), councils in the Hunter, Central and Lower North Coast region have collaboratively directed significant resources toward a regional program to:

1. Improve understanding of climate change and its likely impacts;
2. Identify the key risks to councils and their communities arising from climate change;
3. Develop and implement adaptation strategies to manage priority risks.

Local and regional scale risk assessments completed across all fourteen HCCREMS member councils have identified the following priority areas for adaptation research, planning and implementation:

- Research & information
- Decision making frameworks
- Land use and infrastructure templates, guidelines, tools and resources
- Co-ordinated emergency management
- Professional capacity building & information sharing
- Community engagement and awareness

Implementation of the Decision Support for Adaptation project has represented an important step forward in progressing these regional level priorities.

Decision Support for Adaptation

The Decision Support for Adaptation project was implemented during 2011-2012 with funding support from the Commonwealth Government's Coastal Adaptation Pathways Initiative. Overall the project aimed to assist councils plan and implement adaptation approaches in vulnerable coastal areas. Specifically, it sought to promote a more consistent and transparent approach to adaptation planning in the context of land use planning and asset management – a key recommendation of earlier regional level risk assessment and adaptation planning processes. To do so, the primary output of the project has included the development of a Decision Support Framework and Guide – 'The Handbook'.

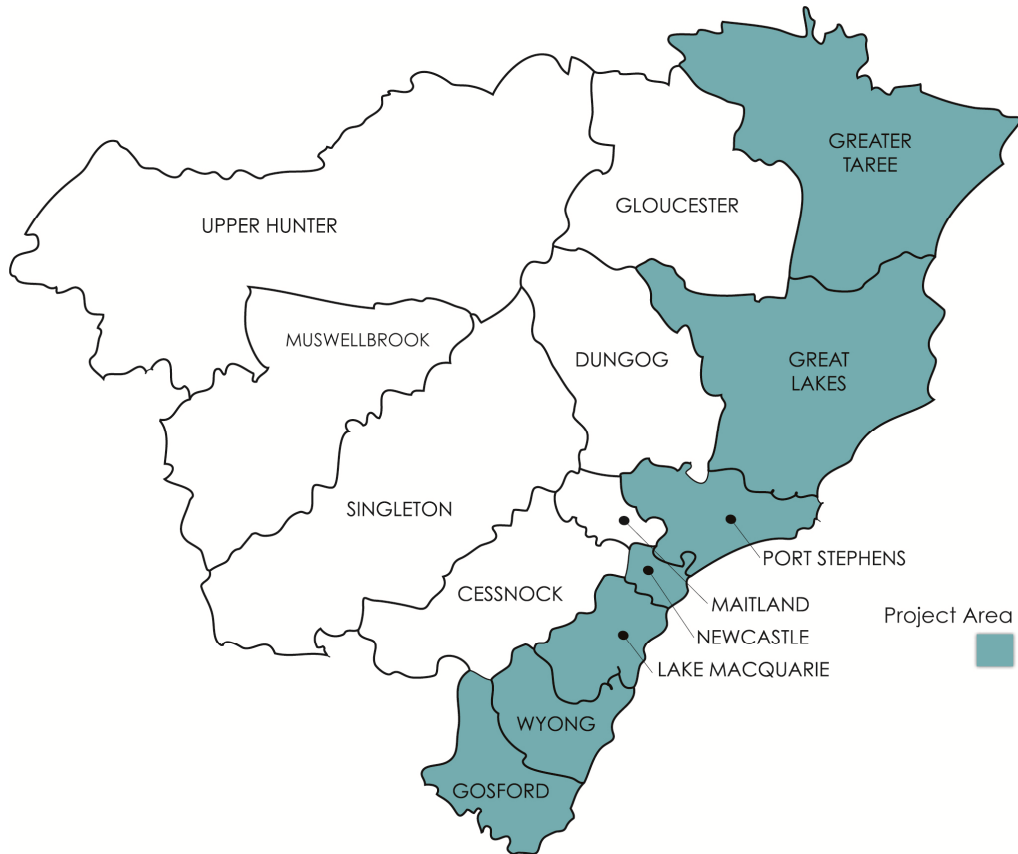
Primary objectives of the project included:

- Assisting councils to more effectively consider and determine adaptation pathways for vulnerable coastal areas.
- Promoting a consistent, transparent and structured approach to adaptation planning in the context of land use planning and asset management both within and across councils, and in other stakeholder organisations.
- Enhancing organisational capacity to adaptively manage the complex interplay of environmental, social, economic and governance factors influencing planning and land use decisions with respect to climate change.
- Translating the broad scale outcomes of local and regional risk assessment and adaptation planning into practical level decision making and outcomes.

