

A USER'S GUIDE TO APPLIED ADAPTATION PATHWAYS.



Adaptation into action

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www.adaptationpathways.net

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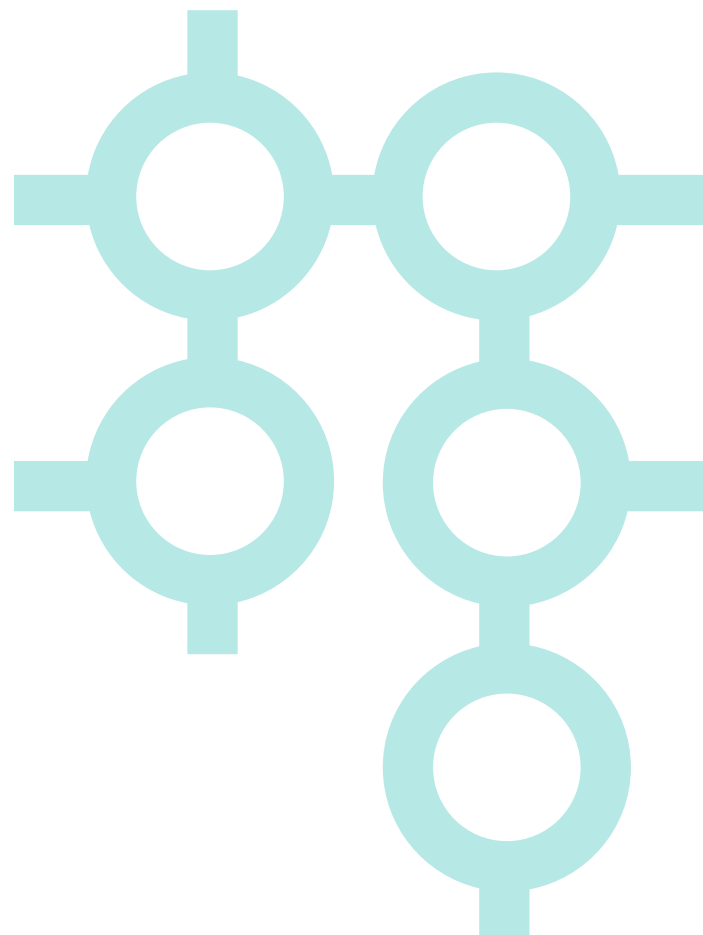
Do you have any feedback?

This guide presents an approach for use by practitioner's based on current experience with participatory based adaptation pathways approaches. As the approach is used for new projects we encourage practitioner's to provide feedback on their experience in using the Guide.

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The context for adaptation

Climate change presents many challenges to our communities, businesses and the natural environment. While we often want to identify a small number of high priority actions, in most cases, there will be more than one way to adapt to climate change at different points in time. Different responses might also be preferred depending on how the climate (and other non-climate parameters such as population or social values) change through time.

Given this complexity, working out what to do now to adapt to climate change can seem daunting. This can be compounded by what may be seen as uncertainty, or the range of possible futures for which planning must allow. Experience shows that where people perceive that there is uncertainty and complexity, they find decision making hard and may put it off altogether.

What is an adaptation pathways approach?

An adaptation pathways approach recognises that there are often many possible ways to respond to climate change and that a combination of actions, some of which are taken now and some that may be taken in the future, could present the best way to respond. By breaking down adaptation into steps, it is easier to take the first step with confidence.

WHY CHOOSE AN ADAPTATION PATHWAYS APPROACH?

Pathways can provide a simple way to illustrate how a range of adaptation options can be implemented through time, and hence help take the first steps.

Part of the attractiveness of adaptation pathways is the ability to present “pathways” on a diagram. The diagram illustrates the range of adaptation options and how these can be sequenced through time.

As a general approach, adaptation pathways can be applied to almost any type of adaptation project. Past applications have included infrastructure projects^{1,2}, sustainable water management³, planning in remote, disadvantaged communities⁴, coastal zone impacts planning⁵, and cross sectoral adaptation planning (e.g. Eyre Peninsula⁶, Southern Adelaide⁷).

What is an applied adaptation pathway?

An **applied adaptation pathway** is a specific way of developing and graphically presenting an adaptation pathway that can help with preparing an adaptation plan and informing decision making. The underlying approach focuses on identifying, appraising and sequencing options through a participatory process. The resulting output is referred to as an “adaptation pathways map”.

Taking a participatory approach is an important part of developing an applied adaptation pathway. Experience shows that when participants are involved in a planning process they are more likely to support proposed actions and lead or assist with their implementation.

About this User's Guide

The concept of adaptation pathways has been applied in many different ways. This Guide has been developed to provide a non-technical, user friendly overview of how to develop an *applied adaptation pathway*. It specifies critical elements of an approach that can be used to undertake adaptation planning in your own organisation.

While the approach described here is intended for implementation as part of a participatory process; however, it can be modified so that more quantitative inputs are used thus enabling more direct guidance on decision making.

While developed to assist with climate change adaptation planning, the concept of pathways, and sequencing actions through time when external drivers are changing, can be applied to other areas of planning for long-term change.

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There are various other guides that deal more comprehensively with adaptation planning in general - such as Climate Compass or the South Australian Local Government Association's Climate Adaptation Planning Guidelines; this User's Guide focuses specifically on the development of applied adaptation pathways. This approach can be used in conjunction with the other guides.

