NSW FUTURE FOREST SCENARIOS

FINAL REPORT

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Executive summary

Scenarios are internally-consistent representations of multiple, plausible futures. They are intended to present alternative futures in sufficient detail to allow decision-makers to imagine what those futures might be like, and to challenge assumptions and logic in ways that other methods do not.

The **NSW Future Forest Scenarios Project** was commissioned by the NSW Natural Resources Commission as part of the Forest Monitoring and Improvement Program (FMIP). The Project was facilitated by an ANU/ CSIRO team, drawing on expertise of FMIP Steering Committee members and NSW agency representatives, and ran from September 2021 – February 2022.

This project sought to **explore** possible futures and their implications rather than seek pathways towards already identified outcomes. There were no stated preconceptions about how such as process could or should be linked with NSW planning cycles.

The **Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services**' (IPBES) characterisation of scenarios and its Nature Futures Framework guided the project. The values expressed by *Exploratory Scenarios* were represented in the context of a 'Forest Futures Framework'. Uncertainties along 5 axes – demography, values, technology, environment (including climate) and governance – were used in scenario development.

Eight scenarios were developed to represent different combinations of these uncertainties. Each is described by a narrative and timeline imagining its emergence through to 2050, the outcomes and relative expression of values that might result, an elaboration of associated issues, and an indicative causal relationships diagram. Readers are invited to reflect on these and populate an associated PARK (Protect, Acquire, Remove, Keep out) table.

The scenarios span a spectrum from optimistic to pessimistic, and a range of forest extents:

Outlook/ tone	Forest extent compared with 2022		
	Less	Similar	Greater
Optimistic		Beautifully Aligned Respecting Country Vibrant Bioeconomy	Restored NSW
Neutral		Regional Devolution	
Pessimistic	Neglected The Great Weathering	Hostilities Continue	

The scenarios are **illustrative rather than definitive** and are intended to prompt rather than to answer questions. They are soundly-based but could be further explored, challenged and refined with the broader engagement of a wider range of stakeholders and knowledge holders. The associated causal relationships diagrams are similarly indicative and could be further refined and quantified at a regional scale.

We commend these scenarios to you as **a vehicle for thinking about the possible futures** of NSW forests. The report suggests establishing an enduring process that seeks to embed structured futures-thinking as an integral part of futures-responsive cultures across organisations that have carriage of forest policy and/or management in NSW.

Table of contents

Introduction

The NSW Future Forest Scenarios Project was commissioned by the NSW Natural Resources Commission as part of the NSW Forest Monitoring and Improvement Program (FMIP). A number of factors – the prolonged drought culminating in the 2019-2020 Black Summer bushfires, the subsequent NSW Bushfire Inquiry, and the emergence of COVID-19 – prompted consideration of what might be wanted for the future of NSW forests, what the pathways for getting there might be, and the consequences of different decisions (Annex 1).

This Project was facilitated by an ANU/ CSIRO team, drawing on expertise of FMIP Steering Committee members and NSW agency representatives, and ran from September 2021 – February 2022. COVID-19 constraints meant that the Project was conducted virtually.

Consistent with established practice, the Project explored possible futures and their implications, rather than seeking pathways towards already-identified outcomes. There were no preconceptions about how the Project could or should be linked with NSW planning cycles; some opportunities for such linkages emerged as the Project proceeded.

Context and brief

In this and the next section, we discuss the context and purpose of the Project as established by the initial brief (Annex 1) and related background documents. The key messages the facilitation team took from the brief and background materials were:

- This Project should be about encouraging new and deeper thinking, *exploring* multiple possible futures, and understanding the range of visions that stakeholders have for the future of NSW forests, rather than seeking pathways towards already-identified futures;
- There are many possible approaches that could be taken to develop and use scenarios, and this Project was tasked to provide recommendations for a suitable approach and to demonstrate that approach within a limited timeframe and budget;
- The process should provide a mechanism for strategic conversations between stakeholders, and should improve the ability of the NSW Government to anticipate and plan for future circumstances;
- There were no preconceived processes for embedding the scenarios or the scenario development process into NSW planning cycles, although we were conscious that we could offer suggestions on how scenarios could be linked with planning;
- It was expected that the scenarios would explore the range of futures situations in which forest policy and management decisions might need to be made, and the possible implications of different decisions in these different futures;
- Statements such as "Now is the time to think about what we want for the future of NSW forests" (Annex 1) suggested the Project should focus on the values society might have for forests under different futures, consistent with the Nature Futures Framework (Annex 1);
- Whilst it was expected that alternative climate futures should be a major consideration in the scenarios, it was also the case that scenarios should not be limited to or by these futures.

On the basis of these initial framings, and from discussions with NRC staff, we understood that this Project, should the approach show merit, might be the beginning of a larger and longer process to deepen and widen thinking about plausible futures. Therefore, it should provide a framework that could support serious thinking and further development, rather than providing a set of outputs for communication of simplified messages. Whilst the use of such simplified messages is a common means of communicating complex scenarios, these should come *after* rather than *before* deeper thinking. Hence, as explained in later sections, we elected to consider a larger number of future uncertainties than is often done in scenario processes and to retain 8 scenarios rather than reduce the set to the more usual 3-5 seen in many scenario activities. A further consideration strong in our minds was that, because the Project could only engage a relatively small number of stakeholders, the next stage of tightening the focus on uncertainties and limiting the number of scenarios should be done with wider stakeholder involvement.

Towards the end of the Project, we were made aware of a State-wide planning process within the NSW Government that has futures-thinking embedded as a component. We had some helpful interaction with this process, but those responsible for it were not able to share details. Nevertheless, it was apparent that there were similarities, complementarities and differences between the processes. We offer some commentary on these in the Conclusions.

Purpose

The purpose of this project evolved through discussion with the NRC, and subject to time constraints and the availability of stakeholders and experts. Within the context explained above, our understanding of the purpose of this Project was to:

- Consider approaches for engaging stakeholders in futures-thinking (foresight) about the range of alternative, plausible futures for NSW forests.

Within that overall purpose, we were to:

- Recommend a suitable approach;
- Run a version of that process, scaled to fit the short time-frame and limited resources, to allow assessment of its suitability;
- Produce a report that includes:
    - A preliminary set of scenarios exploring the range of plausible futures for NSW forests that can be further refined by engagement with a wider range of stakeholders;
    - Consideration of pathways by which these futures might emerge;
    - Discussion of the implications of different decisions along the way;
    - Recommendations for how this approach could be built upon and integrated into other strategic thinking and planning processes

The remainder of this report addresses these points.

Scenarios - Background

In the brief for this Project, scenario development was seen as: "*a process that can assist in simplifying the overload of information, challenge prevailing mind-sets, promote cross disciplinary action and develop a shared understanding across diverse stakeholder groups"* (Annex 1). The following summary presents key insights from the scenario literature.

What are scenarios?

Scenarios are one component of a broader discipline often called *foresight*, *strategic foresight*, *futures-thinking*, or *futures-studies.* In France, futures-thinking is called *la Prospective* and scenarios are *futuribles*.

Scenarios are internally-consistent representations of multiple, plausible futures. They present alternative futures in sufficient detail to allow decision-makers to imagine what those futures might be like rather than just reading sterile descriptions. Constructing these narratives also challenges assumptions and logic in ways that other methods do not.

Scenario-development processes

Although there are many different approaches to developing scenarios of alternative futures, all involve a systematic process of:

- clarifying the questions to be asked about possible futures;
- assessing past and emerging trends (horizon scanning);
- recognising and questioning assumptions about the past, present and future;
- distinguishing aspects of the future that are highly likely to occur from aspects whose future trajectories are uncertain given current knowledge; and
- exploring the implications of different trajectories of critical uncertainties in detailed, internally consistent narratives (see also Table 1).

Table 1: An example of a foresight framework (modified from Voros, 2003)[1]

	Stage	Questions	Methods
	Inputs	Look and see what's happening	Strategic Intelligence Scanning Delphi, Near-Future Context
Foresight	Analysis	"What seems to be happening?"	Emerging Issues, Trends Cross-Impact Analysis
	Interpretation	"What's really happening?"	Systems Thinking Causal Layered Analysis
	Prospection	"What might happen?"	Scenarios, Visioning Normative methods, Backcasts
	Outputs	"What might we need to do?"	Reports, Presentations Workshops, Multimedia
	Strategy	"What will we do? "How/ when will we do it?"	Strategy Development & Strategic Planning

1 Voros, J (2003) A generic foresight process framework. Foresight 5, 10-21

In our workshops, we used the following illustration of the scenario development process (Figure 1), emphasising that this is *not* a process of prediction but one of exploring multiple possibilities and their implications. In the Approach section of this report, we explain what we did in each stage of this process.

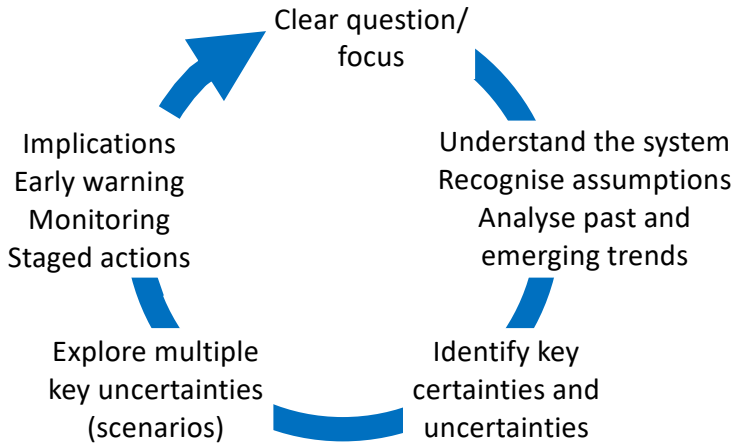


Figure 1: The steps followed to develop and interpret scenarios in this study (based on a range of published approaches, including that shown in Table 2)

Uses for scenarios

Scenarios can be used in for various purposes, including:

- encouraging constructive dialogue among people with knowledge and insights relevant to the questions being asked;
- testing and revising assumptions;
- providing virtual immersion of decision-makers in alternative futures so they can consider how they might operate in those futures, what early warning signs they should be watching for, what preparations could be made for different futures and when; and
- communicating with those who might benefit from the insights gained.

Benefits of scenarios and strategic foresight

Many analyses have been made of the application of foresight processes in organisations and societies. Key conclusions include:

- unless participants are given time, opportunities and encouragement to break out of well-known constraints on human thinking, scenarios will largely be based on what people have experienced in the past and their educational, cultural and other biases;
- the greatest benefit from scenarios comes from being engaged in the development process and subsequent dialogue generated by exploring, reviewing and revising them in depth as part of an organisation's culture; and
- participation by the full range of stakeholders is important for effective futures-thinking, but having the process supported by, and engaged with, by the most senior members of stakeholder organisations can make or break the process.

IPBES and the Nature Futures Framework

A major review by the Inter-Governmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) provided particularly useful guidance in the early stages of this project (Figure 2). Similarly, we were asked to consider the ideas developed by the Nature Futures Forum on values ascribed to forests by people around the world (Figure 3).

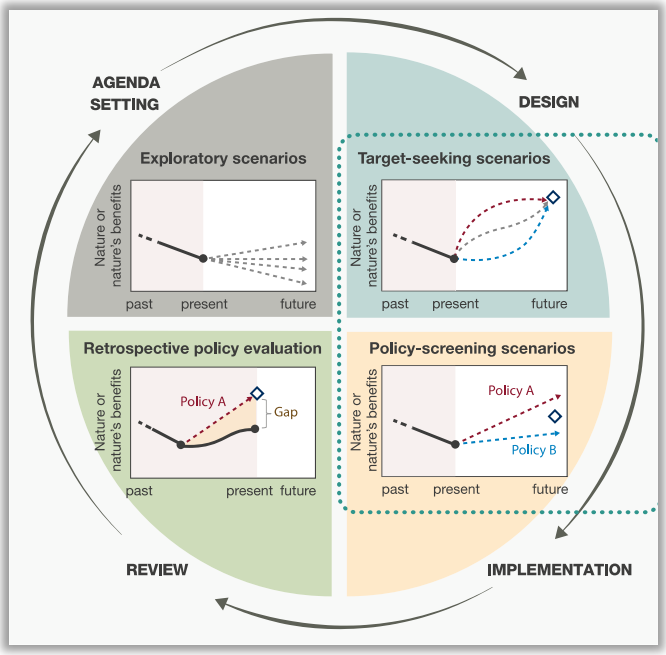


Figure 2: The review of methods for scenario planning by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)[2] identified four broad ways in which scenarios can contribute to policy processes.
Note: We were asked to focus on the *Agenda Setting (Exploratory)* phase, in which we asked what sorts of futures might unfold and what their implications might be. The other phases might become important as the scenarios developed in this project are applied to ask questions like: how might we achieve certain desired futures; what policies might best help us achieve our future objectives; and how well did different policies work as we look back?