Project partners included

- Hunter Councils through the HCCREMS program;
- The region's coastal councils (Greater Taree, Great Lakes, Port Stephens, Newcastle, Lake Macquarie, Wyong and Gosford); and
- NSW Office of Environment and Heritage.

Figure 2. All HCCREMS coastal council members and the Office of Environment & Heritage participated as project partners



Other key stakeholder organisations participating in the project included:

- NSW Department of Premier & Cabinet
- NSW Department of Planning & Infrastructure
- NSW Department of Primary Industries (Crown Lands Division)
- Hunter Water Corporation
- Mid Coast Water

The consultancy firm Marsden Jacob Associates were engaged to deliver key aspects of the project including:

- Consultation with project partners and stakeholders
- Research and development of Background Discussion and Literature Review & Consultation papers
- Research and product development of the Decision Support Framework and Guide (The Handbook).
- Design and facilitation of pilot workshops to test application of the decision making process

Decision Support for Coastal Adaptation: The Handbook

Decision Support for Coastal Adaptation: The Handbook;

'*Decision Support for Adaptation: The Handbook*' represents the primary output of the project. It describes the decision-making framework that has been developed, and provides detailed discussion and reference information for each stage of this process. It is application of this process that aims to improve the consistency and transparency of decision making by councils when considering adaptation pathways for vulnerable coastal areas - to address both existing hazards and those projected to worsen due to climate change

A companion document to the Handbook has also been produced – '*Decision Support for Adaptation: The Workbook*'. This document provides a practical, template based resource to assist councils progress through the decision making process detailed in the Handbook, including summarising each decision making stage and providing for each stage:

- a checklist of the major steps to be completed and key points to be addressed when doing so; and
- worksheets to assist decision makers record key relevant information consistent with the checklists.

Photograph 1: The Handbook will assist councils identify adaptation strategies for existing coastal hazards as well as those expected to worsen due to climate change (Location: Old Bar, NSW. Source: HCCREMS)



Photograph 2. The Handbook will assist councils consider and plan adaptation responses over time for issues including extreme events and flooding (Location: The Entrance, NSW. Source: NSW State Emergency Service)



Focus of the Handbook

The focus of the Handbook is on coastal adaptation decision-making in response to the potential economic, social and environmental impacts of climate change linked to:

- sea level rise;
- coastal recession associated with more frequent or severe storms, storm tides, and changes to coastal currents and other coastal processes;
- changes to extreme rainfall and associated flooding (rivers and flash flooding) in coastal areas;
- a combination of these events.

Coastal areas are defined broadly to include:

- beaches, dunes, cliffs, headlands and foreshore areas on the open coast;
- estuaries, wetlands and lagoons, coastal lakes, and tidal river systems;
- coastal catchments and the coastal hinterland.

It is important to note that this is broader than the legal definition of the coastal zone for New South Wales, as defined in the *Coastal Protection Act 1979*. This broader definition has been adopted because from an adaptation perspective, it covers the full range of coastal features likely to be impacted by climate change.

Structure of the Handbook

The Handbook comprises three main parts.

Part A provides an overview of the framework that underpins coastal adaptation decision-making, outlining:

- the stages and steps in the decision-making process;
- the pathways and choices available at each step; and
- an understanding of the context in which decisions are made.

Part B represents the core of the Handbook, providing decision-making guidance and advice. This is presented in a series of numbered sections, reflecting the main decision-making stages and steps.

Part C provides supporting information including a glossary, links to other useful materials and references.

Application of the Handbook

The Handbook has been prepared for and is primarily intended for use by HCCREMS member councils, including land use and statutory planners, asset managers and engineers, environmental managers and community planners. However, the Handbook is also potentially relevant to a much wider audience; other councils could benefit from its use, as could other public decision-makers, including State government departments and public authorities, especially where their decision-making involves interaction with local councils.