Practitioners interested in developing adaptation pathways are also encouraged to consider other approaches that describe their development and/or other visualizations (e.g. 3, 8).

What follows is a description of seven steps that outline the process for using an applied adaptation pathways approach. These steps can be followed as part of a single project or be tackled separately, depending on the needs of the individual adaptation planning project.

Further information and tips for designing the process are on page 16.

Step 1 - Define the scope of your applied adaptation pathway

Output: Statement on the scope of the pathway(s) and agreement on the key area of decision making

Ensure that the scope for your project is clear from the outset. It could deal with a portfolio of issues across multiple sectors in a region, state or nation or focus on a discrete project within one sector.^a

In practice, the broader the scope of the project the more generic the pathways maps will become and the more they will be aimed at strategic planning. With a narrower scope, the pathways maps will be more targeted and likely to inform individual decisions and operational planning.

Once the scope is clear, general climate projection information should be obtained and a summary of the potential impacts of climate change prepared. Careful consideration needs to be given to how much climate projection information is actually needed to support the adaptation planning exercise. In the early stages of your applied adaptation pathway project, general, regional trends will typically be sufficient.^b

DEFINING THE SCOPE - EXAMPLES:

Region wide - Our pathways project will support development of a regional plan that needs to involve sectors that underpin the economy of our region, such as agriculture, transport or water supply.

Issue specific - Our pathways project will support development of an adaptation plan that addresses engineering issues and community consultation needs in relation to construction of a new bridge at a specific location.

The focus of each pathways map is a **key area of decision-making**. A *key area of decision making* should explain:

- What is important? Make a connection with something of value or importance to the participants you are working with, for example, an asset (e.g. threatened species, residential developments, farming produce) or service (e.g. emergency or health services, potable water).
- What responses are possible? Potential responses include manage, maintain, protect or enhance; and
- How could it be impacted? Identify the aspects of climate change that will impact the asset or service (e.g. increasing bushfire frequency and intensity may destroy residential developments near bushfire-prone vegetation).

There are various commonly used adaptation planning tools that can help identify *key areas of decision making*. Risk and vulnerability assessments can identify high risk or vulnerable assets and services; decision lifetime analysis⁹ can identify long lifetime decisions that will more likely be impacted by climate change; discussing community values can identify assets or services that are important to a community.

A final step can be to check that the *key area of decision making* is achievable in the view of project participants. When developing applied adaptation pathways for strategic planning purposes this will be more straightforward because the scope of the *key area of decision making* will be broad. However, where the scope is narrower, the practicality of achieving the key area of decision making may need to be assessed.

KEY AREA OF DECISION - MAKING - EXAMPLE:

What is important?

Natural and built assets on the coast

What is the preferred response?

Manage

How will it be impacted?

Sea level rise and storm surge will erode beaches

The key area of decision making:

How can we manage natural and built assets on the coast that will be affected by sea level rise and associated storm surge that will erode beaches?

^a Climate Compass refers to Scan, Portfolio and Project cycles of planning

^b How to select climate data is discussed on www.ClimateChangeInAustralia.gov.au

Step 2 Identify the limitations of current practice

Output: Documented current practice and its limitations with respect to future climate change

The underlying premise of most adaptation planning is that current practice – or “business as usual” - will not be sufficient to enable an asset or service to adapt to climate change in the future. In preparing an adaptation pathway, this should be explicitly discussed to ensure that participants agree that action should be taken in the first place.

In a participatory process, identifying the limitations of current practice should be done with the input of participants and informed where necessary with desktop analysis or additional expert input. It is important that discussions and assessments of current practice occur in the context of the current rate, funding and capacity to implement the practice.

Key questions to ask in facilitated discussions are:

- What actions are currently being taken that will help to address the *key area of decision making*?
- Will the effectiveness of those actions be affected by different aspects of climate change, and, if so, which aspects of climate change are important and how long will current practice remain effective?

In discussing whether current practice will be sufficient to adapt to climate change, it is important that key participants are aware that in many instances the impacts of climate change will be beyond their experience and that what has always worked in the past under a naturally variable climate, may not necessarily work in the future. In this respect, thinking about transformation may be difficult, with truly transformative approaches emerging only after more than one planning cycles.

Step 3 Discuss thresholds and triggers

Output: Documented description of the thresholds of change relevant to the key area of decision making

The concept of **thresholds** is common in resilience thinking and adaptation planning, but it is not always straightforward to apply. They are relevant to understanding when managers will need to change from one response option to another.

We define thresholds as a point at which a system starts to operate in a significantly different way. Thresholds can be social, economic, environmental or physical. For example, a threshold could be a critical change in livestock production which causes a dramatic change in farm operations or profitability, or repeated damage to infrastructure due to increased flood frequency.

Thresholds differ from **triggers**, which are when a monitored system driver like sea level or temperature changes to a point where existing responses should be reviewed and new options implemented. A trigger may occur without a threshold being reached, but the conditions are set for a system threshold to be crossed before decision-makers can do anything about it. Triggers should be easily monitored, for quick action.

In a participatory process, discuss the *key area of decision making* to identify thresholds and triggers.

Participant discussions can be informed, where necessary, by review of relevant studies and expert input. However, discussing people's own past experiences of climate or (e.g. flood, drought, bushfire) climate driven events (e.g. blackouts, storm damage) can also be highly effective.

