



SECTION 4.

OPTIONS APPRAISAL

4 HOW CAN MY ORGANISATION RESPOND? (OPTIONS APPRAISAL)

Once risks and vulnerabilities to climate change have been identified, determining how to respond becomes the next priority. However, experience with adaptation approaches has found that identifying suitable options⁷ can prove challenging.

“Appraising” options refers to the process of selecting the preferred suite of adaptation options and includes tasks like identifying, screening, assembling and prioritisation. A range of methods are available for appraising adaptation options. They vary substantially in terms of resource requirements (e.g. time and money) and outputs.

Factors that can influence your organisation’s choice of method include the:

- Requirement for quantitative versus qualitative data or analysis;
- Amount of focus on economic costs and benefits; and
- Extent of engagement required.

Where a quantitative, economically focused output is required techniques such as Cost-Benefit Analysis (CBA), Cost-Effectiveness Analysis (CEA) and Cost-Utility Analysis (CUA) might be considered relevant. These are already common place in councils and your organisation will most likely already have experience with them, especially CBA. Further discussion on decision making tools is contained in Step 5 of the LGA SA’s *Adaptation Planning Guidelines*.

However, these methods are rarely adopted on their own for adaptation planning because of the various other factors that need to be considered in appraising options such as community acceptance, and social and environmental impact. Instead, Multi-Criteria Analysis (MCA) has emerged as a preferred technique.

MCA uses a variety of criteria to assess alternative options. This method can be used to identify a priority ranking for adaptation options as a starting point for more detailed assessments and analyses. MCA is suitable when quantification and valuation in monetary terms is not possible. In cases where benefits cannot be quantified and valued (e.g. the benefits of preserving biodiversity, environmental services), MCA is preferred to CBA (9).

⁷ Some guides distinguish between an adaptation *measure* – in the wide sense of anything one can do to adapt – from an adaptation *option* – strictly one alternative in a decision, possibly collecting together a package of adaptation measures (18).

More recently, a greater focus has emerged on how to identify options given the broad range of *climate projections* that exist. This recognises that while climate change trends are clear (e.g. warmer conditions, rising sea levels), the rate and extent of change varies between *climate models*, timeframes and levels of emissions.

On one hand this can be dealt with by adopting low cost and low risk options in the short term and then using an adaptive management approach, or learning by doing, and responding as impacts occur through time. This is widely regarded as leading to greater costs in the long run though.

Alternately, the process of appraising options can identify those that are either “robust” to different future *climate projections* or that are “flexible” over time to accommodate for this variability (10).

Traditional CBA and related methods are not well suited to dealing with variation in *climate projections* because they do not work when applied to multiple future scenarios. Alternative techniques include robust decision making, scenario analysis and adaptation pathways. It has been argued that it is useful to apply adaptation pathways thinking in almost all cases, even if it sometimes simplifies to a “one-shot” decision (2).

Key rule: When applying an adaptation pathways approach, identify *triggers* and *thresholds* for decision making.

A further explanation of adaptation pathways is provided, which is an approach used widely in regional adaptation planning in South Australia (**Box 4**).

Has your organisation already started to identify adaptation options? Be sure to check the climate change adaptation plan for your region, industry adaptation plans and see if your organisation already has its own adaptation plan.

See Step 5 of the LGA SA's Climate Adaptation Planning Guidelines for further general information on selecting adaptation options and decision making.

Box 4. Adaptation pathways

Past experience identifying adaptation options shows a tendency to look for “one shot” solutions, that aim to identify a single best adaptation solution for an area of risk or vulnerability. In practice, the diverse range of possible future climates means that an organisation is better off exploring multiple options.

An “adaptation pathway” can be broadly described as a sequence of adaptation options and interim targets that are directed to achieving long term adaptation objectives (2). Common features to most pathways approaches involve developing alternative bundles of options, sequencing over time, being able to take first steps without unconsciously cutting off future options, monitoring change, and adjusting to this at pre-defined decision points. Adaptation pathways are also popular because of the ability to develop a visual map of how options can be implemented through time.

In adopting a pathways type approach it is helpful to consider the following types of questions:

- What are the limitations of current practice with respect to a changing climate?
- Are there social or institutional barriers which mean implementation lead times are longer than expected?
- Are some options only suitable for a period, up until more extensive changes in climate occur?
- Are there social, economic, environmental or physical **thresholds** that, once passed, mean new options are required? and
- Can your organisation identify **triggers** that prompt a new suite of options to be implemented?