Key applications for the Handbook and Workbook identified by project partners include:

- informing locality or 'place based' adaptation planning
- informing the design and implementation of coastal and flood risk hazard assessments and management plans, and in particular, assisting with the assessment and selection of preferred management options
- informing the design of new assets or renewal / upgrade of existing assets to improve resilience to climate change
- providing a clear process for consistently and effectively engaging local communities and stakeholders in coastal decision making processes, including demonstrating the process through which adaptation options are determined.

Decision making principles

The design, development and application of the Handbook aims to provide the following for decision makers:

1. **Consistency and transparency:** The Handbook will lead to consistent and transparent approaches to decision-making on coastal adaptation.
2. **Comprehensiveness:** The Handbook is applicable to a range of different issues.

3. **Scalability:** The Handbook can be applied at different scales and over different timeframes.
4. **Adaptiveness:** The Handbook enables risk and uncertainty to be addressed through adaptive decision-making processes.
5. **A Community and stakeholder focus:** The Handbook recognises the crucial role and input of local communities and stakeholders to the decision-making process.

The Handbook also provides more specific guiding principles for coastal decision making to inform all decisions at different stages in the process. These aim to improve the credibility and consistency of coastal adaptation decision making. These are identified in Box 1.

Box 1. Guiding principles for coastal decision making included in the Handbook

<ol style="list-style-type: none"> 1. Objective focused: Decisions should be made with the purpose of meeting clear, measurable and prioritised objectives. 2. Efficient use of resources: Decision-makers should seek to achieve objectives cost effectively. 3. Risk averse: As a minimum, pursue strategies that will avoid catastrophic outcomes. 4. Avoid maladaptation: Avoid adaptation strategies that adversely impact or increase the vulnerability of other systems, sectors or social groups. 5. Adaptive management: Encourage adaptation strategies that are flexible, reversible and can achieve multiple objectives and synergies. 6. Relevant: Use data, methods, criteria and assumptions appropriate to the nature of the decision and that meet the expectations and requirements of stakeholders. 	<ol style="list-style-type: none"> 7. Completeness: Consider all potential implications of decisions - direct and indirect costs, and winners and losers. 8. Consistent: Use data, methods, criteria and assumptions that allow for meaningful and valid comparisons with other decisions of a similar nature. 9. Consultative: Meaningful consultation and engagement should be undertaken to ensure that decisions reflect stakeholder and community values and preferences. The level of engagement should reflect the significance of the decision. 10. Collaborative: Decisions should be collaborative, involving close cooperation with other relevant decision-makers. 11. Transparent: Provide clear and sufficient information for reviewers to assess the credibility and reliability of the decision. 12. Compliant: Ensure decisions comply with relevant national and State legislation, policies and guidelines.
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Key elements of coastal decision making

Integrated decision-making.

The Handbook identifies that an integrated approach to coastal adaptation planning is particularly important given that many coastal adaptation decisions are likely to entail multiple dimensions. To facilitate an integrated approach the Handbook recommends:

- Adopting a collaborative approach to adaptation decision-making where feasible, involving a cross-section of council staff and relevant stakeholders.
- Instigating effective engagement and communication processes
- Pursuing consistency of objectives between adaptation decisions, strategic plans and other key planning documents, and prioritising objectives where there are multiple and potentially competing objectives for an area.
- Having a clear understanding of the full range of coastal values (direct and indirect, market and non-market) potentially affected by climate change and by adaptation
- Recognising that trade-offs between competing values will be an inherent part of the adaptation decision-making process and that there will be 'winners' and 'losers' (distribution effects) arising from that decision.
- Building adaptation decisions into strategic and annual plans.

Dealing with risk and uncertainty.

Uncertainty can be defined as poor knowledge of the likelihood (or probability) that an event or state-of-nature will occur. Uncertainty about adaptation to the impacts of climate change can derive from lack of knowledge, and also from disagreement about what is known or even knowable. Given the high degree of risk and uncertainty typically associated with coastal management issues, the Handbook provides detailed guidance for considering and managing this uncertainty in the decision making process.

Effective collaboration, engagement and communication processes.