The level of detail in which thresholds and triggers are described will vary according to the scope of the pathways project. Where the scope is broad then they can be more indicative; where the scope is more specific (e.g. a particular location, species or asset), then more detail and quantification of thresholds and triggers is preferable.

AN EXAMPLE – THRESHOLDS VS. TRIGGERS

Sea level rise might reach a point where a large storm could destroy infrastructure, even if this has not actually occurred; the threshold would be the actual failure of that infrastructure, which is a real change in system function; the trigger is the sea level rise reaching a level at which a decision needs to be made, even though it may not yet have resulted in the threshold actually being crossed.

Step 4 Identify and appraise your adaptation options

Output: Adaptation options identified and assessed with initial prioritisation complete

Potential **adaptation options** should be identified through a participatory process and may be added to with knowledge gained from desktop analysis or additional expert input. However, where understanding of adaptation options amongst participants is limited, it may be helpful to propose a list of options for review and refinement.

At this stage of the process, a broad range of options should be encouraged and it is important that they are not removed because they are not currently feasible or desirable. Such options can become an important feature on an applied adaptation pathways map.

Current practice(s) can be included as an adaptation option, but only where the way in which it would be implemented is altered in some way (e.g. accelerated through additional funding, expanded in scope, lead responsibility changed). There is a tendency to want to say “apply leading current practice everywhere” – this is fine as one option, but its limitations in the face of climate change (and why it is not already happening) should be firmly addressed.

Once the list of options has been agreed, further assessment is required and specific questions should be asked to obtain the information necessary to prepare the pathways map. Consider the following questions:

- Should the option be ruled out, and if so why? (unless totally undesirable, we recommend including it in the pathways map for possible future re-consideration.)
- Should the option be implemented now or delayed, and if it is delayed:
 - when does it need to be implemented?
 - what is the preparation (lead) time required?
- Are there **use-by-dates**, that is, conditions under which the option no longer help address the *key area of decision making*? It is possible that some options will continue to form part of the adaptation response and be useful but to a diminishing degree.

- How could such an option be initiated?
- Who should take lead responsibility for implementing the option and who else needs to be involved?
- Does the option have the potential to be maladaptive? If an option is found to be maladaptive, this may be a reason to exclude it from the applied adaptation pathways map, although this should be documented if it occurs.

To keep the pathways map easy to interpret, ideally keep to no more than 10-15 adaptation options. To achieve this, some grouping of similar options may be warranted.

Note that you may find it useful to iterate back and forth between Steps 4 and 5 several times, as the options and map become clearer.

EXAMPLES OF USE-BY-DATES

- Building a sea wall that will eventually be overwhelmed by sea level rise;
- Planting crop varieties more tolerant to drier conditions that cannot tolerate longer term, more extreme rainfall declines;
- Installing air-conditioning but then not using it because energy prices rise too much.

Step 5 Prepare a draft applied adaptation pathways map

Output: Draft applied adaptation pathways map

The construction of the draft applied adaptation pathways map uses information from previous steps and can be developed using various commonly available drawing software packages. Alternately, a basic map can be sketched by hand. The foundation structure is:

- **X-axis:** the time scale starting from the present (labeled as “now”) and projecting into the future. The units on the x-axis are typically 10 year increments projecting forward to at least 50 years (but this may also be about different levels of change, instead of time – e.g. amounts of sea level rise or the frequency of flooding).

The interval can be varied as required, but needs to relate to the confidence in the data obtained from previous steps (e.g. 5 year increments are not suitable if thresholds have been estimated at the scale of decades). The end of the x-axis can include a short description of the main aspects of climate change relevant to the key area of decision making.

- **Y-axis: the adaptation options derived from Step 4. It is easiest if options are ordered as follows:**

- current practice (provided this has been discussed in sufficient detail);
- options favored for immediate implementation;
- options that should be delayed, with those with a shorter delay closer to the top of the y-axis and those with a longer delay toward the bottom; and
- options that are (currently) ruled out.

Once the basic structure of the diagram is assembled, the next step is to draw a horizontal line (parallel to x-axis) for each option, illustrating the length of time that it can contribute to addressing the key area of decision making. For options that should be implemented immediately, the line starts at “now” or 0 years. For an option that is delayed the line would start at the point of delay (e.g. 10 years’ time, or “When sea level rise reaches 30cm”). An option that has a **use-by-date** at some stage in the future as the climate changes will have its line end before the full length of the x-axis.

Solid lines indicate that a proposed action could address the key area of decision making in its entirety, whereas a dashed line indicates that an option contributes to addressing the key area of decision making.

Note that for any option, the line may change from solid to dashed at some point.

Lines also need to be assigned to options that have been ruled out. This is to ensure that options that may seem to be unfeasible or not desirable at present, such as may be the case with more transformational actions, are still identified on the pathways map so they can be reconsidered as conditions change and decision-makers re-visit the map in the future.

To differentiate between options that have been ruled out and those that may form part of the adaptation approach, different colors are assigned to the lines.

Options that were delayed but require preparatory work are indicated with a lighter shading of the line color. For example, coastal protection work such as a sea wall may not be required for 30-40 years, but in highly urbanised areas early planning is often required to acquire the land on which the barrier will be constructed, or to build community support.

