NCCARF
National
Climate Change Adaptation
Research Facility

Policy Guidance Brief 3

Supporting decision-making for effective adaptation

Effective adaptation to climate change requires complex decision-making, taking into account not only the impacts of climate change but also the social, economic and technological context within which these changes take place.

Key Points

Decision support strategies and products need to reflect the needs of different adaptation contexts and communities of decision-makers. They require:

- co-design between developers and end users: and
- joint ownership of tools to guarantee continuing use and support.

There are common user needs for decision-support tools and knowledge, which can be best met through shared, centralised and standardised services. The model should be sustainably-funded, tailored to the needs of adaptation decision-makers, and accompanied by provision of expert advisory services. This approach leads to maintenance of quality, comparability of outputs, financial efficiencies and on-going support.

Effective decision-making for adaptation is risk-based, and takes account of:

- the best and most up-to-date information on future climate change;
- the context of this information in terms of national and international socio-economic and demographic trends;
- uncertainties in this information; i.e. retaining flexibility on future options, not locking into inappropriate and costly financial investments, and seeking out low-regrets actions;
- the need for effective engagement with all parties involved, including policy-makers, businesses, scientists and civil society;
- examples of adaptation best practice as a benchmark; and
- the need to evaluate performance on an on-going basis.

NCCARF's evidence-based Policy Guidance Briefs address key challenges to effectively adapting Australia to a variable and changing climate. This Brief explores the support of decision-making for adaptation, through provision of frameworks, knowledge and criteria for performance evaluation and comparison. Broadly, these are known as Decision Support Tools, or DSTs.

1

Information on the future for decision-making

Into the future, Australia will increasingly be confronted by much greater weather-related risks than we face currently from present-day climate variability, with potentially greater impacts and costs for the economy, society and the environment. Thus, it is important to focus now on sound decision-making frameworks and tools to equip us with approaches that provide resilience to future climate change, at least cost.

Present and future climate: Scientists have high confidence that human interference is changing the climate. Projected changes in Australian climate include (Whetton, 2011):

- Annual average warming by 2030 (above 1990 temperatures) of approximately 1.0°C across Australia, with warming of 0.7 to 0.9°C in coastal areas and 1 to 1.2°C inland.
- Drying in southern areas of Australia, especially in winter, and in southern and eastern areas in spring. Changes in summer tropical rainfall in northern Australia remain highly uncertain.
- More frequent and hotter heat waves are likely and this may lead in turn to an increased frequency and severity of bushfire. Drought frequency is expected to increase, particularly in southern and south-western Australia. There is less agreement amongst models about future trends in intense rainfall, and hence river-valley flooding.
- A recent estimate of sea-level rise is for an increase of 80 cm by 2100 compared to the 1990s (Church et al., 2011). Sea-level rise, possibly associated with greater storminess, will lead to increased occurrence of storm surge, coastal flooding and erosion.

Box 1: Uncertainty in future climate change projections

Information on future climate change derived from climate models is a fundamental building block of adaptation decision-making. Some of the sources of uncertainty in future climate change projections are:

- Different models will give different answers.
- The behaviour of the atmosphere is partly random – two runs of the same model with the same starting conditions will not end up in the same place.
- Uncertainties about how greenhouse gas emissions will change over time.
- Climate models are not able to realistically capture all atmospheric processes including, for example, formation of some cloud types.

Attempts have been made to overcome some of these issues by, for example, developing probabilistic scenarios tailored to the needs of end users. These can work well where users have a good understanding of the information presented, for example, catchment managers working with hydrologists. Others, without the scientific and statistical understanding, have struggled to make use of these sometimes complex presentations.

The disconnect between the reality of model data and the expectations of users remains an issue in developing knowledge on future climates to underpin adaptation decision-making. Decision-makers should ask themselves whether there is a real need for complex, detailed, and often time consuming and expensive to produce, information on future climates that may have a low degree of certainty. In fact, broad-brush information on climate changes may be sufficient to do an exploratory examination, which may in turn be highly revealing of where the exposure and sensitivities to climate change lie.