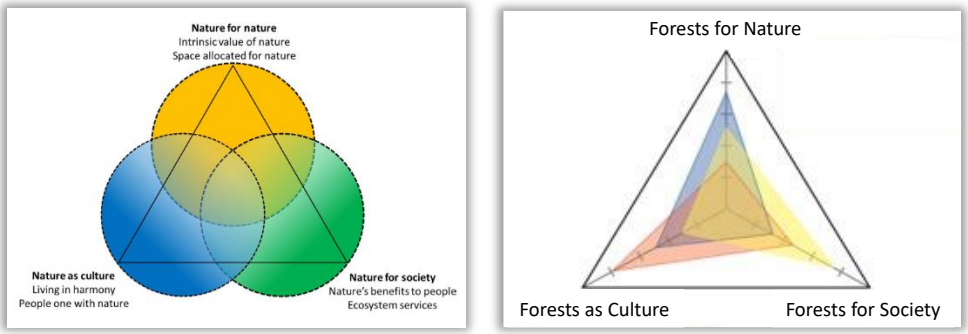


Figure 3: The Nature Futures Framework (left) was developed as a heuristic tool to capture the diversity of ways in which humans value nature.[3] We adapted this and expressed is as values for forests (right).
Note: One of the first steps in the project was to elicit views from participants about what these different types of values are. The scenario focused on how the different values might be prioritised differently in different futures and how forests might be managed for the full range of values in all futures.

[2] Ferrier S, Ninan KN, Leadley P, Alkemade R, Acosta LA, et al. 2016. The methodological assessment report on scenarios and models of biodiversity and ecosystem services. Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany

[3] Pereira LM, Davies KK, Belder E, Ferrier S, Karlsson-Vinkhuyzen S, et al. 2020. Developing multiscale and integrative nature–people scenarios using the Nature Futures Framework. People Nat. 2(4):1172–95

Approach

Overview

Figure 4 gives an overview of the process, which is explained in subsequent sections.

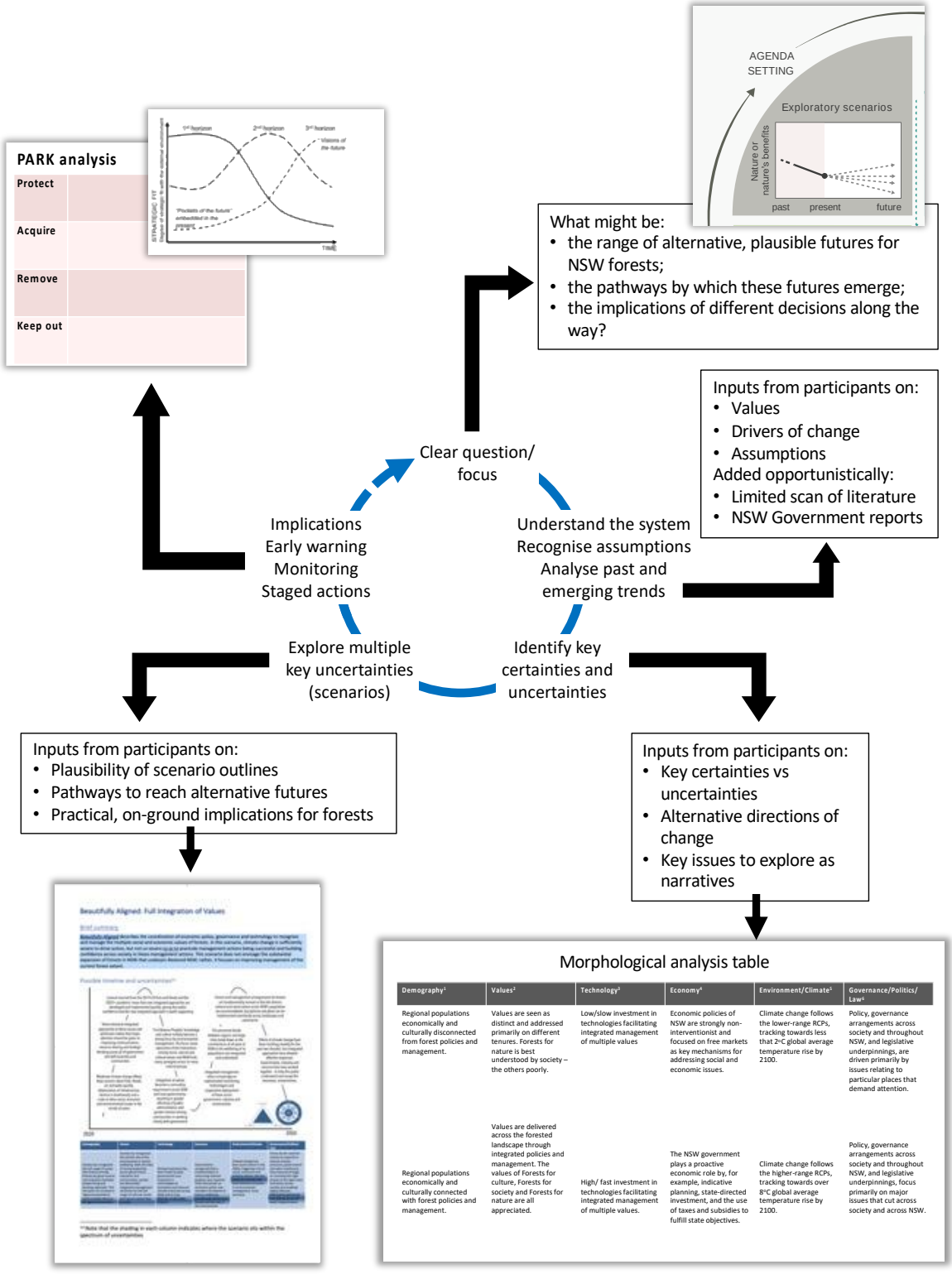


Figure 4: Overview of the process of developing scenario in this Project

Due to the COVID-19 pandemic, we were unable to meet in face-to-face workshops. Therefore, we implemented the Project as a series of 1-2 hour on-line workshops using either MS Teams or Zoom platforms.

The Project was run in two phases.

Exploring what process would best suit this Project, and developing preliminary scenarios (September to November 2021):

- Five fortnightly workshops in which ideas were generated;
- Between-workshops thinking and responding to workshop issues, by both participants and facilitators.

Refinement and initial interpretation of the scenarios (November 2021 to February 2022):

- Consultation with individuals and small groups;
- Next drafts of the scenarios for review by the project participants;
- Refinement and of the scenarios to the point of being appropriate for further development and application by NRC and other agencies, in conjunction with the NSW Forest Monitoring Steering Committee and others with expert knowledge about forest policy, planning and management processes.

Initially, we considered engaging a wide range of stakeholders from within government and across industry and society. That was not possible given the time constraints and limitations imposed by COVID-19 regulations, so we engaged primarily with the FMIP Steering Committee and nominated representatives of key NSW government agencies.

Early thinking

Figure 5 illustrates our early thinking, which evolved as the project progressed into the process illustrated in Figure 6.

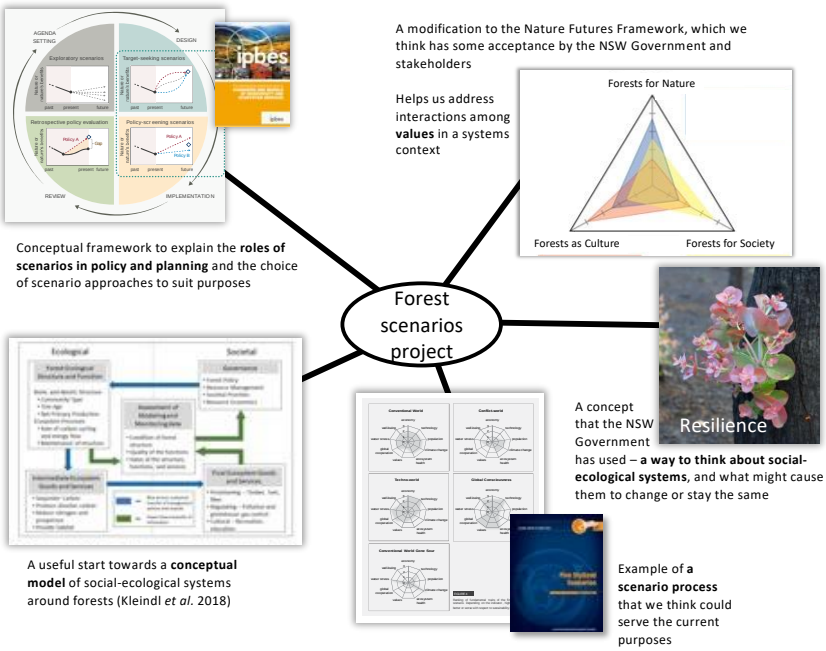


Figure 5: Diagram used to describe our approach in early workshops (see text below for explanation)

Note: Explanation of Figure 5 (clockwise from the top-left):

- Our focus was on exploratory scenarios, considering the full range of forest values.
- The concept of resilience was embedded in our approach (as it had been previously in the thinking of the NRC and the NSW Government) as a way to think about forests as coupled social-ecological systems.
- We quickly realised that the focus on multiple interrelated issues[4] would require us to consider more uncertainties than is common in many other scenario projects.[5] Initially we favoured the approach of Gallopin *et al.*[6] (pictured above as orange "spider" diagrams) but we subsequently settled on a related approach, based on morphological analysis, which is explained in the following section.
- We progressively incorporated the views of participants in a systems model. The model pictured above, from Kleindl *et al.* (2018)[7], was an example to guide our early thinking, but was not used subsequently.

Morphological analysis

In many foresight analyses, scenarios are structured around only two overarching uncertainties (the so-called "2 x 2 matrix"). In this Project, we found there were a larger number of key uncertainties on the minds of participants, so we explored *Morphological Analysis*.

Morphological analysis identifies the key parameters of an issue (key *uncertainties* in the case of futures-thinking) and considers alternative conditions that those parameters could be in (Table 2).

Table 2: Example of a morphological analysis in which one of many possible engineering solutions is represented by the set of conditions in black cells[8]

A 6-parameter morphological field. The darkened cells define one of 4800 possible (formal) configurations.

Parameter A	Parameter B	Parameter C	Parameter D	Parameter E	Parameter F
Condition A1	**Condition B1**	Condition C1	Condition D1	Condition E1	Condition F1
Condition A2	Condition B2	Condition C2	**Condition D2**	Condition E2	Condition F2
Condition A3	Condition B3	**Condition C3**		Condition E3	**Condition F3**
Condition A4	Condition B4	Condition C4		**Condition E4**	Condition F4
Condition A5		Condition C5		Condition E5	
				Condition E6	

[4] As explained in the Context section at the beginning of this report, our brief led us to focus on the issues of managing forests for multiple values, the policy and governance environments in which such management might occur, the technologies that might be available for measuring and monitoring and processing and dissemination of information, and multiple climate change trajectories

[5] The most common approach used in scenario projects is to focus on just two critical uncertainties and to structure scenarios around these. However, this is by no means the only approach as we explain in the following section on morphological analysis.

[6] Gallopin, G. (2012) *Five Stylized Scenarios*. UNESCO, Paris

[7] Kleindl, W. *et al.* (2018) Toward a Social-Ecological Theory of Forest Macrosystems for Improved Ecosystem Management *Forests* 2018, *9*, 200; doi:10.3390/f9040200

Morphological analysis has been used in major engineering projects[8] and is the basis for Field Anomaly Relaxation, a method used especially in long-term defense planning.[9] It is also used in futures-thinking (e.g., UK National Ecosystem Assessment[10] - see Table 3).

Table 3: A simplified version of the Nature@Work scenario, one of six developed for the UK's National Ecosystem Assessment using morphological analysis[10]

Demographic	Socio-political	Economic	Science/ technology	Culture/ religion
Population grows – families larger	Centralised national govt	Moderate economic growth	Rapid tech. dev. by government	Strong stewardship
Population grows steadily	Local govt more powerful	Strong growth but some crises	Private investment	Benefits of nature valued
Population grows slowly	A globally-minded govt …	Static but healthy	Slowed development	Society values beauty of nature
	Govt interferes with free market	Modest growth but steady	Sustainable resources tech.	Nature exploited
	Govt stance fluctuates		Focus on self-sufficiency	

In the NSW Future Forests Scenarios Project, we considered a spectrum of uncertainties under the headings of demography, values, technology, economy, environment/ climate and governance/ politics/ law. The eight scenarios developed explored different combinations of conditions on those spectra (Figure 6). This is represented schematically in Figure 6 and the details of the morphological table are given in the Results section. The combinations chosen for scenarios were those that we and the stakeholders engaged in the process thought challenged our thinking the most and represented the fullest plausible range of possibilities.