Once the lines have been assembled on the diagram, **decision points** need to be added. A *decision point* is a time at which a decision needs to be made regarding implementation of different options. This could be triggered by regular review points in a planning cycle (e.g. every 10 years for longer term strategies) or by threshold points in the assets or services that are the focus of the *key area of decision making* (e.g. when bushfire frequency and intensity increases by 20%, or sea level rise reaches 35 cm). Decision points are represented by circles located over existing lines that relate to each adaptation option. Once in place, circles are connected with solid lines.

At this point the draft applied adaptation pathways map is complete and ready for further discussion with participants. Depending on the drawing software being used and the number of maps being prepared, it is likely that it will take more time to prepare the map than is available during a single workshop. As such, the draft applied adaptation pathways map may be better presented at a subsequent workshop of participants.

When interpreting an adaptation pathways map it should be noted that if climate change is to occur more rapidly than considered during project discussions, then implementation of options would occur more rapidly; if climate change occurs more slowly then implementation would be slowed or delayed. Furthermore, when developing adaptation pathways the aim should be to identify options that are robust against different climate futures. Where this is not feasible, options should be considered that “hedge” against alternate futures.

Step 6 Review the pathways map and select the preferred or emerging pathway

Output: Applied adaptation pathways map with draft preferred pathway(s)

The draft pathways map is a visual interpretation of the input from participants and information collated from other experts and review of relevant literature. The draft pathways map should therefore be presented to participants for review, focusing on whether all of the expected adaptation options are present and whether the participants agree to the:

- starting dates for implementation;
- *use-by-dates*;
- timing of *decision points*; and
- possible lead times to prepare for some options.

Once reviewed and adjustments have been noted, the pathways map represents the full range of options that could be implemented to address the *key area of decision making*. In most instances though, not all options need to be implemented.

Therefore, participants are asked to identify their currently **preferred pathway** (possibly more than one alternative) to achieve the desired outcome for the *key area of decision making*. To help reach consensus on this, one approach is to carry out a simple qualitative appraisal. An initial understanding of priorities can be gained in a participatory process through use of a qualitative cost-benefit analysis. For example, options can be assessed for their social, economic and environmental costs and benefits, with assessment by participants using a low/medium/high scale.

In a workshop the *preferred pathway* can be drawn directly on to a hard copy of the applied adaptation pathways map after facilitated discussion. Depending on project resourcing, other, more quantitative approaches to appraising alternative options include full cost-benefit or multi-criteria analyses.

A *preferred pathway* is identified where there is high confidence amongst participants as to the combination of options required to address the *key area of decision making*, both in terms of the types, combinations and sequencing of actions. In this sense, the preferred pathway represents the priorities for adaptation. Where there is lower confidence underpinning the choice of a preferred pathway, it may instead be called an “emerging pathway”. This differentiation can be important in presenting pathways maps for participant endorsement.

Once the preferred pathway has been identified, many participants will want to explore how to implement or operationalise their adaptation pathways. This will require consideration of responsibilities, timeframes and resources for each adaptation option and may require additional assessment.

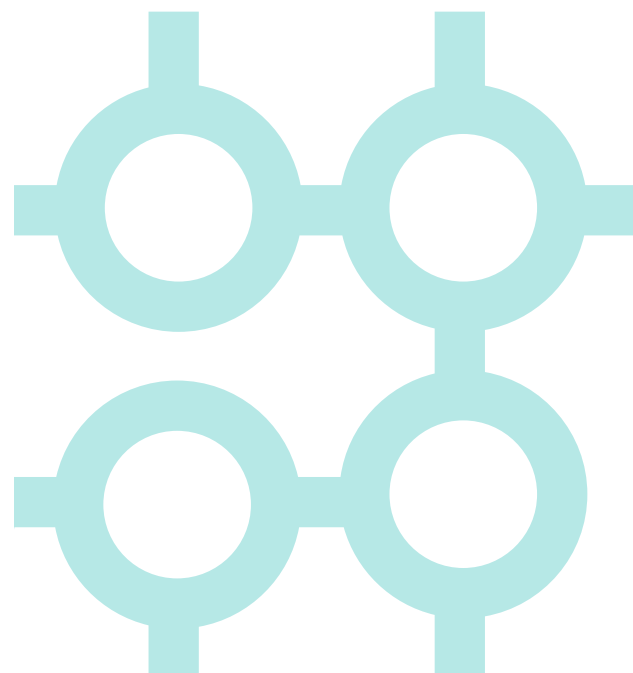
INTERPRETING A PATHWAYS MAP

A basic applied adaptation pathways map is presented in Figure 1 and suggests a simple transition between adaptation options through time. In practice, applied adaptation pathways maps tend to be far more complex, such as Figure 2, which is explained further here using the corresponding numbers on the map:

1. Current practice helps address the *key area of decision making* for at least two decades. The bar is shaded grey because it is not preferred.
2. Enforcing fuel load clean up notices could address the *key area of decision making* entirely in the coming two decades but after that, it provides only part of the solution (dashed line).
3. Prescribed burns reach their “use-by-date” within two decades. This is because the fire risk becomes so high that there are no longer sufficient days on which prescribed burns can occur.
4. Three options (yellow arrows) are identified as being part of the preferred solution. While simple pathways maps show a single traceable preferred pathway, it is often the case that participants will identify a number of options as part of their preferred solution.