Approaches to overcoming the challenge of uncertainty in model data are discussed in the NCCARF Research Report 'Decision making Under Uncertainty' (Verdon-Kidd et al., 2012).

Information on the future for decision-making ... continued

Changes in climate averages have limited relevance for policy-making – it is the changes in frequency and intensity of extreme events that will drive damage costs and set priorities for adaptation action. And yet the uncertainties around projections of changes in extremes are much greater than for estimates of changes in the mean climate, especially at the local scale.

The uncertainty that surrounds projections of future climate has proved and continues to prove arguably the greatest barrier to effective decision-making for adaptation. This Brief sets out the foundations of approaches to address this uncertainty in adaptation decision-making (see Box 1).

2

Framework for decision-making

Climate change is a complex and strategic risk, requiring decisions concerning policies, strategies, plans and projects that will deliver a well-adapted Australia. The UK Climate Impacts Programme (UKCIP) has, through practice and experience, identified ten principles of 'good' adaptation[1]. Decision-making that is mindful of these principles should deliver effective adaptation to climate change. They are:

1. Work in partnership – identify and engage the community and keep them well informed.
2. Understand risks and thresholds, including associated uncertainties.
3. Frame and communicate SMART[2] objectives/outcomes before starting out.
4. Manage climate and non-climate risks using a balanced approach – assess and implement your approach to adaptation in the context of overall sustainability and development objectives.
5. Focus on actions to manage priority climate risks – identify key climate risks and opportunities.
6. Address risks associated with today's climate variability and extremes as a starting point to addressing risks and opportunities associated with longer-term climate change.
7. Use adaptive management to cope with uncertainty – recognise the value of a phased approach to cope with uncertainty.
8. Recognise the value of no/low regrets and win-win adaptation options in terms of cost-effectiveness and multiple benefits.
9. Avoid actions that limit future adaptations or restrict adaptive actions of others.
10. Review the continued effectiveness of adaptation decisions by monitoring and re-evaluating risks.

However useful, these principles do not provide a pathway for decision-making. Following the steps of a structured framework should enable decision-makers to identify and evaluate the risks and opportunities presented by a changing climate, make the best use of available information about the impacts and available adaptation options, identify and implement appropriate adaptive responses, and monitor and evaluate the performance of those responses. A possible framework for structured decision-making is shown in Figure 1.

This is just one of many possible frameworks. It provides well-structured pathways to decision-making, but has been criticised for failing to explicitly consider the values and context from which the problem is identified in Step 1. The choice of an appropriate framework is discussed in 'The Practitioner's Handbook', developed as part of NCCARF's research program (Randall et al., 2012).

3

Tools for decision-making

Having identified a potential pathway, what are the tools that will support the decision-maker to move along this pathway to make and implement an adaptation decision? There are a large variety of DSTs, each with a range of complexities. They include frameworks, standards, management processes, conceptual models and software. Many DSTs have not been developed for climate change adaptation purposes. In the NCCARF Research Program, the project on 'Leading Adaptation Practices and Support Strategies for Australia' (Webb and Beh, 2013) describes and evaluates tools to support decision-making in adaptation.

It is informative to look at the pathway laid out in Figure 1 and consider the decision-support tools that can be utilised at each step. In the early stages (Stages 1 and 2 in Figure 1), establishing community participation (including business and industry) and support will be an important activity, using participatory processes such as workshops and focus groups. Bringing together the various actors, including the community, to define the objectives and evaluation criteria, can be facilitated through brainstorming and gaming exercises.

[1]http://www.ukcip.org.uk/essentials/adaptation/good-adaptation/
[2]Definitions of this acronym vary, but most usually Smart, Measurable, Attainable, Relevant, Timely.