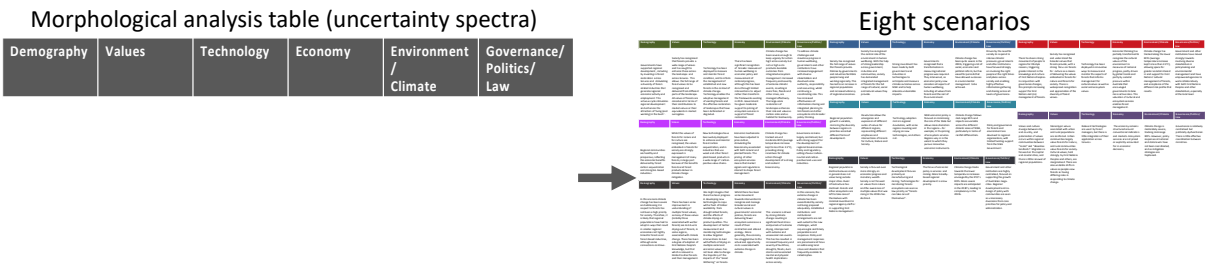


Figure 6: In this Project, the scenarios explored challenging combinations of conditions from uncertainty spectra

8 Ritchey T. 2011. Modeling Alternative Futures with General Morphological Analysis. World Futur Rev. 3(1):83–94

9 Stephens AKW. 2006. Future Urban States: a Field Anomaly Relaxation Study. DSTO Defence Science and Technology Organisation, Australia

10 Haines-Young R., Paterson J., Potschin M., Wilson A. & Kass G. (2011) The UK NEA Scenarios: Development of Storylines and Analysis of Outcomes. In: The UK National Ecosystem Assessment Technical Report pp. 1195-264. UK National Ecosystem Assessment, UNEP-WCMC, Cambridge. <http://www.nottingham.ac.uk/CEM/pdf/NEA_Ch25_Scenarios_Haines-Young_et al _2011.pdf>

Results

Focal questions

This project asked what might be:

- the range of alternative, plausible futures for NSW forests (to 2050);
- pathways by which these futures emerge; and
- implications of different decisions along the way?

Values and emerging trends

Participants in workshops were asked to provide insights from their own experience and knowledge about the values that different parts of society might have for forests, the processes that have driven change in the past and might drive change in the future, and key literature on these topics. Time did not allow a more detailed horizon scan, although the facilitation team injected their own knowledge from other scanning processes as the Project proceeded.

Key certainties

Table 4 shows some of the trends expected to play out in all futures.

Table 4: Relative certainties (trends/ assumptions thought to apply to all plausible futures)

Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Ongoing conversion of some forests for residential and semi-rural use. Increasing population and ongoing key role of immigration to grow the populations of NSW and Australia. There will continue to be a difference in culture and economic focus between metropolitan centres and regional Australia, but the strength of this difference and the role of regional Australia could vary depending on many interacting factors.	Communities will still demand forest products and iconic species conservation, but the strength of these demands will vary with society's mix of values and the focus on the economy.	Technology will be important in two ways (at least): in managing forests for their values (including production of goods from forests, as well as less tangible values); and in monitoring forest condition. The extent of innovation and investment in technologies, and the types of technologies developed and deployed, will be influenced by society's mix of values and the role of forests in society and the economy.	Continued (growing?) demand for sustainable land use but the strength of this demand will vary with society's mix of values. Growing demand for carbon sequestration in forests and increasing value of carbon, but the strength of this demand will vary depending on society's mix of values and how climate change plays out. Regardless of the role of forests in the economy, ongoing maintenance of the forest estate in some form (including roads) will be needed.	Greater demand for management of fire risk to life and property. Greater frequency and severity of fires, flood, drought as a result of climate change Growing water scarcity and declining water quality in places	Australian policies influenced by international trends. Ongoing influence of vocal minorities. A continued flow of false information, which will vary depending on many interacting factors.

Key uncertainties – the Morphological Table

The Morphological Table is at the heart of the scenarios developed in this project. It was developed after numerous iterations of thinking about what factors might most strongly influence, in unpredictable ways, the future challenges for policy and management in relation to NSW forests over the next few decades. We found it difficult and overly constraining to identify discrete alternatives for each category (columns in Table 5) so we expressed these uncertainties as spectra, which gave us the opportunity to explore a greater range of possible combinations of conditions.

Table 5. Morphological Table illustrating key uncertainties as spectra of possibilities (see notes below)

Demography[1]	Values[2]	Technology[3]	Economy[4]	Environment/Climate[5]	Governance/Politics/ Law[6]
Regional and urban populations economically and culturally disconnected from forest policies and management.	Values are seen as distinct and addressed primarily on different tenures. Forests for nature is best understood by society – the others poorly.	Low/slow investment in technologies facilitating integrated management of multiple values	Government more "hands-off", focusing on shaping markets rather than on other instruments.	Climate change follows the lower-range RCPs, tracking towards less that 2°C global average temperature rise by 2100.	Policy and governance arrangements across society and throughout NSW, and legislative underpinnings, are driven primarily by issues that demand immediate attention.
Regional and urban populations economically and culturally connected with forest policies and management.	Values are delivered across the forested landscape through integrated policies and management. The values of Forests for culture, Forests for society and Forests for nature are all appreciated.	High/ fast investment in technologies facilitating integrated management of multiple values.	Government more "hands-on" via direct taxes, subsidies and other instruments	Climate change follows the higher-range RCPs, tracking towards over 8°C global average temperature rise by 2100.	Policy and governance arrangements across society and throughout NSW, and legislative underpinnings, focus primarily on major issues that cut across society and across NSW.

Notes on Table 5:

[1] Participants identified attitudes and support from communities as a key factor in developing and implementing forest management policies. Possible demographic trends have multi-dimensional consequences: some related to the extent to which attitudes towards forests become polarised within and between parts of NSW; some related to the expression of Values, and to the culture of communities, both regional and urban; some to the role of forests in regional and/or urban economies.

[2] An objective of this project is to consider how forests might be managed for multiple values in the future. We have used the classification developed by the Nature Futures Framework, which identifies three broad types of values: Nature for Nature; Nature for Society; and Nature as Culture. Participants recognised that different types of values would be the focus of different groups of people in different places under different circumstances in different futures. However, it was also

recognized that these values are poorly understood by most people at present, and that this represents a very different social environment in which to manage forests than one in which the full range of values is better recognised and understood.

[3] Measuring and monitoring to support forest policy and management is a strong underlying theme of this project. Further, participants recognized that development of measurement and monitoring technologies would likely lead to very different futures, involving different governance implications than futures where such technologies either were not developed or not deployed.

[4] In earlier versions we characterised the economy uncertainty as GDP-focused economic policies versus so-called "Genuine Progress Indicators". After feedback from several participants, we have adjusted this spectrum to be about the role of government in economic policy, ranging from a more "hands-off" approach with little direct involvement in shaping markets to a more "hands-on" approach that includes indicative planning, state-directed investment, and the use of taxes and subsidies to fulfill state objectives. Social objectives are realised through the choice of economic mechanisms along this spectrum.

[5] The IPCC has produced a set of Representative Concentration Pathways (RCP) leading to a range of increases in global average temperature between 1 and 8.5^{o}C by 2100. In these scenarios, we assume climate change, leading to increased average temperatures and greater extremes of temperature, rainfall and other weather events. The uncertainty is around which RCP is followed. In some scenarios we suggest that a particular level of climate change might be a driver of the scenario. In other scenarios we consider how the uncertainty around degree of climate change might be managed.

[6] Participants discussed various uncertainties around governance and government, including whether institutions are connected/ disconnected or cooperative/ competitive, and whether authority, responsibility and resourcing are more centralized (monocentric) or devolved (polycentric). Following the suggestion of a participant with relevant experience, we have sought to capture these concepts by exploring the uncertainty of whether governments focus more on issues/ constituencies that demand immediate attention versus larger, longer-term issues that cut across society. The former could be characterised as a reactive, damage-control style of policy and decision-making that might be chosen by governments or might be forced on them by circumstances. It is more likely to be centralized due to the need to control the situations. The latter is more likely to lead to devolution of authority, responsibility and resourcing in strategic ways to the most appropriate levels for different issues. It is also more likely to be able to consider multiple values and attitudes towards forests in integrated ways.

[6] We developed the characterization of this spectrum through a number of iterations with participants, seeking to find the best way to describe complex and dynamic policy and governance processes. It could also be restated as primarily a focus on short-term versus long-term issues, but this did not seem to adequately capture the complexity of primarily reactive versus more strategic processes. This might be interpreted as mixing space and time, which can occur in many scenario uncertainties, either implicitly or explicitly. For example, take the spectrum from *individualism* to *communitarianism*, which has been seen in numerous scenario planning projects over the past two decades. Individualism is usually focused at the spatial scale of an individual's interests (which could vary from local to global) and a temporal scale that is usually short-term. On the other hand, communitarianism can also focus at range of scales from local to global, depending on which communities are being considered, but its temporal focus is usually longer term, considering future generations. The characterization illustrates a difficult issue that foresight analyses face. In much public communication, complex issues are often reduced to simple either-or framing, whereas foresight usually deals with issues that are too complex to reduce to such levels of simplicity.

Presentation of scenarios

The scenarios are presented as separate sections below. We first offer some further explanation of how these scenarios are presented.

We have presented eight scenarios, which is more than commonly presented in publications of scenarios work. We are aware that this number of scenarios is too many for communication purposes, but – as noted in the Introduction - this Project was not intended to develop a small number of scenarios for communication. The eight scenarios each explore what we and process participants think are important and different issues. They are intended to generate deep thinking among those willing to think seriously about alternative futures. It will be appropriate to reduce the number of scenarios and distill the key messages once this further thinking has been undertaken by a wider group of stakeholders.

One reason to retain a large number of scenarios is that we have explored the interactions of several very important areas of uncertainty (i.e., values, decision-making environments, climate change, and technology for measurement and monitoring). This number of issues is not conducive to being distilled into 3-5 scenarios at this exploratory stage.

Flower diagrams and values triangles

The NSW Forest Monitoring and Improvement Program uses the flower diagram shown in Figure 7 to capture the range of outcomes it aims to achieve and the key questions that should be addressed. We have chosen to present the outcomes of our scenarios using this diagram.

Figure 7: The NSW Forest Monitoring and Improvement Program Ecologically Sustainable Forest Management outcomes and evaluation questions "flower" diagram

We introduced the Nature Futures Framework and the values triangle developed under that framework earlier in this report. We have presented values triangles for each scenarios, showing how we think that future might affect the state of the different values and the emphasis placed on each by society.

Overview of the scenarios

The scenarios vary in terms of their tone (optimistic, neutral, pessimistic) and the anticipated extent of forests in 2050 compared with 2022 (Table 6).

Table 6: Outlook/ tone of the scenarios and the changes envisioned to extent of forests

Outlook/ tone	Forest extent compared with 2022		
	Less	Similar	Greater
Optimistic		Beautifully Aligned Respecting Country Vibrant Bioeconomy	Restored NSW
Neutral	Neglected	Regional Devolution	
Pessimistic	Hostilities Continue The Great Weathering		

How each scenario is presented

In the following sections, for each scenario we present:

- a brief description of the scenario;
- an imagined pathway through which the scenario might emerge;
- a characterisation of the uncertainties that drive that scenario;
- ESFM outcomes illustrated using a flower diagram;
- an indication of how the scenario maps onto a values triangle;
- an elaboration of issues associated the scenario, for consideration and exploration; and
- an indicative causal-relationships diagram showing how different drivers of change were thought to influence one another.

Traffic light indicators

Within each flower diagram, we have included indicators showing which "petals" we think indicate low, medium or high levels of desirability (Figure 8). This indication is a value judgement on the part of the facilitation team, and so is open to debate.

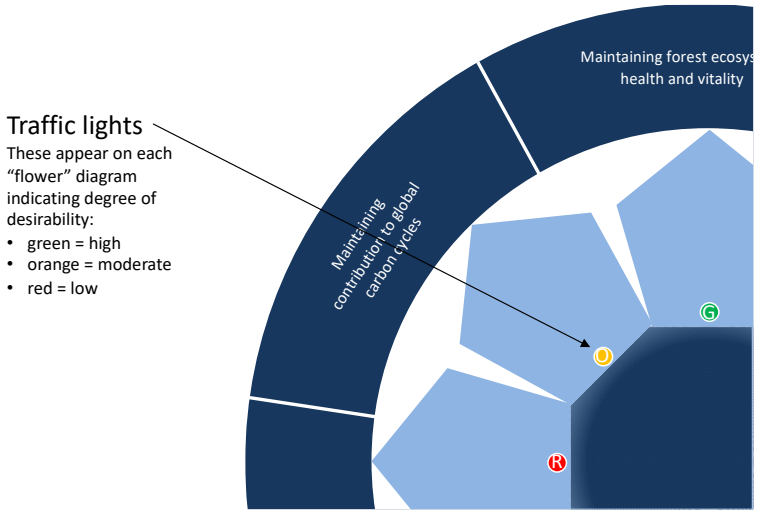


Figure 8: The traffic light indicators used in reporting each scenario

Colours used in scenario diagrams

We have arbitrarily assigned colours to each scenario (Table 7)[11].