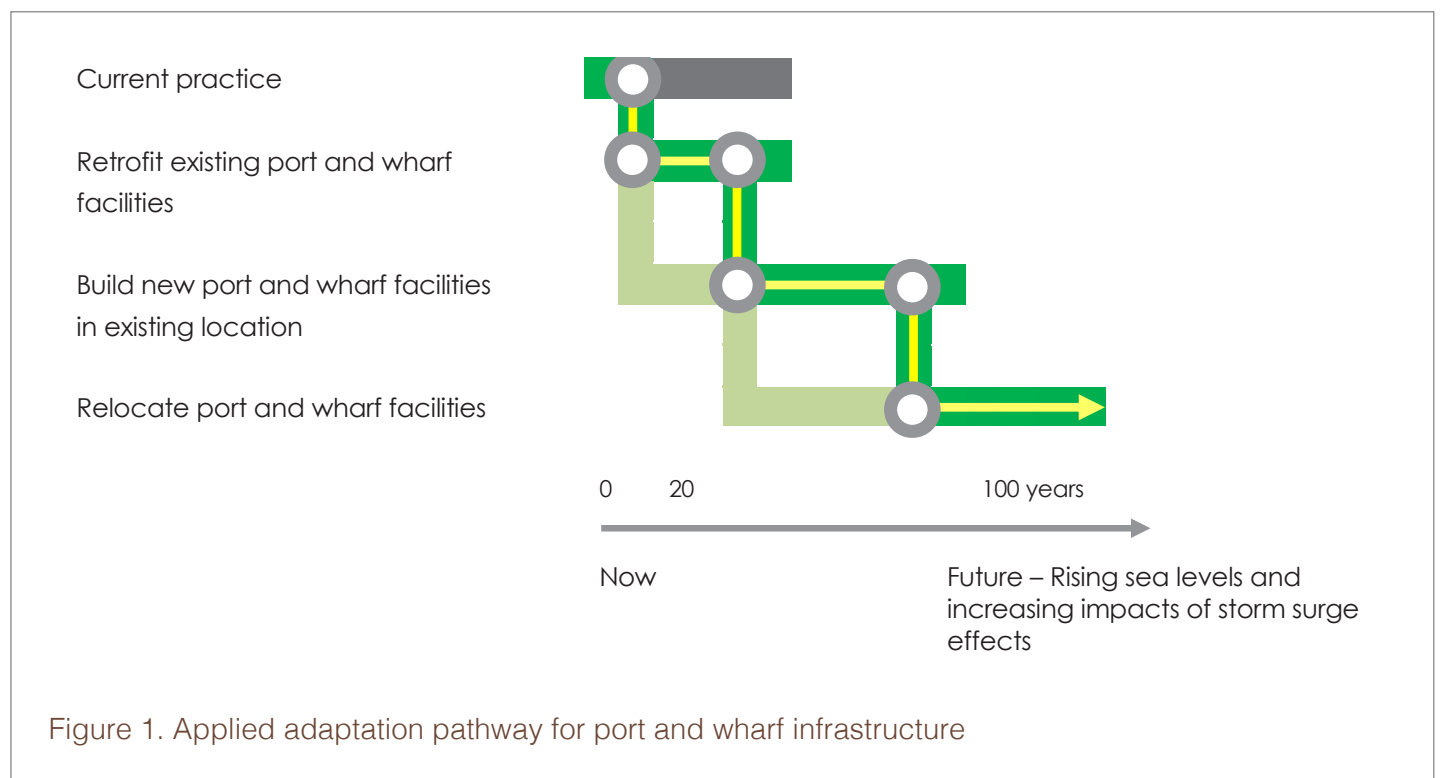
5. The light green shading indicates that although the option may not be implemented for some decades (i.e. where the dark green shading begins), there is a lead time and preparatory work must begin now. In this case, there will need to be considerable discussion to gain community consensus on housing relocation.
6. Grey is used to indicate that this is a non-preferred option. The light grey shading indicates the time over which preparatory work would be undertaken if this option was ever implemented.
7. To assist with communication, the options are categorized. The description of groups can be determined by the practitioner; however, these generally range from incremental actions in the short term to more transformational ones in the long term.

Depending on the information obtained from participants, pathways maps can reflect a more incremental rather than transformational adaptation strategy. Where this occurs, it may be a flag that more work is required with participants to understand the potential impacts of climate change or to identify what transformational options are available and when they need to be implemented.



Issue: Port and wharf infrastructure

Key areas of decision making: How do we maintain marine freight and export services in a given location as sea levels rise and storm surge effects increase?



Issue: Fire management in peri-urban areas

Key areas of decision making

How do we protect people and infrastructure in growing, peri-urban areas close to dense areas of native vegetation as the frequency and intensity of bushfire conditions is expected to increase in the future?