You should expect that in adopting pathways type approach for your organisation, that the level of detail in which **triggers** and **thresholds** are identified will increase moving from the **Scan** level through to the **Delve Deeper** level of adaptation.

Several approaches for developing or conceptualising adaptation pathways or decision pathways exist (e.g. (11; 12; 13; 1). Regardless of the approach used, for adaptation pathways to be effective there should be a monitoring and evaluation process in place to monitor when **triggers** and **thresholds** are met.

For examples of where adaptation pathways have been used in South Australia, look at some of the following regional adaptation plans:

- Adapting Northern Adelaide Regional Climate Change Adaptation Plan;
- Eyre Peninsula Regional Climate Change Adaptation Plan;
- Resilient Hills and Coasts Regional Climate Change Adaptation Plan; and
- Resilient South Regional Climate Change Adaptation Plan.

4.1 Scan

At the *Scan* level the primary aim is to identify a range of options that may be suitable for addressing your organisation's risks and areas of vulnerability to a different future climate.

Initial identification of options can be guided by a brainstorming exercise combined with consulting existing registers or lists of options. When identifying initial lists of options it is important to think beyond current best practice. This can be assisted by considering what types of options may be required under different future *climate scenarios* or by using visioning exercises.

Initial identification of options can be followed by preliminary screening to filter out options that are not relevant to your organisation's circumstances, or to identify gaps in the initial list. Screening can be done by compiling options in a spreadsheet and then applying a simple scoring approach, similar to an MCA.

The screening of options can be guided by considering "principles" for adaptation. There are a wide range of principles proposed in various guidelines that authors argue should be considered when selecting options. Some of the principles apply to the style of adaptation (e.g. appetite for risk) while others are similar to criteria and can directly inform how an MCA is structured. Potential principles for use in appraising adaptation options are summarised in **Attachment A**. Based on input from regional climate change coordinators consulted in developing this Guideline, priority principles include the following:

- Avoid actions that can help one sector or functional areas to adapt, but that have a negative impact on another (i.e. maladaptation);
- Build economic resilience;
- Maximise triple bottom line (social, economic, environmental) benefit-cost;
- Look for win-win outcomes;
- Balance quick wins with long term outcomes; and
- Identify decision with long lifetimes.

It is important that options are not ruled out at this early stage because they are not popular. In some instances, options that are not popular will be suitable in the future as the values of the community change or as new government policies are introduced.

With respect to introducing an adaptation pathways approach, at the *Scan* level your organisation may want to consider qualitative responses to the following:

- What are the limitations of current practice with respect to a changing climate?
- Are there social or institutional barriers which mean implementation lead times are longer than expected?

- Are some options only suitable for a period, up until more extensive changes in climate occur?
- Are there **thresholds** that once passed mean that new options are required? and
- What types of **triggers** could prompt a new suite of options to be implemented?

A basic, visual adaptation pathways map can be developed following approaches such as those outlined in the User Guide for Applied Adaptation Pathways (11) and the LGA SA Climate Adaptation Planning Guidelines (1).

The output from this level of assessment would be a list of preferred options with a broad indication of how they may be implemented through time.

4.2 Plan

At the **Plan** level, the options identified in the **Scan** level will start to be bundled further and assessed in relation to their ability to support action against specific areas of decision making. In contrast to the **Delve Deeper** level, options are still likely to be broad (e.g. diversify agricultural activities, restore dunes along the coast, raise awareness about the dangers of extreme heat amongst the community).

The emphasis shifts from screening to prioritising options for implementation. The most widely used approach for this level of analysis is Multi-Criteria Analysis (MCA) because of its ability to consider non-economic inputs and to be delivered as part of a participatory approach involving stakeholders.

In practice, the choice of MCA is often influenced by the availability of data and funds to conduct the analysis, and the need to engage a broad range of stakeholders in the process.

The common steps in undertaking an MCA are to:

- Identify criteria;
- Weight criteria;
- Assemble the data and information needed to assess criteria (which may include experts or people with local knowledge);
- Assign a score for each option against the selected criteria;
- Sum the scores across all options;
- Keep a record of the assessment and decision making, and make a note of any assumptions or judgements; and
- Conduct a sensitivity analysis by varying the weights of the criteria.