Table 7: Explanation of colours used for scenarios

Scenario	Explanation of colour
Restored NSW	Green is associated with restoration of vegetation
Beautifully Aligned	Blue is associated with opportunity ("blue skies")
Respecting Country and People	The colours of the Aboriginal flag
A Vibrant Bioeconomy	A vibrant colour
Regional Devolution	No particular connotation – just different from the others
Neglected	A dull, greyish colour that does not attract attention
Hostilities Continue	Purple might be associated with anger
The Great Weathering	Intermediate between the extremes of climate change (brown and green)

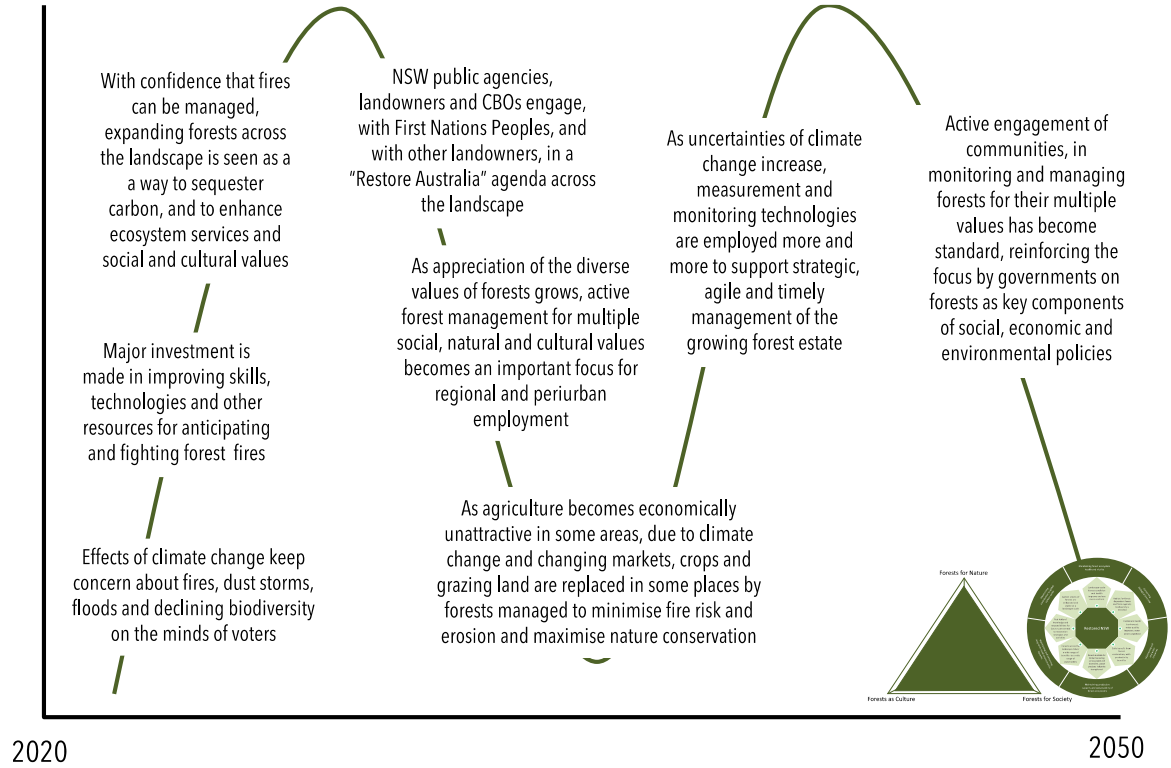
[11] Originally, we used colours for each scenario that were deliberately different from what might be normally associated with the tones of the scenarios. For example, we deliberately avoided using green for any of the environmentally optimistic scenarios or brown for environmentally negative, as these were seen as stereotypic associations with colour. In doing this, we intended to challenge people's thinking and avoid strengthening preconceptions. Ultimately, however, we assigned colours that were more stereotypically associated with the tone of each scenario.,

Restored NSW

Brief summary

The large-scale restoration envisaged here is inspired by the UN Decade of Ecosystem Restoration, the global Forest and Landscape Restoration agenda and Trillion Trees initiative, and both established and new Australian programs. The scenario envisages major expansion of forested areas, a consequence of transition in land uses to more integrated farming and forests, and widespread restoration efforts. The diverse values of forests are valued economically, environmentally and socially in NSW. NSW public agencies, landowners and CBOs engage, with First Nations Peoples, in a *Restore Australia* agenda across the landscape. This scenario goes beyond the *Beautifully Aligned* scenario in scope and scale.

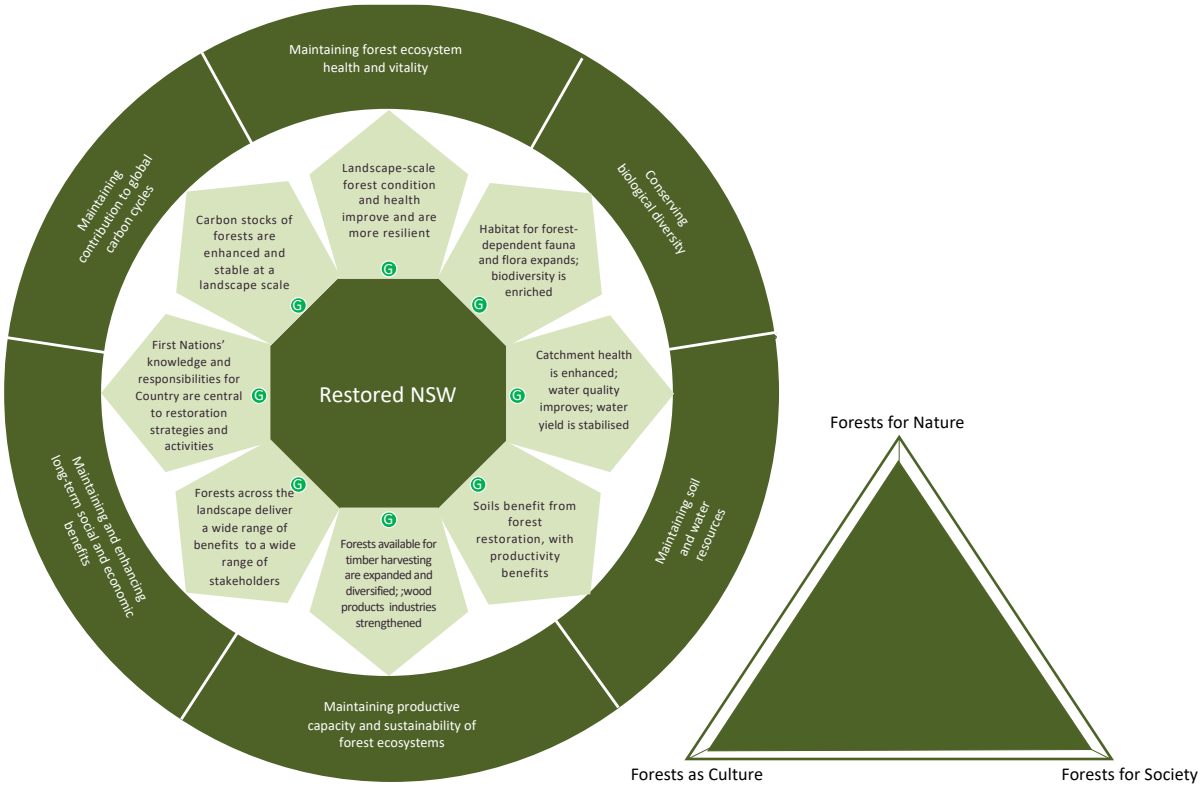
Possible timeline and uncertainties[12]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Governments have supported regional development , including by investing in forest restoration across tenures and stimulating a diversity of forest-related industries that generate regional economic activity and employment. This virtuous cycle stimulates regional development and enhances the attraction of 'living (and working) in the bush' .	Society has recognized that forests provide a wide range of values and has sought to enhance these across the landscape and across tenures. This allows the full range of forest values to be recognised and delivered from different parts of the landscape. All values of forests are considered in terms of their contributions to market values or their equivalents in market surrogates.	Technology has been deployed to measure and monitor forest condition, and to inform the management of established and new forests in the context of climate change. Technology enables the adaptive management of existing forests and the effective restoration of landscapes that have been deforested or degraded.	There has been significant recognition of broader measures of human wellbeing in economic policy and measurement of national progress, although this has been done through limited interventions to adjust rather than transform the frameworks existing in 2021. Government has given moderate support to pricing of ecosystem services in support of forest restoration.	Climate change has been severe enough to keep urgency for action high across society but not so high as to preclude desirable outcomes from integrated ecosystem management. Increased frequency and severity of extreme climatic events, resulting in more fires, floods and other crises, are managed effectively. The large-scale restoration of landscapes enhances their role and value as carbon sinks and as habitat for biodiversity.	To address climate challenges and maximise progress in human wellbeing, governments and other institutions have increased engagement with diverse stakeholders and devolved some authority, responsibility and resourcing, whilst continuing a coordinating role. This has increased effectiveness of information sharing and integrated planning to link forests and other ecosystems into broader policy thinking.

[12] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

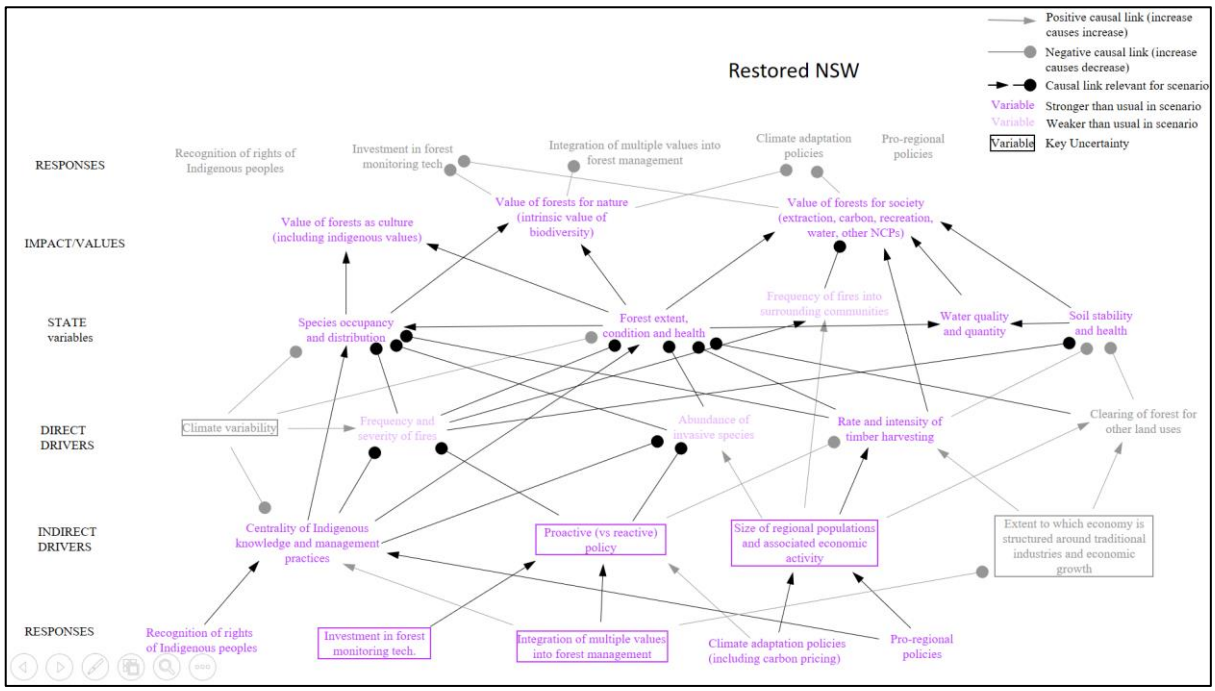


Issues to consider

Issues	Notes
Branching points/ early warning signs	• A critical first step is improved confidence that forest fires can be anticipated and managed • Decisions by insurance companies (about what to cover or not cover) and by governments (to mitigate large cost of regular pay outs and interventions) could be important trigger points. • Perhaps ongoing concern about about water and air quality are key triggers for this scenario as well? • If climate change does not stay on the national agenda in the 2020s, could this scenario branch into Neglect? • This scenario is separated from A Vibrant Bioeconomy by decisions to expand forests for many more purposes than economic values. Perhaps arising concerns about water and air quality might be trigger points/ early warning signs?
Reinforcing/ balancing processes	• This scenario represents more investment in forests than has been the case in the past. Initially that might be driven by public concern about water and air quality but later perhaps the scenario is maintained by the effects on viability of regional communities and their roles in supporting national economic and environmental wellbeing? But caution is required here, as past studies suggest that forests and forest-related industries have minimal impacts in many regional economies. A much stronger driver for increased population and economic activity in regions might be the provision of infrastructure and services that allows people to live and work remotely. • As regional communities prosper their political power will grow and maintain this scenario if it benefits them.
Policy challenges/ opportunities	• Initially, it is likely that governments would want major replanting programs rolled out quickly but there will inevitably be constraints to this, such as objections from some community and industry interest groups. Managing this tension could require special skills and strategies for forest policy makers and managers. • How could such major programs be balanced with other priorities for governments? • Can regional infrastructure (including human workforce) cope with such programs? • As the scenario unfolds, there will be pressure to cut costs of maintaining the forest estate • It is likely that there will be strong support from regional communities for many forest policies but also strong fightback if they are not happy.