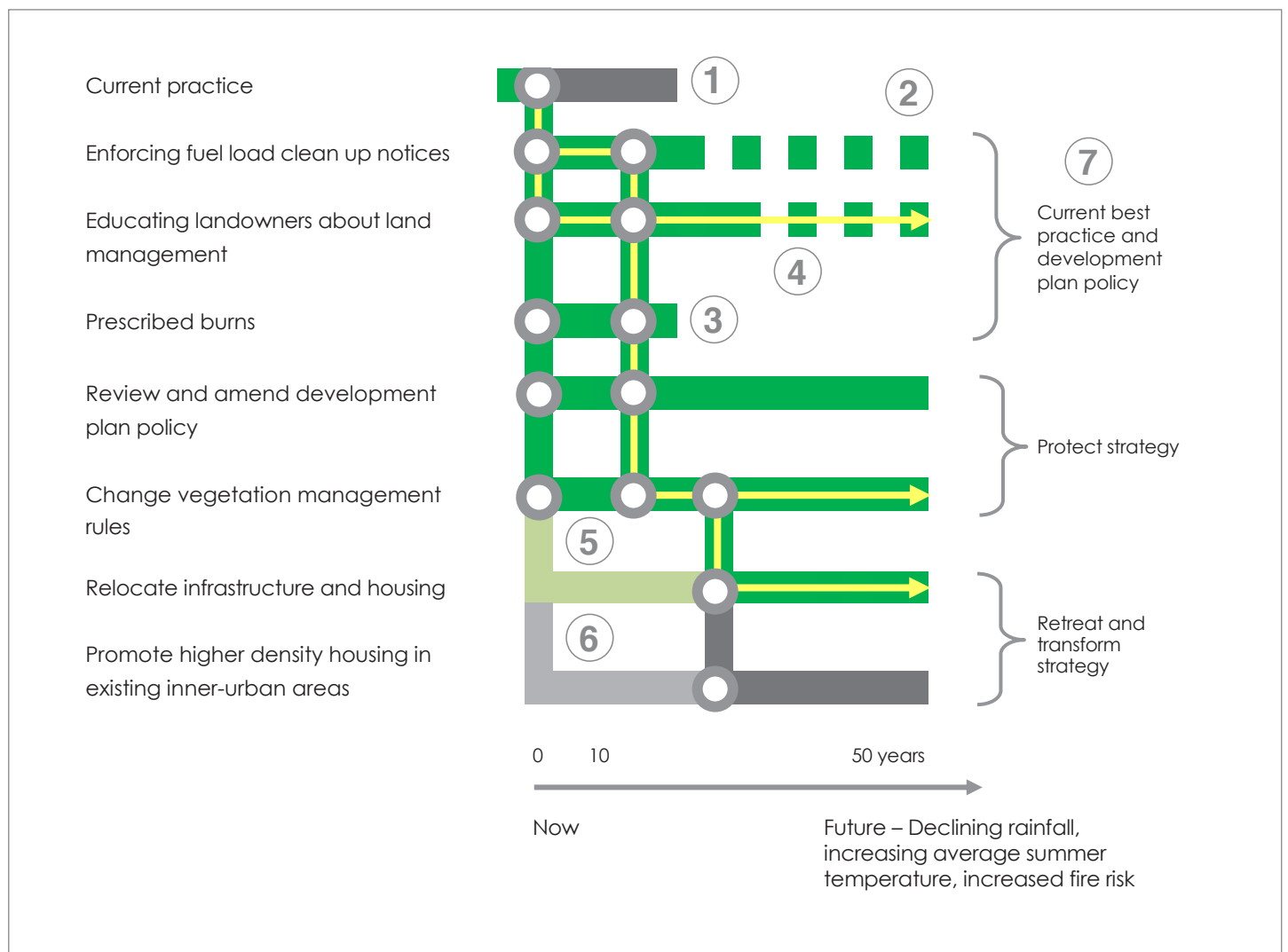


Figure 2. More complex applied adaptation pathways map related to a hypothetical applied adaptation pathway for managing fire risk to growing peri-urban areas.