MCAs are generally operated in a spreadsheet with a list of adaptation options in the left-hand column and criteria moving left to right. Formulas are used in spreadsheet cells to combine criterion scores and weightings.

The results of the MCA are highly sensitive to the type of criteria chosen, the weighting of criteria, and how scores are calculated. A list of possible criteria are presented in **Attachment B** which are proposed in various guidelines for use in MCAs. In practice, this list contains too many criteria to use in a single MCA. As such your organisation will need to develop a list of preferred criteria with an understanding that the selection of criteria will have a major impact on the list of priority options that emerges from the analysis.

Criteria recommended for consideration based on adaptation planning practice in South Australia are:

- Ability to implement (both capability and resources);
- Alignment with strategic objectives;
- Availability of resources for implementation;
- Effectiveness;
- Efficiency;
- Flexibility to change in the future;
- Political will;
- Risk and vulnerability reduction;
- Robust against multiple climate futures; and
- Social acceptance.

There are different ways of applying an MCA with various approaches having been used in South Australia. Examples of the different approaches in general include:

- Assembling options in a single MCA framework for a one-pass assessment, with priorities for action based on those with either the highest or lowest score;
- An initial screening conducted using qualitative analysis to remove non-preferred options before a semi-quantitative assessment is done with either the same or a different group of criteria to develop a priority list;
- A series of filtering steps, where the results of assessment with a small group of criteria result in the removal of low scoring options (e.g. the bottom third), after which options are assessed against another group of criteria; and
- A cyclical approach, with screening at the start followed by more detailed analysis, and then a return to earlier stages of the process to obtain basic information on the risk or the adaptation option, followed by redesign of the option (14).

With respect to introducing an adaptation pathways approach, at the *Plan* level your organisation may want to consider semi-quantitative to quantitative responses to the following:

- When might current practice no longer be effective in mitigating risk or reducing vulnerability given a changing climate?

- If there are social or institutional barriers that could delay implementation, what is estimated length of the lead time?
- For options that may have a limited time for which they can reduce risk or vulnerability, how long will they be effective under a changing climate?
- What **thresholds** are relevant to the systems in which you want to reduce risk and vulnerability? and
- What are the **triggers** that could prompt a new suite of options to be implemented and when are they likely to occur under a changing climate?

A basic, visual adaptation pathways map can be developed following approaches such as those outlined in (11) and (12).

The output from this stage would be a list of priority options with an indication of how they may be implemented through time based on an understanding of important **thresholds** and **triggers**. Your organisation would expect to identify bundles of options rather than the single best option.

4.3 Delve Deeper

At the **Delve Deeper** level your organisation will need to consider explicit choices between different adaptation options. The **Delve Deeper** level of appraising options is inherently more complex and will often require external assessment and economic analysis assistance for many organisations.

It is assumed that your organisation will have already undertaken preliminary screening of options as part of the **Scan** level. It is also likely that you will have used an MCA to prioritise options during **Plan** level options appraisal.

The extent of further option appraisal at the **Delve Deeper** level will largely depend on the resources available, and the amount of information your organisation needs to inform decision making.

For smaller, less risky or lower cost projects, qualitative and semi-quantitative approaches will still be suitable (e.g. open space design, engagement and awareness raising activities). In this instance, further use of MCA is warranted and may be applied by further refining criteria,

For projects requiring greater investment and where the risks of not accounting for climate change are high, more detailed and formal approaches should be considered, including:

- Real options analysis to evaluate whether a deliberate delay to implementing options is justified;
- Adaptive management where responses are evaluated progressively and future actions modified accordingly;

- Cost benefit analysis or cost-effective analysis extended to include social and environmental outcomes, noting that these approaches are limited when planning for long timeframes because they are not designed for use with multiple future *climate scenarios*;
- Robust decision making (one shot and multiple shot) to identify options that are most suitable across a broad array of futures; and
- Adaptation pathways (formal approaches) to evaluate in terms of likely efficacy and flexibility to change in the future.

The choice between the methods will be influenced by whether there are short term or long-term options, whether residual impacts can be projected for long decision lifetimes, whether there are already risks in the current climate, how costly options are, and, for long lifetime decisions, whether these are amenable to being shortened or broken down into a flexible pathway or not (2).