Issues	Notes
Challenges for monitoring and other management	• It is likely that there will be strong demand for an expanded measurement and monitoring program, which will require skilled people able to purchase and deploy technologies wisely. • There will likely be a need to manage citizen-science as part of such a program, but it grows the workforce. • There will likely be a tension between support for Australian innovation and the ease of buying imported technologies (e.g., for measurement and monitoring and for processing and dissemination of information). It might be relevant to consider the extent to which NSW have its own state-based technology development centre(s) so that technologies relevant to Australian issues and conditions can be developed quickly.
Implications of change in the state of forests (flower diagrams)	• The extent of forests in NSW has expanded considerably, with forest restoration taking different forms in different landscapes. Trees on farms are now well-integrated into farming systems and contribute to sustainable production. • The expanded forests include restored native ecosystems, plantation forests of native and exotic species, and some novel ecosystems in environments vulnerable to climate change. • Degradation of various forms that had been impacting on forests has been addressed through management that draws on traditional, local and scientific knowledge.

Systems (causal-relationships) diagram

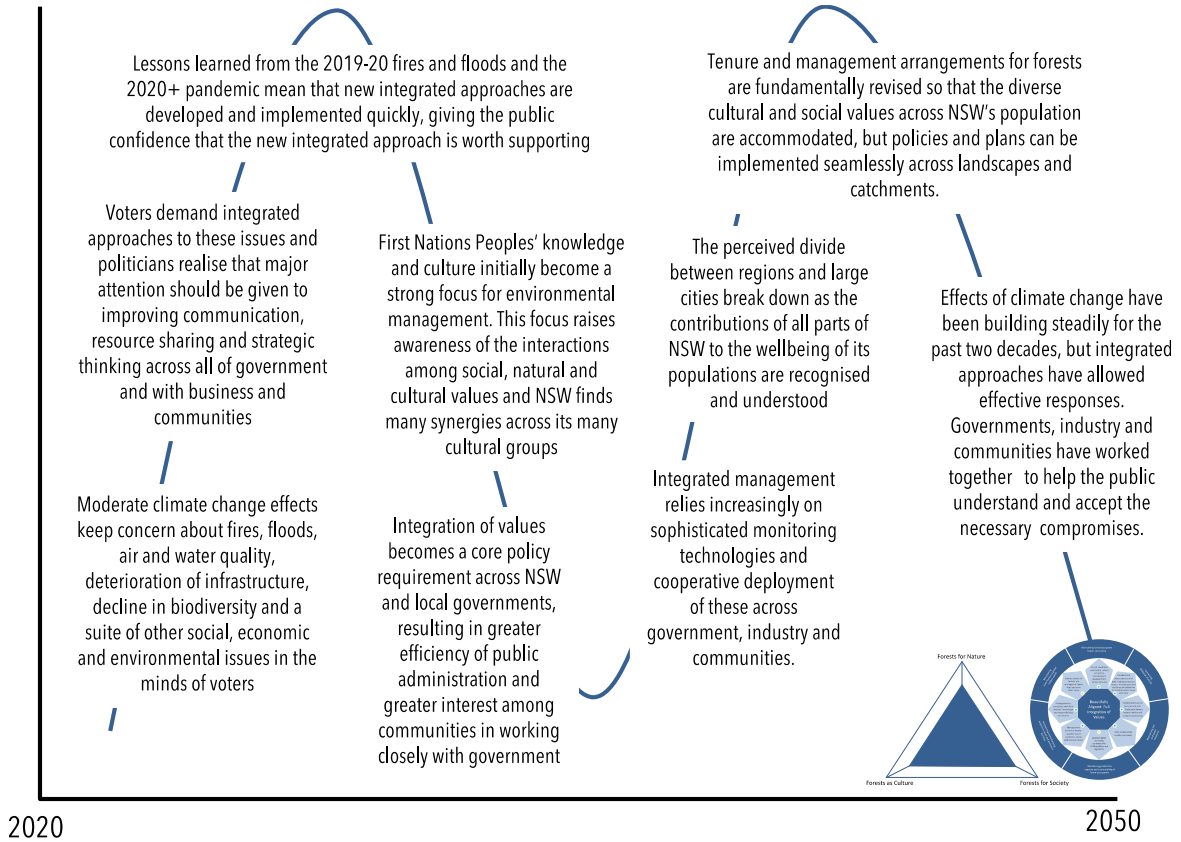


Beautifully Aligned: Full Integration of Values

Brief summary

Beautifully-Aligned describes the coordination of economic policy, governance and technology to recognize and manage the multiple social and economic values of forests. In this scenario, climate change is sufficiently severe to drive action, but not so severe so as to preclude management actions being successful and building confidence across society in these management actions. This scenario does not envisage the substantial expansion of forests in NSW that underpin *Restored NSW*; rather, it focuses on improving management of the current forest extent.

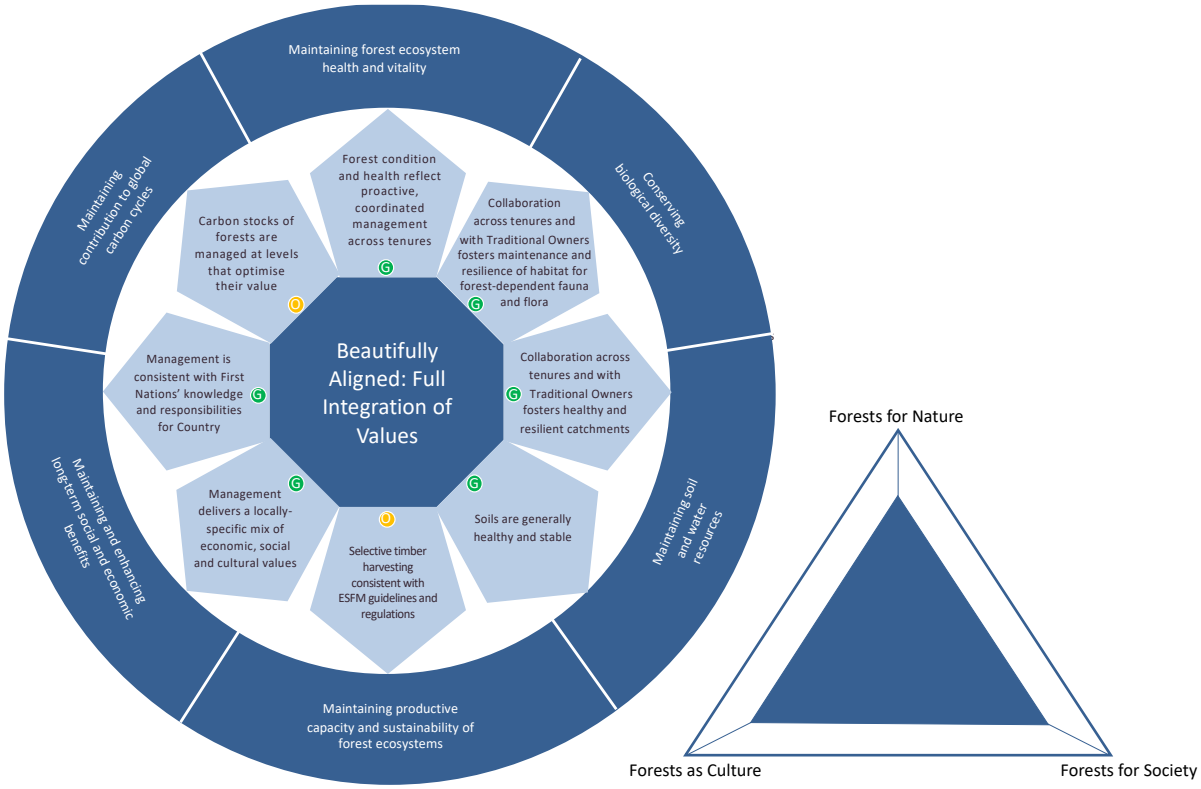
Possible timeline and uncertainties[13]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Society has recognized the full range of values that forests provide. Policies by governments and industries facilitate people living and working regionally. This has led to an increase in regional populations and increased vibrancy of regional economies.	Society has recognised the central role of the environment in human wellbeing. With the help of strong leadership across government, industries and communities, society has demanded integrated management of forests for the full range of cultural, social and natural values they provide.	Strong investment has been made by both governments and industries in technologies to anticipate and measure climate outcomes across NSW and to help alleviate undesirable impacts.	Governments recognized that a transformation in measuring national progress was required. They intervened, so economic policy now considers all aspects of human wellbeing, including all values from forests and the rest of the environment.	Climate change has been quite severe in the 2020s, triggering a lot of social, economic and political reform, but has eased for periods that have allowed successes in environmental management to be achieved.	Driven by the need for society to respond to intense climatic pressures, governments and other institutions have focused strongly on involving the right people at the right times and places across society and enabling highly effective information gathering and sharing across all levels of governance.

[13] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

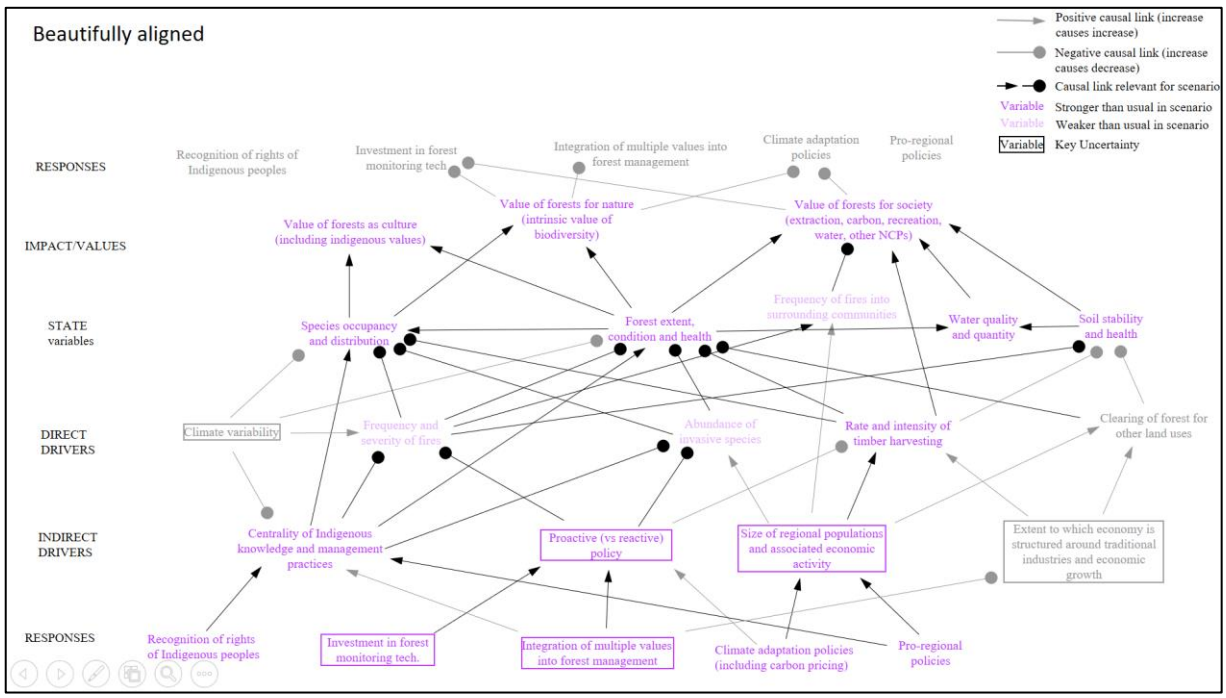


Issues to consider

Issues	Notes
Branching points/ early warning signs	• Does this scenario depend on climate change being sufficiently severe to encourage government action but not too severe that governments go into reactive policies? • Might this scenario flip into *Hostilities* or *Neglect* if climate change is too severe and attempts at integrated action fail (i.e., people might fight or just turn their attention elsewhere)? • More severe climate impacts on air and water quality might push this scenario towards *Restored NSW.* • If economic priorities dominate government priorities, then this scenario could move towards *A Vibrant Bioeconomy*
Reinforcing/ balancing processes	• This scenario relies on early and continued success of integration and cooperation across government and society. Factors such as institutional reluctance, entrenched power struggles and/or misinformation could derail progress. • As regional communities prosper their political power will grow and maintain this scenario if it benefits them.
Policy challenges/ opportunities	• It would be important for policy makers to be ready with plans to implement integration and cooperation quickly – otherwise the opportunity might be missed. • How could resource re-allocation proceed? • Can regional infrastructure (including human workforce) cope with such programs? • How can governments (not just politicians) communicate the value of problems avoided as these integrated approaches unfold? (Perhaps more sophisticated communication will need to be part of policy implementation?) • It is likely that there will be strong support from regional communities for many forest policies but also strong fightback if they are not happy.