The Handbook recognises that meaningful stakeholder and community engagement processes should be undertaken to ensure decisions reflect community values and preferences and that the community is fully informed about adaptation decisions – i.e. the nature of the decisions and the rationale for them. It also recognises that the level of engagement should reflect the significance of the issue and the extent to which community members have a stake in it. Benefits arising from this approach include:

- increased public understanding and awareness of climate change and coastal impacts, including the status of science, the nature of uncertainties and implications of this for policy making;
- improved understanding by councils of community values (especially as they relate to coastal areas) and perceived threats to those values;
- broader and deeper input into council decision-making on adaptation; and
- strengthened public support for coastal adaptation decisions.

The Handbook also identifies the importance of collaborative decision making for overcoming issues and barriers often associated with coastal decision making (e.g. contested values, uncertainty over authority for decision-making, lack of leadership, concerns over the credibility and / or legality of decisions). Collaborative decision making can assist in overcoming these barriers by:

- increasing mutual awareness and understanding of jurisdictional responsibilities and objectives;
- enhancing the prospects of an agreed outcome;
- boosting the legitimacy of the decision in the eyes of the community; and

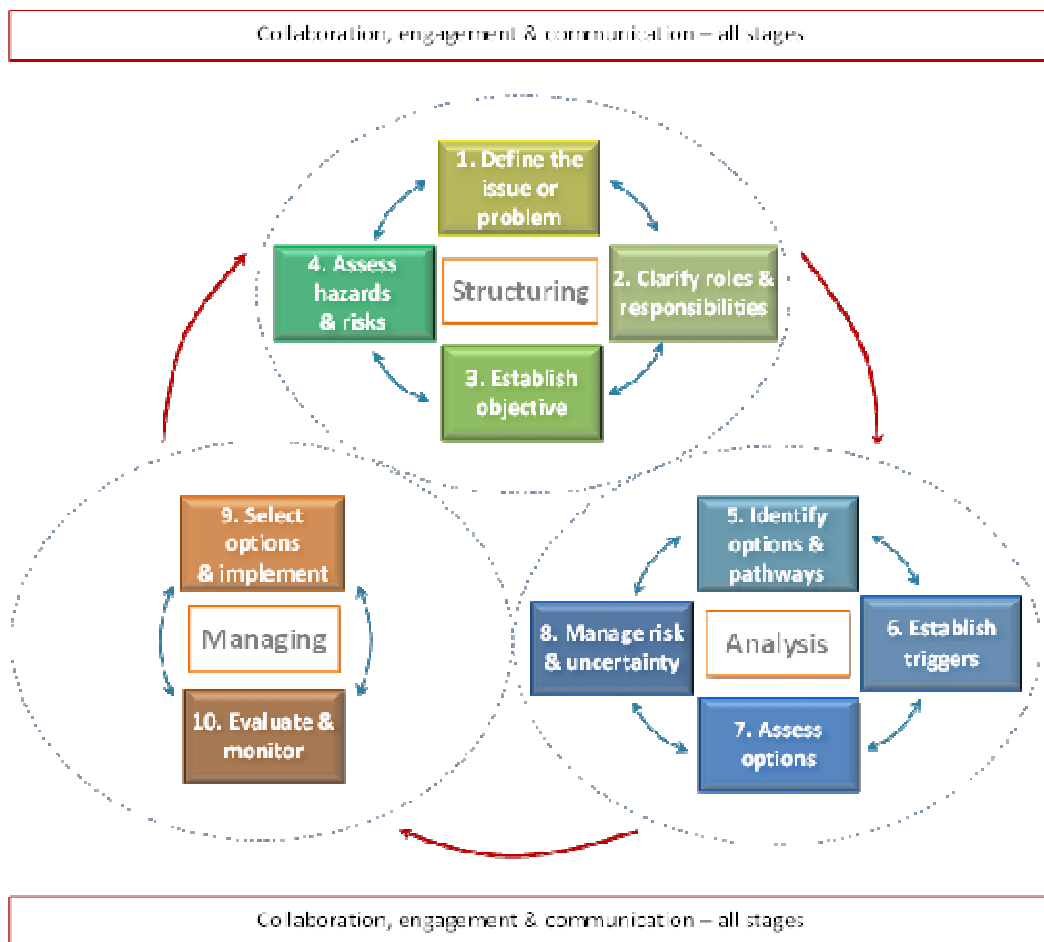
- increasing efficiencies and the potential for resource sharing.