Tools for decision-making ... continued

At the stage of assessing the risk (Stage 3), information from climate models, and methods of processing this information such as statistical downscaling, come into use. Impact models can be used to evaluate the effects of the projected climate changes on sectors of interest (for example, crop-climate models to assess yield changes). This information feeds into consultation and brainstorming exercises in Stage 4 to identify options. The appraisal of these options in Stage 5 will use a range of formal statistical tools such as cost-benefit analysis and multi-criteria analysis. Stage 6 brings together all the information from the previous steps to make the final decision. The 'preferred' option may be very clear at this point, but the final decision can be supported by techniques such as portfolio analysis. The project then moves out of the decision-making stage and into the implementation and, ultimately, evaluation stages.

4

Flexible decision making for adaptation

Climate change has been described as a 'wicked' problem by authorities such as Ross Garnaut. A wicked, as opposed to 'tame' problem, is complex, difficult to understand and resistant to solving. Climate change is wicked because of the inherent and pervasive uncertainty, not only around the scientific evidence and its interpretation, but also around the viability of possible solutions.

Under these circumstances, it is essential that decision-making is flexible, does not lock us into inappropriate and costly financial investments, is low-regrets and does not restrict future adaptation actions; in brief, it should not be maladaptive.

An example of decision-making which tries to account for uncertainty in climate change projections and avoid potential maladaptive pitfalls is the work that has been done in the UK around the construction of a new Thames Barrier (Figure 2). In summary, portfolios for managing flood risk are laid out, indicating their effective range against rising sea levels. It is then possible to plot and evaluate routes of adaptation action through these portfolio options, depending on considerations of risk, financing, public acceptability, etc. These routes are flexible – they can change depending on how circumstances change in the future and, in particular, how actual sea-level rise evolves. Not only are the options flexible, but it is possible to move from one adaptation option to another depending on availability of information.