Step 7 Cross-sectoral applied adaptation pathways map

Output: Cross-sectoral applied adaptation pathways map

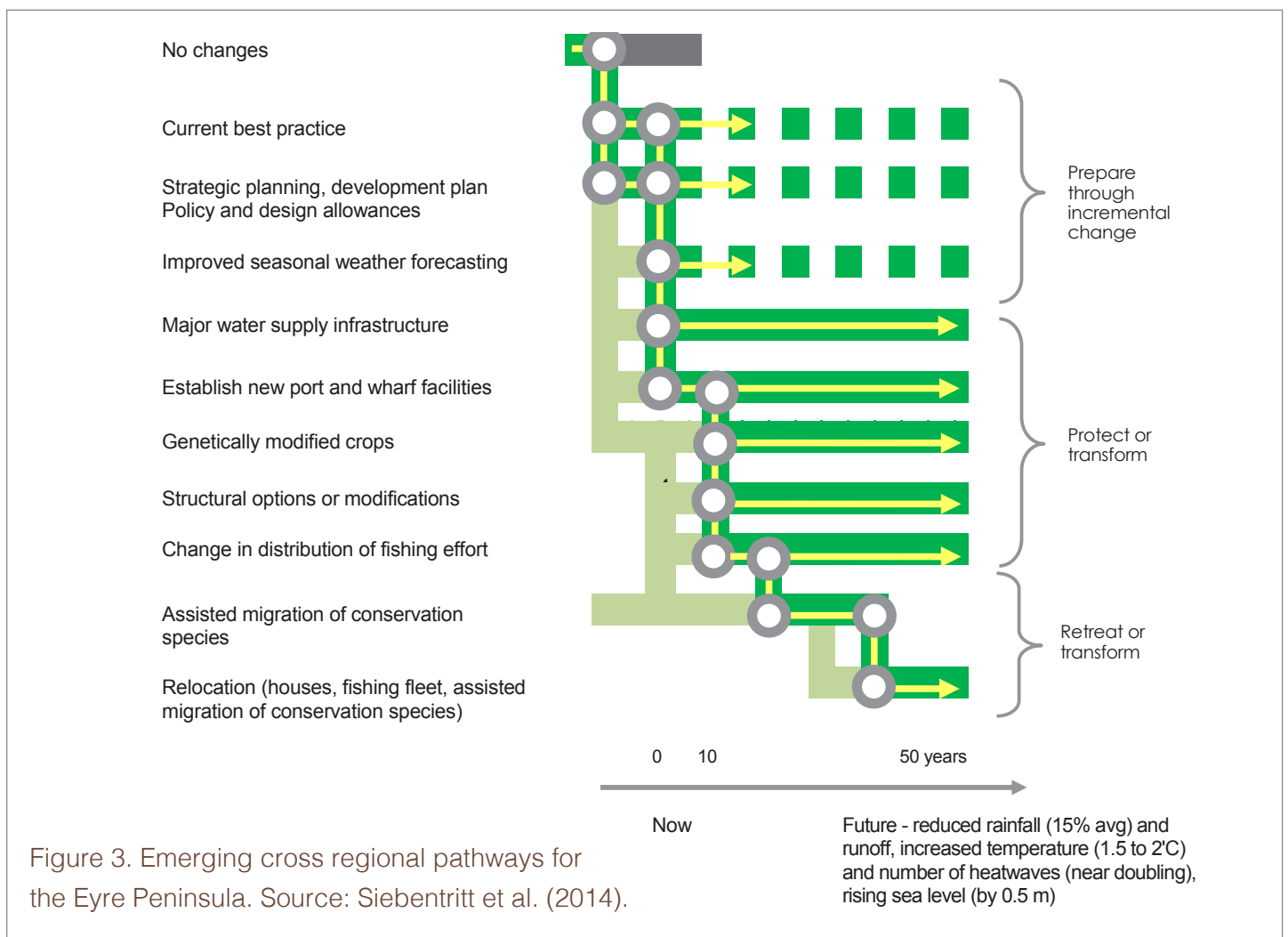
In some applications, adaptation pathways only need to address a single key area for decision making (in which case skip this step). However, in cross-sectoral or regional-scale planning, it is often important to combine the results of multiple pathways maps on to a single diagram. Doing so can help end-users to identify:

- common options from across multiple pathways maps (e.g. a common need for services like transport, though perhaps on different timeframes);
- sectoral options that could be in conflict and need resolving (e.g. increasing demand for water from mining, agriculture and the environment simultaneously); and

- emergent issues across multiple pathways maps, that may require the involvement of a higher level of governance (e.g. coordinating governance arrangements across sectors in a region).

To combine multiple pathways maps for cross-sectoral analysis, take the same basic approach as used in constructing the pathways map (outlined in Steps 5 and 6). Considerable lumping may be needed to make the consolidated map useful.

Because of the need to group options, their description on cross-sectoral applied adaptation pathways maps tends to be broad. As such, cross-sectoral applied adaptation pathways maps tend to be more useful for strategic planning purposes and for identifying alignment across multiple sectors, rather than for specific local-scale decision-making. An example of a cross sectoral adaptation pathways map from the Eyre Peninsula Regional Climate Change Adaptation Plan is presented in Figure 3.



What to consider when designing the process

The approach outlined in this Guide is intended to be implemented as part of a participatory process. Each of the steps can be delivered through facilitated workshops with internal and/or external participants.

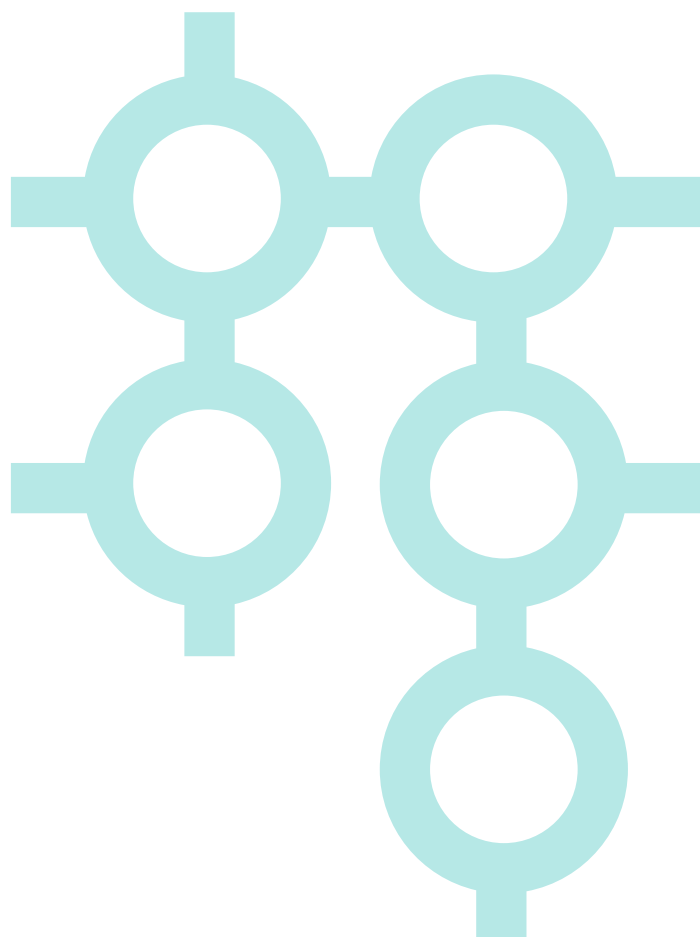
This can be assisted by developing activity sheets to direct participant input. The process lends itself to being highly interactive and should be designed to be fun and engaging.