The decision making process

The decision making process included in the Handbook incorporates ten key stages. However in considering these stages (and the steps therein) it is important to note that public policy decision-making is rarely a linear process. While presentation of the process is as a series of numbered stages, in reality:

- the order in which decisions are made will vary from issue to issue;
- the process is iterative, with decisions often jumping backwards and forwards between stages; and
- because coastal issues and actions are interconnected, decisions will need to be reviewed to ensure that indirect as well as direct implications have been considered.

Figure 3. The Handbook identifies 10 key stages in the decision making process



Given this, it is intended that application of the decision-making process can be flexible, depending on the nature and scale of the issue at hand. In regard to the scale of the decision, large scale 'macro' decisions, involving substantial values (market or non-market), long time horizons and/ or a large number of stakeholders are likely to require

Careful planning and mapping out of the decision-making process and in-depth analysis at a number of stages. Small 'micro' issues however (e.g. a single lot development), while still requiring application of the decision-making process; will generally not warrant the same depth of application.

It is also noted that regulatory and policy frameworks can also significantly influence the approach to the assessment. In particular, these may contain binding requirements or 'rules' that a decision-maker must comply with in making a decision.

Stages in the decision making process

Stage 1. Define the issue

Stage 1 in the decision making process aims to assist practitioners clearly define the issue or problem that they are seeking to address. Key steps for doing so include:

- understand the nature of the issue by describing the category and type of issue, its scale, who is affected and the time horizon over which it is likely to play out;
- identify and understand the regulatory and policy framework under which decisions may need to be made;
- identify information requirements and gaps; and
- map out consultation and engagement processes.

Clearly defining the issue in this way is important for informing the level of priority that should be assigned to the issue, the overall decision-making approach and subsequent stages in the process.

Stage 2. Clarify roles and responsibilities

Stage 2 reflects the importance of councils and other decision-makers determining roles and responsibilities in relation to the issue. In particular it seeks to identify whether responsibility for the decision rests with council, with other agencies or whether it is a shared responsibility? To support consideration of this question the Handbook:

- outlines the legislative and administrative framework in relation to coastal planning and infrastructure management in NSW;
- examines decision pathways for defining roles and responsibilities, including how councils should deal with shared responsibilities and multi-layered decision-making; and
- discusses barriers and uncertainties relating to councils' responsibilities.

Stage 3. Establish objective

Before councils can identify and assess adaptation options they need to have a clear understanding of the objective against which options will be assessed. This will in some respects influence the method that is used to assess options and will ultimately determine the outcome of that assessment, i.e. what is the 'best' decision.

As such Stage 3 provides guidance on:

- identifying objectives for the region or area being examined, as established in strategic plans, planning schemes, policies and legislation;
- prioritising between competing objectives; and
- establishing a primary objective and constraints on that objective.

Stage 4. Assess hazards and risks

All decisions on coastal adaptation need to be underpinned by a sound understanding of potential climate changes and the local and regional scale consequences of those changes. A hazard and risk assessment (often referred to as a vulnerability assessment) will seek to do this, considering the likelihood (or probability) of changes, the land, waterways, ecosystems, settlements, infrastructure and communities exposed to the changes. It will also consider the underlying environmental and social conditions that can provide an understanding of the sensitivity of systems to the changes and, by extension, the consequences of the changes.

In this context, Stage 4 of the decision making process provides guidance on:

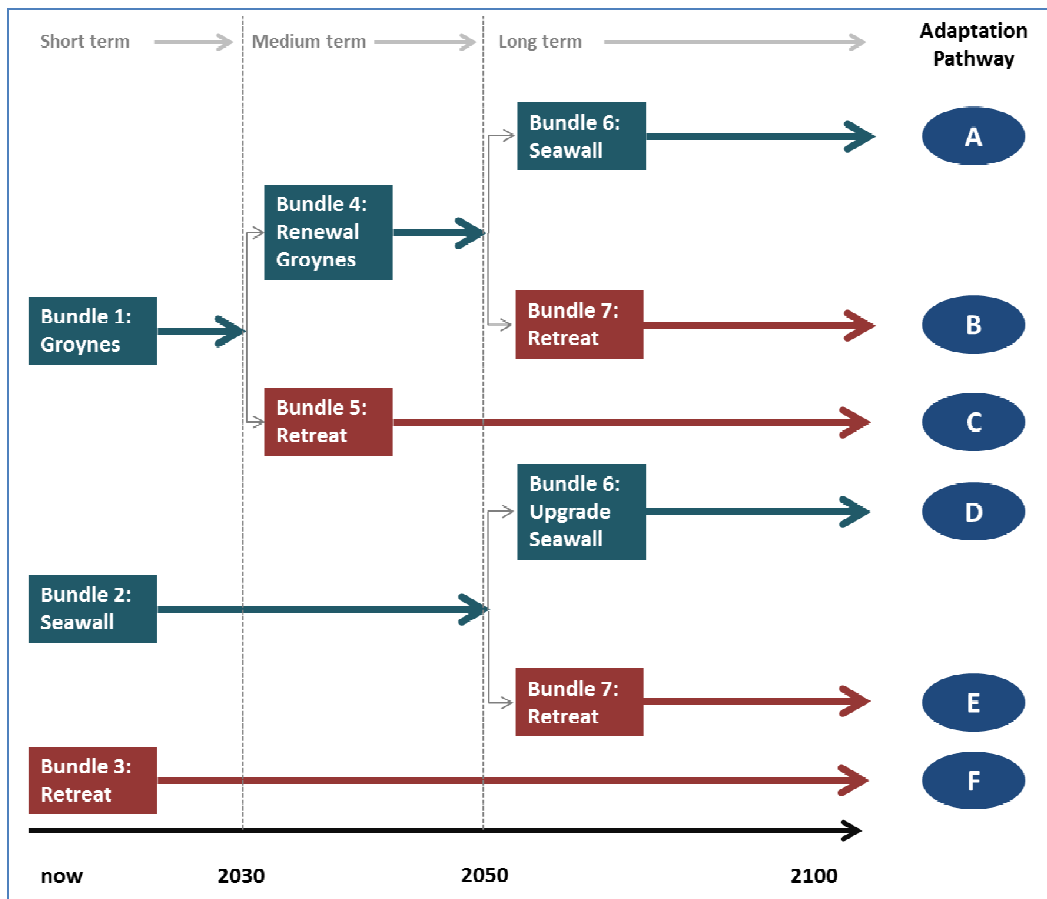
- the difference between a hazard assessment and a risk assessment;
- why hazard and risk assessments are important to the decision-making process;
- hazards and risks that should be addressed in the assessment; and
- the hazard and risk assessment process.

Stage 5. Identify options and pathways

This stage aims to assist councils identify a range of potential adaptation options, considering how those options will be sequenced over time (i.e. adaptation pathways). The Handbook describes:

- examples of different adaptation strategies and categories of adaptation options;
- guiding principles for good adaptation practice;
- a process and criteria for filtering (or screening) options to derive a short list of options that warrant a more detailed assessment later in the process;
- a process for bundling (or grouping) of options that have synergies; and
- a process for mapping adaptation pathways over time, distinguishing between flexible and inflexible options and discussing implications of different pathways for the options assessment.

Figure 4. Stage 5 of the decision making process provides practitioners with advice and illustrative examples for mapping adaptation pathways over time.



Stage 6. Establish thresholds and triggers

This stage provides guidance on the methodology and process for identifying the timing of adaptation responses. In particular it provides guidance on:

- the concepts of ‘thresholds’ and ‘triggers’ and the difference between the two;
- the benefits of using thresholds and triggers and circumstances where it is appropriate to use them;
- types of thresholds and the process for establishing them;
- the process of selecting appropriate triggers based on thresholds; and
- principles, processes and mechanisms for monitoring progress toward identified triggers.

Stage 7. Assess options

This stage focuses on methods that can be employed to assess identified options (or bundles of options) and discusses the factors influencing selection of a suitable method, including:

- identification of benefits and costs of adaptation, an important early step in the options assessment process;
- describing the main characteristics of a range of options assessment methods and how they are applied;
- identifying the factors influencing selection of the options assessment method;
- the nature of information and expertise required for application of alternative methods; and
- outlining some key principles of options assessment.

Stage 8. Manage risk & uncertainty in the options assessment

Making decisions on coastal adaptation will inevitably involve dealing with risks and uncertainties. Effectively managing risk and uncertainty is a crucial aspect of the decision-making process. Information included in the Handbook for this stage provides guidance on a variety of techniques available for managing risk and uncertainty. Key questions that are addressed include:

- What is uncertainty? What is risk?
- What techniques are available for dealing with uncertainty and risk in the options assessment?
- Which of these techniques should be used?