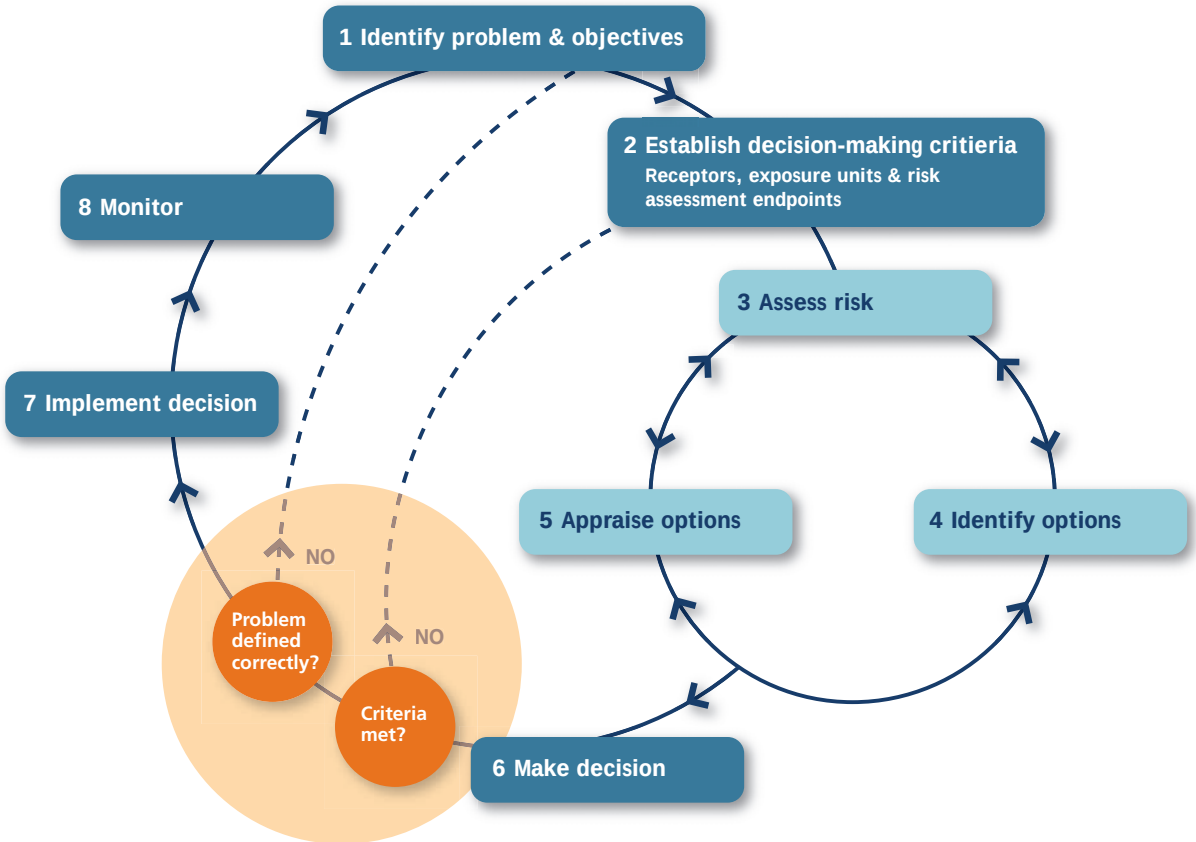


Figure 1: The UKCIP Decision-making framework (Willows and Connell, 2003). Reproduced with permission UKCIP.