Issues	Notes
Challenges for monitoring and other management	• Setting up mechanisms for communication, cooperation and efficient collection and sharing of data will be vital. • New governance arrangements will be needed to manage information gathering and sharing, to avoid too much duplication and redundancy but with just enough to avoid the whole system collapsing when there are problems in one part of it. • There will likely be a need to manage citizen-science as part of such a program, but it grows the workforce. • There will likely be a tension between support for Australian innovation and the ease of buying imported technologies (e.g., for measurement and monitoring and for processing and dissemination of information). It might be relevant to consider the extent to which NSW have its own state-based technology development centre(s) so that technologies relevant to Australian issues and conditions can be developed quickly • New skills might be required within government to acquire and use technologies as smart purchasers.
Implications of changes in the state of forests (flower diagrams)	• The extent of forests in NSW has not changed significantly, but policy and management across tenures are now much more coordinated and complementary. • Improved forest management across all forests, informed and enabled by Traditional Owners' knowledge and participation, and by other local knowledge, delivers a broad suite of ecosystem services. • Both native and planted forests are healthy and resilient, notwithstanding the moderate level of climate change.

Systems (causal-relationships) diagram

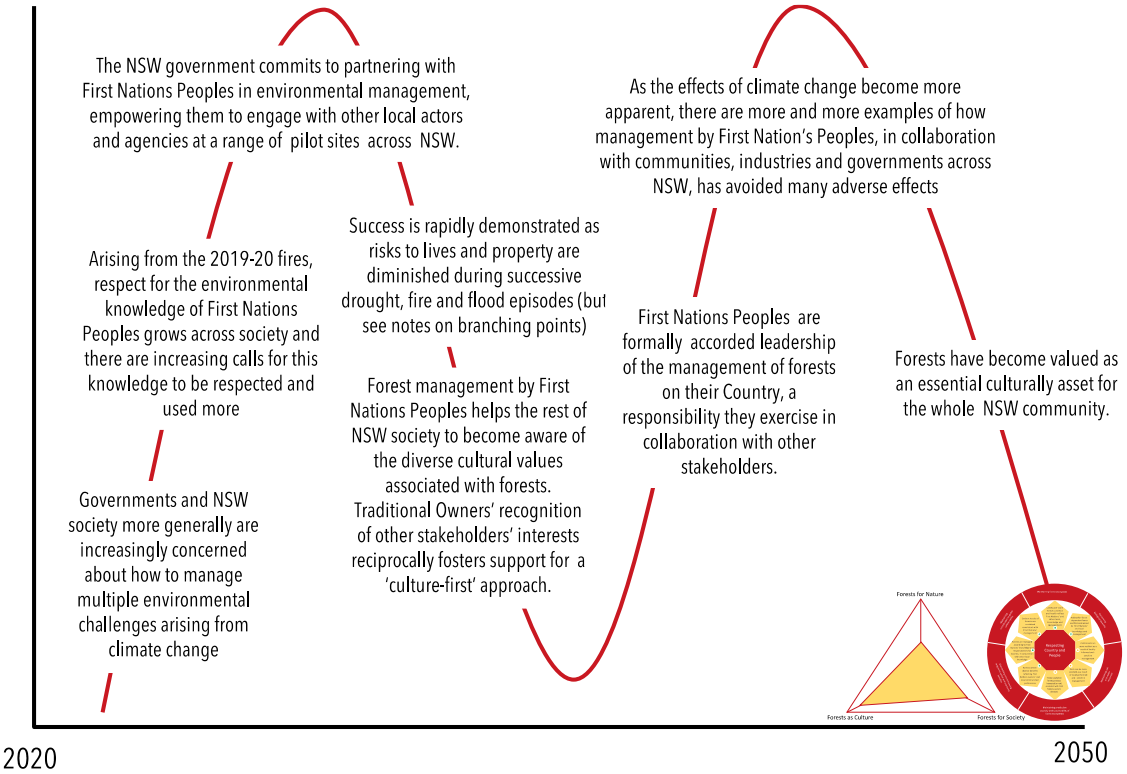


Respecting Country and People

Brief summary

A scenario driven by widespread recognition of the primacy of First Nations Peoples' rights and responsibilities for country, which is exercised collaboratively with public and private forest owners, and in conjunction with other local peoples' knowledge and values. Management across public tenures is led or co-led by Traditional Owners, and supported by agencies; Traditional Owners also manage their own lands, and work in partnership with private forest owners. The values for which forests are managed reflect a conjunction of those of Traditional Owners, local communities, mediated in some cases by co-management agreements. Traditional Owners gain wide respect across society for their skilled (co)management of Country.

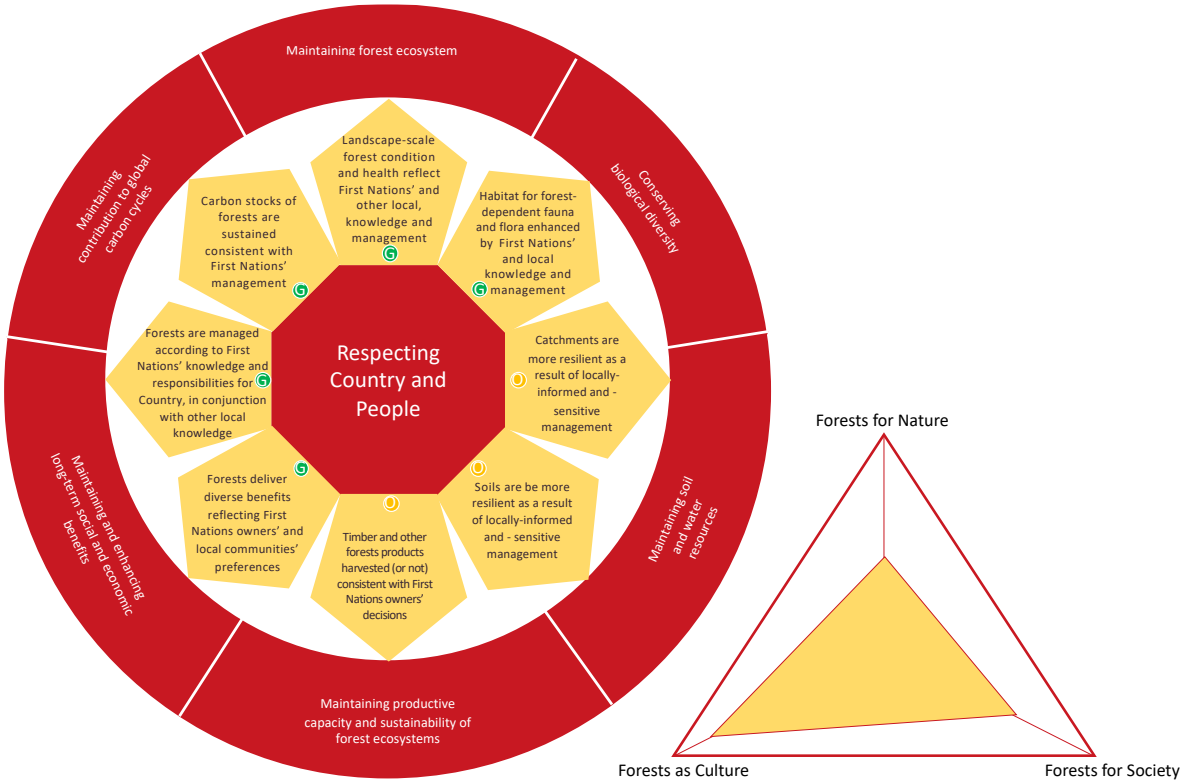
Possible timeline and uncertainties[14]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
There has been strong movement of people to regions for lifestyle reasons, triggering greater interest in the knowledge and culture of First Nations Peoples. In conjunction with governance changes, this prompts increasing support for First Nations-led (co) management of forests.	Society has recognized and understood the broader values that forests provide, with a strong focus on forests for culture as a means of delivering the values embodied in forests for nature and forests for society. There is widespread recognition and appreciation of the diversity of forest values.	Technology has been deployed in innovative ways to measure and monitor the aspects of forests that informs management for cultural values as well as social and ecosystem values.	Economic thinking has partially transformed to recognize the cultural values of the environment in measures of national progress, partly driven by global trends and partly by societal pressure within Australia that encouraged governments to take more active roles. This valuation of cultural and ecosystem services enables forest management.	Climate change has tracked along the lower RCPs (average temperature increase kept to less than 2.5°C), allowing space for greater societal interest in and support for First Nations' cultural management of forests, and acceptance of the different risk profile that results.	Government and other institutions have moved strongly towards involving diverse stakeholders in policymaking and environmental management and have empowered agencies to work collaboratively with both First Nations Peoples and other stakeholders, especially at the local level.

[14] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

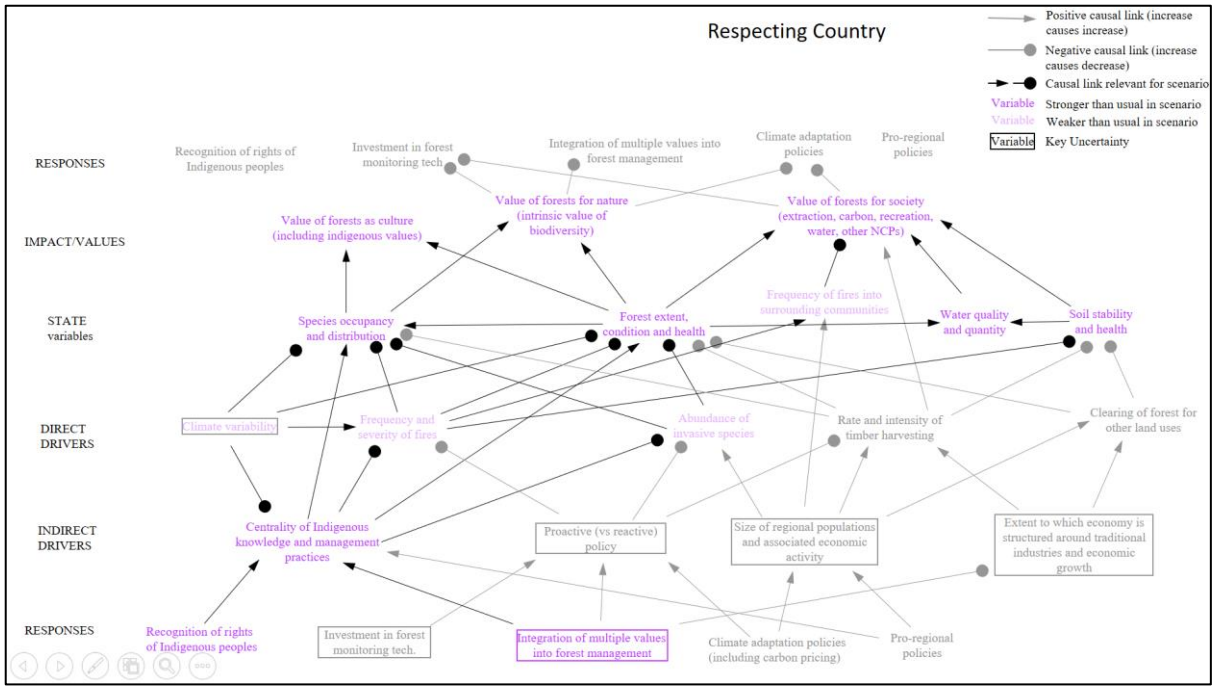


Issues to consider

Issues	Notes
Branching points/ early warning signs	• This scenario involves recognition of rights for Indigenous self-determination and custodianship in native title and policy processes, and major action across society consistent with the United Nations Declaration of Rights for Indigenous Peoples and the United Nations Sustainable Development Goals. Trends that could be precursors of these changes are evident in 2022, nationally and at state level, but if this scenario were to unfold there would need to be increasing progress in these directions to allow this future to have unfolded fully by 2050. In thinking through the early signs of this scenario unfolding, we need to ask what factors and choices might accelerate this trend. • Demonstration of early successes is a key branching point. As well as the intention of government and society to move further towards Indigenous self-determination and empowerment, this scenario relies on sufficient resourcing, capacity building and being able to adapt traditional practices to be effective under a changing climate, and potentially to integrate well with technological approaches. If such resourcing is not provided, then this scenario would likely move in a different direction because the benefits of forest management by First Nations Peoples would not be demonstrated and, therefore, the positive feedback (discussed below) might not emerge.
Reinforcing/ balancing processes	• It is easy to see how there would be successes that gave society confidence, and it is also easy to see how society could realise that First Nations People's values are consistent with, and enhance, other cultural values across society. • Together these could lead to public support for more responsibility and authority being transferred to and accepted by First Nations Peoples. • However, it is also easy to imagine that it forests are managed primarily to mitigate short-term challenges, that the deeper and longer-term benefits of First Nations management are less evident, and so there could be a reduction in public confidence and resourcing and other support from government. • There is a risk that society will expect too much of First Nations Peoples and not do enough to support them. • Resources might be withdrawn if First Nations Peoples' management is judged to be sufficiently successful, and underlying longer-term challenges and limitations are not apparent.