Stage 9. Select and implement options

Once options have been identified and assessed, councils and other decision-makers need to select the preferred options, bundles or pathways, develop an implementation schedule and ensure that possible impediments to the implementation and operation of the option are identified and mitigated. Stage 9 examines these issues and looks at 'distributional issues' a key factor to be addressed prior to implementing the preferred options and pathways. 'Distributional issues' covers two important questions:

- Who benefits from the adaptation strategy? and
- Who therefore should pay?

Stage 10. Monitor and evaluate

This stage discusses monitoring and evaluation of adaptation actions, considering suitable approaches and how best to act on the results of the monitoring and evaluation so as to achieve a truly iterative approach to adaptation.

Piloting the decision making process

To ensure the decision making process developed is compatible with the issues and needs of practitioners, a core element of the project included piloting application of the draft Handbook. This process included six pilot workshops (involving a cross section of practitioners from councils and other stakeholder organisations) to test the rigour, logic and content of decision making process at a desktop level. Importantly this aimed to test the process against `real life' issues currently being experienced by councils. Participating councils, pilot locations and the nature of issues examined for each are shown in Table 1.

Table 1. Location and nature of issues considered during the pilot process

Council	Pilot Locality	Key Coastal Issues
Gosford City Council	Saratoga Peninsula	Sea level rise inundation and flooding
Lake Macquarie City Council	Rocky Point, Eleebana	Sea level rise inundation and flooding
Newcastle City Council	Carrington / Wickham	Sea level rise inundation and flooding
Great Lakes Council	Jimmys Beach / Winda Woppa	Coastal Erosion
Greater Taree City Council	Harrington	Sea level rise inundation and flooding

The key stages in the process tested by councils included:

- Stage 1. Define the issue
- Stage 3. Establish the policy objective
- Stage 5. Identify options and pathways
- Stage 6. Establish triggers
- Stage 7. Assess Options
- Stage 8. Manage risk & uncertainty

Key benefits and outputs arising from the workshops included:

- Establishing consistent cross departmental objectives for each locality
- Clarifying the indicative time frames / processes for implementing future adaptation pathways
- Identifying potential triggers and thresholds for informing the timing and nature of management responses.
- Increasing understanding of the nature and role of options assessment tools as well as those for dealing with risk and uncertainty
- Identifying key information needs, gaps and structural amendments to be addressed within the final version of the Handbook.

Evaluation of the pilots also highlighted the importance of providing practical tools and summary versions of the Handbook to assist practitioners through the decision making process and importantly, to assist in more effectively engaging elected decision makers and community in the process. It is this feedback that directly contributed to development of the Workbook, a valuable and practical resource for assisting practitioners apply the decision making process.

Photograph 3: Existing and future sea level inundation and flooding in the suburbs of Wickham and Carrington was the focus of the City of Newcastle pilot workshops (Source: City of Newcastle)



Photograph 4. Existing and future foreshore erosion at Jimmys Beach was the focus of the Great Lakes Council pilot workshops (Source: Great Lakes Council).



A legal perspective

From the outset of the project it was clear that the Handbook would need to effectively relate to, and assist councils make reasonable decisions within the complex and dynamic legislative and policy environment influencing climate change and coastal management. To ensure it was effective in doing so, a legal review of the Handbook was commissioned from the law firm Baker & McKenzie. This aimed to:

1. Ensure the draft Handbook included appropriate reference to key Commonwealth and NSW legislation, policies and guidelines
2. Ensure that application of the Handbook would be consistent / comply with key NSW State legislative and planning processes necessary to ensure that councils can demonstrate that they have acted in good faith, as per the requirements of s 733 of the *NSW Local Government Act 1993*.
3. Provide a legal perspective as to the benefits, limitations or risks to councils of applying the Handbook to make informed and reasonable decisions within a complex legislative and policy environment.
4. Provide recommendations as to how the Handbook could be modified to address issues, risks or limitations identified from the review, or generally to improve its capacity to assist councils.
5. Identify and articulate any barriers within the current legislative and policy framework to implementation of an adaptive management approach (including the application of thresholds and triggers) for climate change adaptation.