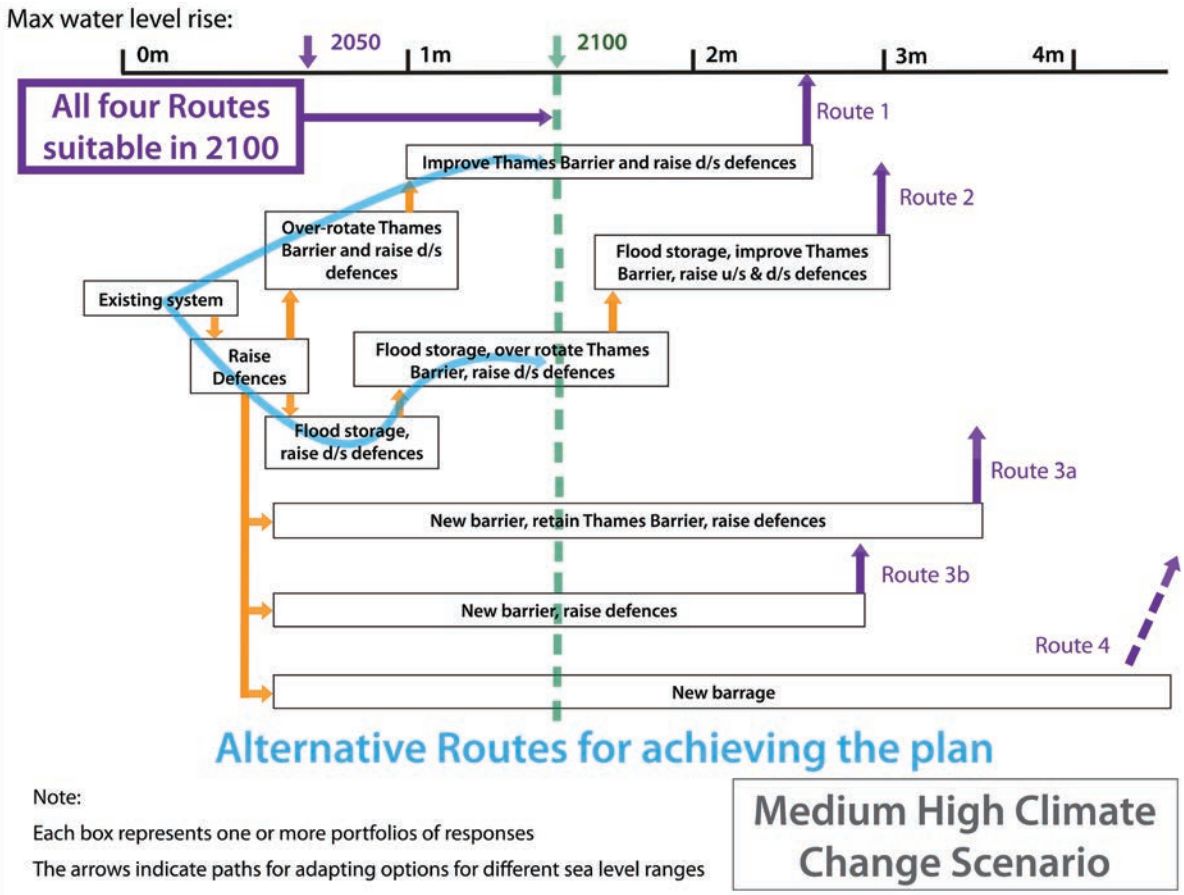


Figure 2: Alternative pathways of adaptation action to avoid flood risk in the Thames Estuary, UK. (modified from Lowe et al. 2009). © UKCP09, 2009

5

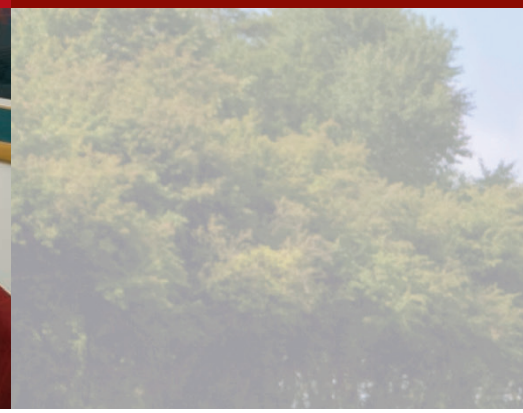
Implications for policy-making

Policy can support decision-making in a number of ways to achieve a well-adapted nation.

1. Leading by example, by utilising transparent and rigorous decision-making pathways to arrive at decisions about effective adaptation actions.
2. Ensuring that the knowledge needed to underpin effective decision-making is available in fit-for-purpose forms accessible by end users, and that end users are supported in the use of this information by expert advisory services. This includes the availability of climate model data and guidance to support tool selection, understanding assumptions that underlie a tool, data limitations and cost implications.
3. Ensuring that examples of good practice are widely disseminated.
4. Providing decision-making tools where there is a market failure. Decision-support tools are often developed through private businesses or organisations in response to market demand. However, where there is a market failure or absence, there is a clear government role to support the development, uptake and maintenance of the tools.
5. Ensuring capacity and good practice in decision-making through on-going resourcing to support training and sustain corporate memory. DSTs should be funded and resourced across their life, including testing, extension and maintenance phases. Effective support of DSTs requires on-going funding and the creation of appropriate institutions.

Approach

The policy guidance provided in this brief was developed at a workshop held in Canberra. The workshop was attended by policy makers and managers from state and federal government, a NSW Catchment Management Authority, local government associations, industry associations, private consultants, two researchers working on Decision Support Tools, Bob Webb (ANU) and NCCARF staff. The discussion benefited from the results from an NCCARF funded research project on DSTs which identified a number of issues and challenges associated with effective decision-making in Australia (Webb and Beh, 2013).



NCCARF is producing a portfolio of twelve Policy Guidance Briefs in 2012–13 on critical climate change adaptation topics. For a complete list of available Policy Guidance Briefs, please go to: www.nccarf.edu.au/publications/policy-guidance-briefs

Further information and references

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National Climate Change Adaptation Research Facility www.nccarf.edu.au

Telephone **+61 7 5552 9333** Email **nccarf@griffith.edu.au**