Issues	Notes
Policy challenges/ opportunities	• There would probably be a need for much greater levels of skills and knowledge within government to support the sort of interactions that would be required to link First Nations Peoples management of forests with other aspects of land management across NSW.
Challenges for monitoring and other management	• If this scenario were to start unfolding, there would need to be some serious thinking about what sort of monitoring might be required from within government to complement what First Nations Peoples would be doing. This would require done over a time scale that suits First Nations Peoples and probably should be started well before the scenario emerges in earnest.
Implications of changes in the state of forests (flower diagrams)	• The character of many forests is changing as a result of extensive Traditional Owner management, particularly as a consequence of the reintroduction of cultural burning on a broad scale. In general, this management enhances forest health and resilience. • Forest structure, composition and biodiversity values are progressing to states more typical of those prevailing c. 1788; although these are mediated by the impacts of climate change. • Other than in strict exclusion zones, a range of wood and non-wood products are harvested from forests across the landscape.

Systems (causal relationships) diagram

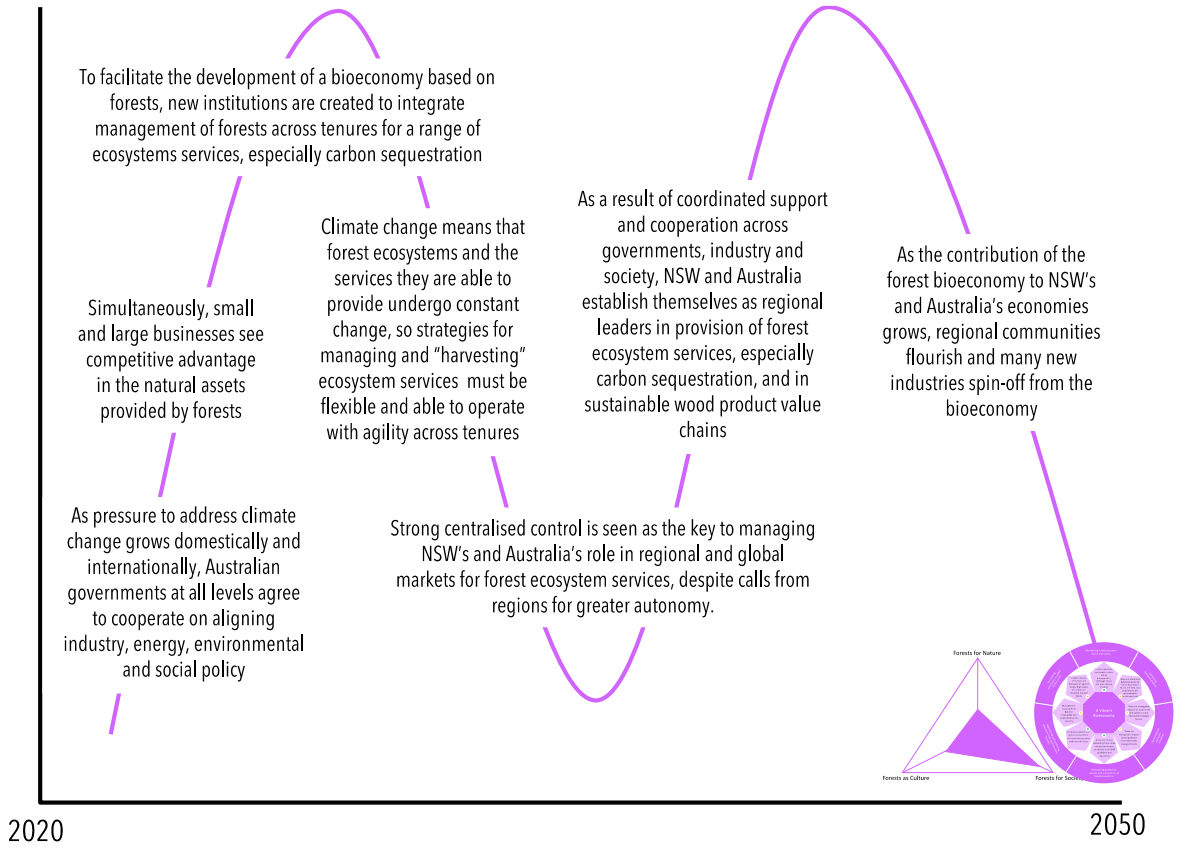


A Vibrant Bioeconomy

Brief summary

A Vibrant Bioeconomy envisages a future in which moderate climate change is a strong driver for policies for and investment in the bioeconomy; the sequestered and embedded carbon values of forests and forest products are paramount, but other ecosystem services are also valued by markets and the community. Both planted and native forests play key but variously differentiated roles in this context, with formal and informal conservation reserves managed for high carbon stocks as well as other values. Much of the bio-economic activity is regionally-based, drawing on new technologies. Regional communities are vibrant as a result.

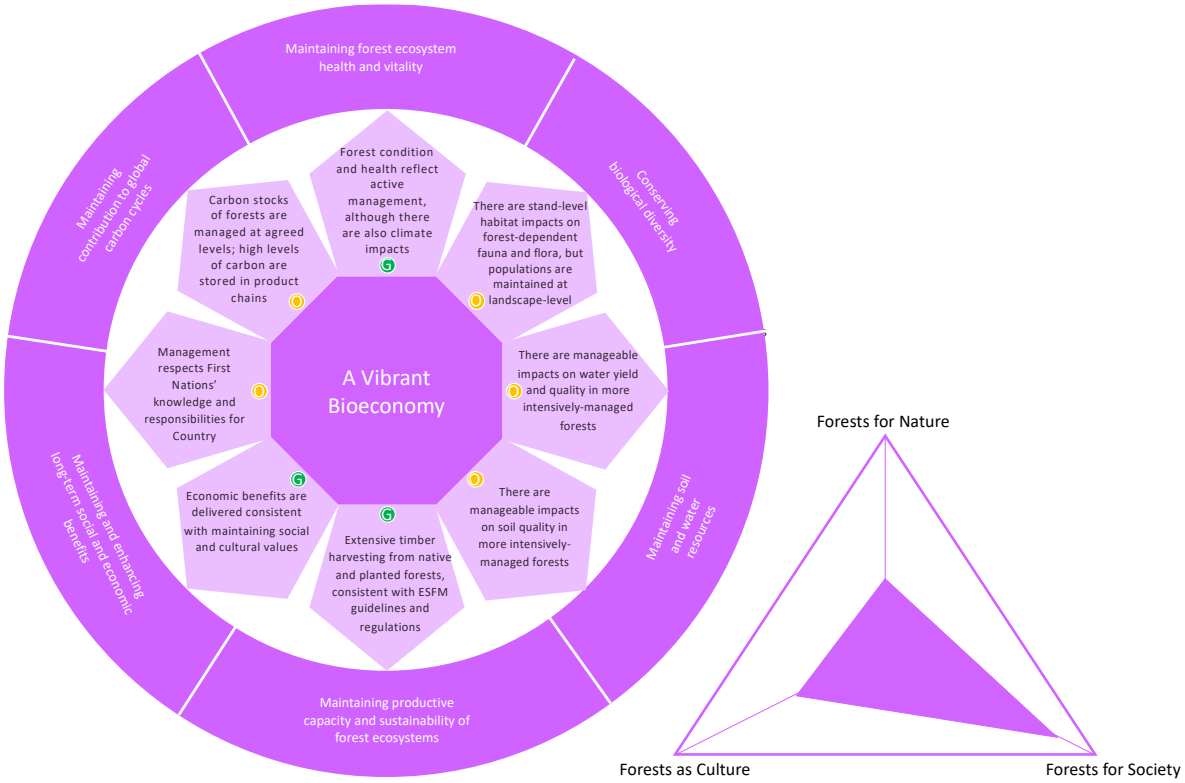
Possible timeline and uncertainties[15]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Regional communities are healthy and prosperous, reflecting the economic benefits delivered by forest carbon sequestration and strong bio-based industries.	Whilst the values of forests for nature and for culture are recognised, the values embodied in forests for society are strongly expressed in management of many forests, in large part because of the benefits forests and forest products deliver in climate change mitigation.	New technologies have been widely deployed: to enhance and monitor forest carbon sequestration, and in industries that use wood and other forest plant-based products in a wide range of carbon-positive value chains.	Economic mechanisms have been adjusted to price carbon, stimulating the bioeconomy associated with both natural and planted forests. The pricing of other ecosystem services means that market signals and regulations interact to shape forest management.	Climate change has tracked around moderate RCPs (average temperature increase kept to less than 3.5°C), providing strong incentives for climate action through development of a strong and resilient bioeconomy.	Governance remains largely centralised, but with strong support for the development of regional bioeconomies. Policy and regulatory settings favour carbon-neutral and carbon-positive land uses and industries.

[15] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

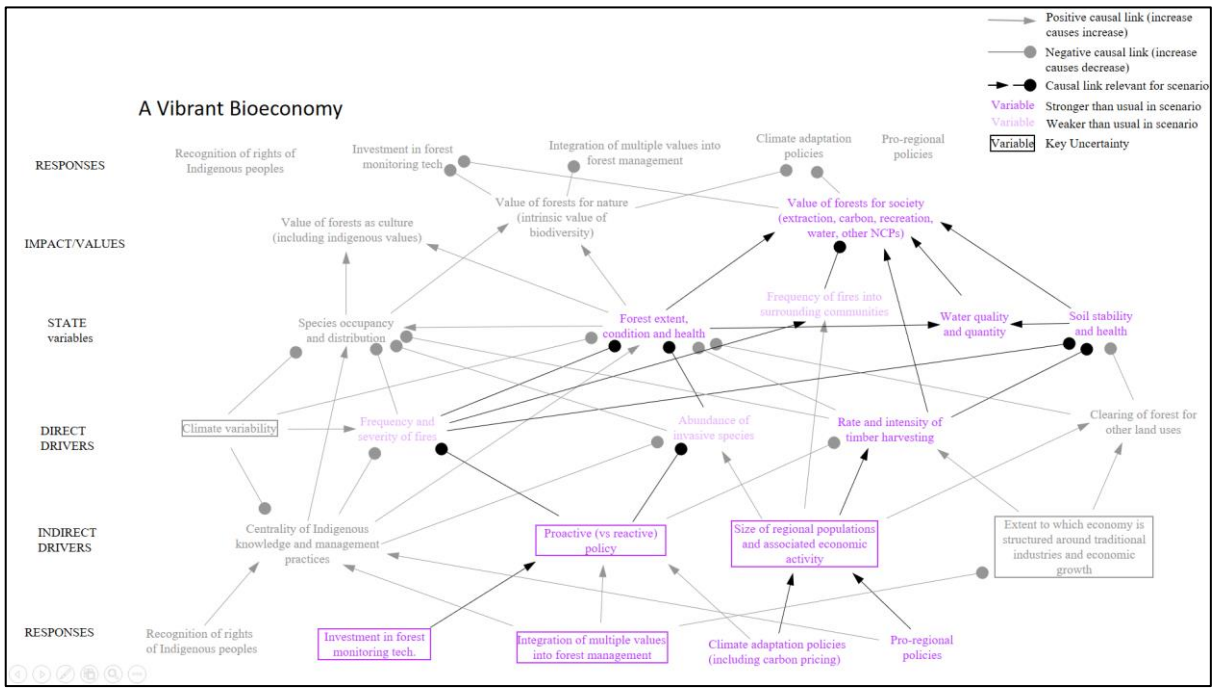


Issues to consider

Issues	Notes
Branching points/ early warning signs	• This scenario is initiated by governments, communities and businesses deciding that a bioeconomy based on forests is both an economic opportunity and a response to climate change. The scenario differs from *Beautifully Aligned* and *Restored NSW* in that (bio)economic values dominate. This scenario may be catalysed by wider movement towards a circular economy, or may arise independently of that because of the particular strengths of a more bio-based economy.\. • This scenario could branch into *Hostilities Continue* if the pursuit of economic values alienates people with other values. • As the bioeconomy develops, choices may have to be made between meeting growing demand for traditional wood/paper products versus the emerging opportunities for new products. The extent to which these tradeoffs will have to be made will depend on resource availability (contracted, stable, expanded) the relative economic returns from various bioeconomy components, environmental impacts and societal preferences.
Reinforcing/ balancing processes	• Clearly, this scenario is reinforced by economic success that benefits a wide range of people in NSW. • If the scenario rolls out too slowly, NSW and Australia might miss their opportunity to become market leaders. • As regional communities prosper their political power will grow and maintain this scenario if it benefits them.
Policy challenges/ opportunities	• As different ecosystem services will come from different places and different forest types, and the composition and state of these forests will be changing with the climate, a viable bioeconomy will need to be able to function seamlessly across tenures. This might require revision of tenures or the conditions attached to these., and pricing of ecosystem services from forests under all tenures. • There could be increased demand for new infrastructure and/or upgrading of existing infrastructure as these new industries arise. This, together with expansion of regional centres, will probably require enhanced cooperation and integration across government and with industry and communities. • While regional communities will likely be supportive of a bioeconomy, there will likely be competition between communities for industries and associated infrastructure, which could require high transaction costs for bureaucrats. There may also be challenges in identifying 'the right' technologies.