The overall findings of the review concluded that:

1. The Handbook achieves a balance between providing guidance that is general in nature so that it can be applied to variety of circumstances and providing a meaningful and applicable framework for decision makers. This approach shields the Handbook from vulnerability arising due to future changes to regulatory and policy settings
2. The Handbook goes further than other guidance materials developed for councils, due to the fact that it:
 - goes beyond the risk assessment phase of decision making
 - provides practical guidance regarding the implementation and monitoring of decision making by councils
3. From a legal and liability perspective the Handbook will enhance the capacity of councils to effectively identify, assess and implement adaptation measures
4. The structure and content of the Handbook does not, of itself, impact on indemnity protection provided to councils under s733 of the *Local Government Act 1993*. There is nothing in the Handbook that conflicts with the NSW Floodplain or Coastline Management Manuals.
5. Practically, the Handbook provides a comprehensive basis for risk assessment incorporating relevant literature, references and descriptive assessment tools including worked examples

6. The Handbook not only identifies decision making steps and procedures, but also provides analysis of the reasons behind such steps and their relative importance
7. The Handbook provides a sound process to be followed by councils in undertaking risk assessment and implementing decisions in respect of coastal planning

Conclusion

Implementation and evaluation of the Decision Support for Adaptation project has identified a number of key benefits and learnings that relate not only to the project outputs, but to coastal planning processes generally. These include:

1. Reinforcing the importance of iterative and practice based processes for engaging input to the design, development and testing of new products and resources that involve multiple and diverse stakeholders and issues within a complex legislative and policy environment. This approach has seen the project engage significant, direct and effective input from a range of practitioners in partner and stakeholder organisations to the design, development and pilot application of the Handbook.

This early engagement, ongoing practice based consultation and direct involvement in piloting application has proven not only an effective means of fostering ownership of project outputs, but also provides key principles and processes for collaborative decision making and communication that can be extended to coastal decision making processes in general.

2. Identifying a high degree of consensus within and across councils (regardless of size and resource capacity) of the issues they face and the nature of products and resources they need to effectively move forward in adapting to climate change in vulnerable coastal areas. These needs are also likely to be consistent with councils outside of the region, indicating the potential for much broader application of project outputs.
3. Clear feedback has been provided by practitioners that the structured process of the Handbook strongly supports them in identifying and collectively agreeing on management objectives and potential management options for vulnerable locations.
4. The project has identified the importance of keeping information simple and concise to facilitate access and application by practitioners. Despite the complexity and interrelated nature of issues the Handbook is aiming to address, given the capacity and time constraints of practitioners there is a need for highly practical tools or support mechanisms that readily integrate with existing work systems and processes.
5. Throughout the project practitioners have consistently identified political decision making and community opposition to planning strategies as key barriers to effective adaptation planning. While the Handbook will assist in addressing this to some degree, it is anticipated they will continue to be significant issues in the absence of a consistent statutory and policy framework across all levels of government.
6. The project has identified the significant benefits that would arise from providing ongoing technical / mentoring support to practitioners as they commence 'real life'

application of the Handbook. HCCREMS is continuing to explore opportunities to provide further mentoring and facilitation of this nature.

7. The project has highlighted that despite significant previous investment by councils in hazard risk assessment, stakeholder consultation and planning processes, a clear, structured and transparent decision making process is needed to assist practitioners effectively interpret, distil and practically apply the considerable extent and complexity of information available to them. Clear feedback has been provided that the structured process provided by the Handbook, particularly its assistance in formulating clear and agreed objectives, is of considerable assistance, even if only applied at a desktop level to date.
8. Development of the Workbook has also generated significant interest in further developing this product as an electronic resource. The iterative and interrelated nature of many of the steps in the process, and the need to move between steps during the process would be readily facilitated by an electronic version. HCCREMS is continuing to explore opportunities to develop a product of this nature.

References

1. HCCREMS (2012). Decision Support for Coastal Adaptation: The Handbook. Hunter Councils NSW.
2. HCCREMS (2012). Decision Support for Coastal Adaptation: The Workbook. Hunter Councils NSW.
3. Commonwealth of Australia Climate Change (2009). Risks to Australia's Coasts. A First Pass National Assessment. Department of Climate Change.