If the aim of a project is to develop only a single applied *adaptation pathways map* (i.e. for a single *key area of decision making*) then this could be readily achieved in a single day-long workshop. However, when developing applied *adaptation pathways maps* for multiple *key areas of decision making* and that involve multiple sectors, the steps may need to be spread over separate workshops. Importantly, enough time needs to be provided between workshops to allow for the preparation of draft applied *adaptation pathways maps*.

Further amendments can be made to the process to suit the requirements of an individual project. For example:

- a subset of steps may be preferred if there is a need to focus on particular issues before developing pathways (e.g. detailed discussion of thresholds and triggers, improving the understanding of what impacts will occur as a result of climate change and how effective current practice will be in response);
- rather than generating pathway maps, options and their sequencing and priority level can be conveyed through use of a table rather than pathway map. This may be preferred where the list of options is long and where retaining detailed descriptions of options is important; and
- where time or resources are limited the focus may be on developing a course scale pathways map using mainly Steps 4-6.


As our understanding changes over time about the impacts of climate change, the pathways maps will need to be reviewed. A final step in the pathways process should therefore be to set a future review point.





HOW TO INTERPRET THE PATHWAYS MAPS


Each map identifies adaptation options on the y-axis relevant to a key decision. A pathway shows how a single adaptation option plays out through time. The pathways maps are not meant to imply that all options should be pursued; instead, there are various options available, some of which may be pursued and others not at the present point in time.


To assist with interpreting the maps, it should be noted that:


 a **solid, dark green line** indicates the time period over which an option could usefully address the relevant key decision. A **lighter green line** indicates time before an action occurs where preparatory work is required;

 a **dashed, thick dark green** line indicates that the option contributes to the adaptation solution but only in part;

 a **solid dark grey line** indicates an option that was not favored in these discussions. A **lighter grey line** indicates time where preparatory work would be required if such an option was to be pursued;

 **circles** indicate a decision point, such as when decision makers may need to choose between different options;

 a **solid line that ends in a vertical black line** indicates an adaptation tipping point, or a point beyond which an option is no longer viable;

 **yellow lines** with arrows indicate emerging pathways that need to be further assessed in most instances with each sector;

- there is no priority in the order in which options are presented;
- the **x-axis** represents a general trend in changing climate through time and should be read as indicative (e.g. decades) rather than precise in terms of the timing of adaptation options; and given that the x-axis represents time, it should also be noted that other factors will change through time that will impact on the choice of adaptation option such as population changes and market forces. The physical expression the understanding of climate change will also alter over time, and the pathways map needs to be reviewed and revised as a responsive living document over time.

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Glossary of key terms

Adaptation pathway – A sequence of *adaptation options* and decision points, laid out over time, to address impacts from climate change in one or more *Key areas of decision-making*.

Adaptation pathways map – The graphical representation of a set of *adaptation pathways*.

Adaptation option: A response that reduces climate change impacts or increases adaptive capacity. Practitioners may alternately differentiate between adaptation measures and options¹⁰, whereby a “measure” is anything one can possibly do to reduce impacts or increase adaptive capacity whereas an “option” is a mix of measures. Your choice of terminology should consider the familiarity of project participants with these terms.

Applied adaptation pathways: The particular way of developing *adaptation pathways* that is outlined in this guide – ‘applied’ because it has been shown in practice to be useful in creating an action-oriented outcome, and ‘pathways’ because it helps decision makers develop and visualize actions needed now compared to in the future.

Decision point: A point in time where progress needs to be reviewed and a choice made between alternate response options, thus determining which “pathway” seems best to decision makers at that point. Decision points often occur prior to a *use-by-date* or *threshold*.

Emerging pathway: A favorable subset of *adaptation options* that have been identified by participants in developing an applied adaptation pathways map but that does not represent the preferred set of options.

Key area of decision making: An area of decision-making in an organisation, sector or region within which adaptation options may be needed to manage the impacts of climate change on an asset, value or service.

Maladaptation: Responses to climate change that achieve short term adaptation in one *key area of decision making* but that may have negative outcomes in other areas or in the same area in the longer term.

Preferred pathway: A preferred subset of adaptation options that have been identified by participants within their complete pathways map.

Threshold: The point at which a system starts to operate in a significantly different way. Thresholds can be social, economic, environmental or physical.

Trigger: When a monitored system driver (e.g. sea level rise or temperature rise) changes to a point where existing response options should be reviewed and new options implemented, i.e. a decision point is triggered. A trigger may occur without a threshold yet being reached (e.g. a degree of sea level rise not yet expressed in terms of a bad flood because a storm tide has not yet happened), but the conditions are set for a system threshold to be crossed before decision-makers can do anything about it. Note that a trigger should be easily monitored, for quick action.

Use-by-date: The point in time (usually, but can also be expressed in terms of a degree of change like sea level rise or temperature increase) at which a proposed adaptation option will no longer be effective, due to continuing climate change or other factors. This might be a little later than the trigger and associate decision point to adapt to this failure.

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