Issues	Notes
Challenges for monitoring and other management	• A wider range of more sophisticated measurement and monitoring would be required compared with traditional forest management. This will require close relationships between government and industry to identify what needs to be monitored for different ecosystem services, how and when this should be done and by whom. • The competitiveness of many industries will require sophisticated monitoring to establish quality of product, sustainability of management and a range of other metrics that might not be apparent until markets develop.
Implications of changes in the state of forests (flower diagrams)	• Outside conservation tenures, forests are actively managed to maximise the joint value of carbon sequestration and bio-based value chains, whether based on wood or ecosystem goods and services. • Forest harvesting in all forests follows ESFM principles and regulations. Intensive harvesting is restricted to planted forests; harvesting of native forests outside conservation tenures is primarily selective. • The values and ecological structure of native forests across various tenures reflect sustainable management consistent with the purposes of those tenures, and which deliver a range of ecosystem goods and services. Management of important catchments prioritises catchment values.

Systems (causal relationships) diagram

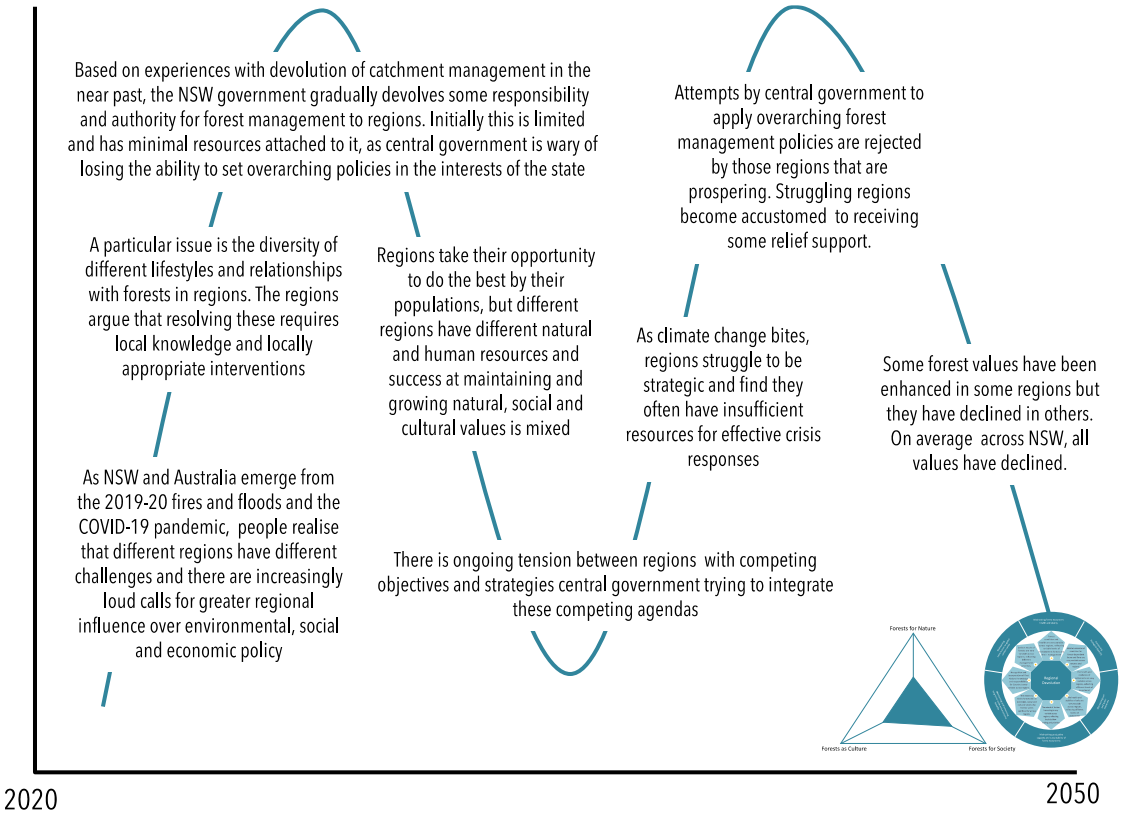


Regional Devolution

Brief summary

The *Regional Devolution* scenario imagines a future in which the authority over, and responsibility for, forests is devolved to regions, with modest levels of financial and institutional support from the state level. Here, devolution is a deliberate strategy for regional empowerment, in conjunction with regional-level responsibility. Consequently, priorities for forests and the quality of management and outcomes vary between regions. Some forest values are enhanced in some regions but have declined in others. The values diagram below envisages a futures in which all values are lower on average than in the *Beautifully Aligned* scenario, but higher or lower outcomes are possible for each axis. Many benefits of regional devolution can be imagined. A major difference between this scenario and *Beautifully Aligned* is that regions operate more independently of one another and of the state government than in the highly integrated *Beautifully Aligned*.

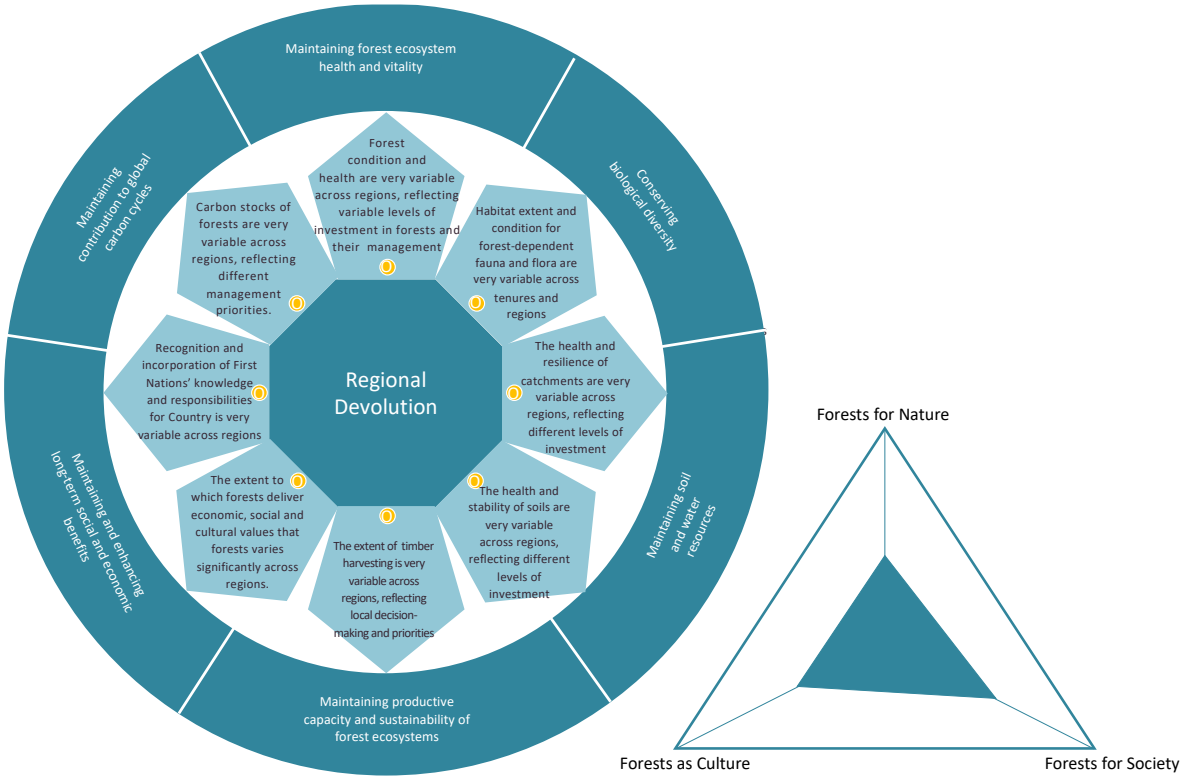
Possible timeline and uncertainties[16]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Regional population growth is variable, mirroring the diversity between regions in priorities accorded different forms of development.	Devolution allows the emergence and expression of different suites of values for different regions, representing different emphases and intersections of Forests for Culture, Nature and Society.	Technology adoption mirrors regional devolution, with some regions investing and relying on new technologies, and others not.	NSW economic policy is focused on minimising the role of the State but allows more discretion in the regions – for example, in the pricing of ecosystem services. Regions vary in in the extent to which they pursue innovative economic instruments.	Climate change follows mid-range RCPs and impacts are variable across the different climatic zones of NSW, particularly in terms of rainfall differentials.	Policy and governance for forests and environment are devolved to regional organisations, with limited funding support from the State Government

[16] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

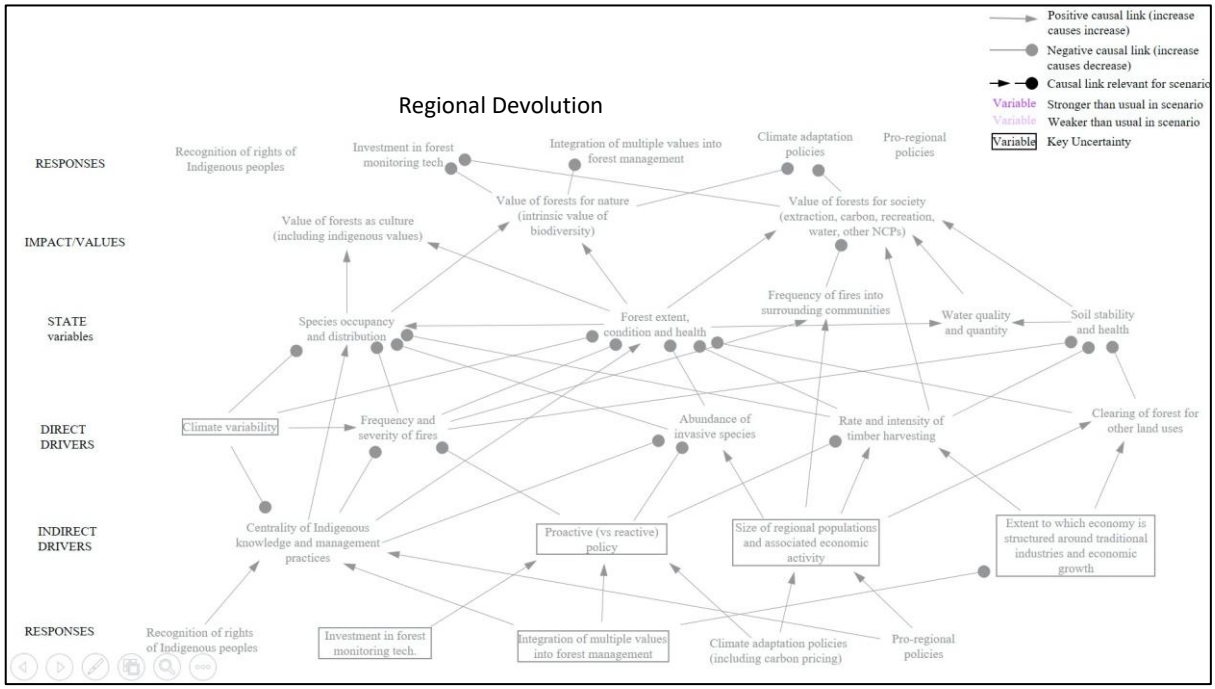


Issues to consider

Issues	Notes
Branching points/ early warning signs	• For this scenario to unfold, national and state governments will want evidence that individual communities are able to accept and apply authority and responsibility. • This scenario could be driven by a combination of growing demand and capacity for regionally-tailored policies and increasing variation in the nature and complexity of forest-related issues across the state (e.g., due to climate change), encouraging strategies to tap into local knowledge, experience and motivation. • This scenario could branch into several others: it could become *Neglect* if governments and communities lose interest or are overwhelmed; it could become like the *Vibrant Bioeconomy* if regions work together with this focus; it could revert to *Beautifully Aligned* if the NSW government decides after a decade that devolution is not working and gets serious about integrations across all levels of forest policy and management from state to regions. • Systems of building and maintaining capacity at regional level are critical for this scenario, as are systems for enabling sharing of learning across regions to reduce siloing of knowledge within regions.
Reinforcing/ balancing processes	• Once regions have received more authority and responsibility, they might be reluctant to give it up. Strong success in some regions could encourage others. If regions are too competitive the scenario might collapse, but if they help one another then this could become a very stable way forward for forest management in NSW.
Policy challenges/ opportunities	• For those working in the state government, managing the relationships with regions will be a key challenge. • Developing and apply overarching forest policies will require considerable transaction costs, much like negotiations under the Murray Darling Basin Plan. • There is likely to be a need to maintain staff in each region, which will be challenging if resources are moved from state government to regional bodies.
Challenges for monitoring and other management	• The regions will require assistance in establishing and maintaining monitoring programs, including access to sophisticated measurement technologies. • It could be a challenge developing a consistent approach to measurement and monitoring across the state and to obtaining, integrating and sharing data on a state-wide basis.

Issues	Notes
Implications of changes in the state of forests (flower diagrams)	• Forests in some regions are healthy and resilient, whereas those in others are less so. • The provision of forest ecosystem services varies between regions, with forests in poorer regions that have been more strongly impacted by climate change most adversely affected. • There is a greater divergence in forest condition and resilience across regions of NSW than at present.

Systems (causal relationships) diagram

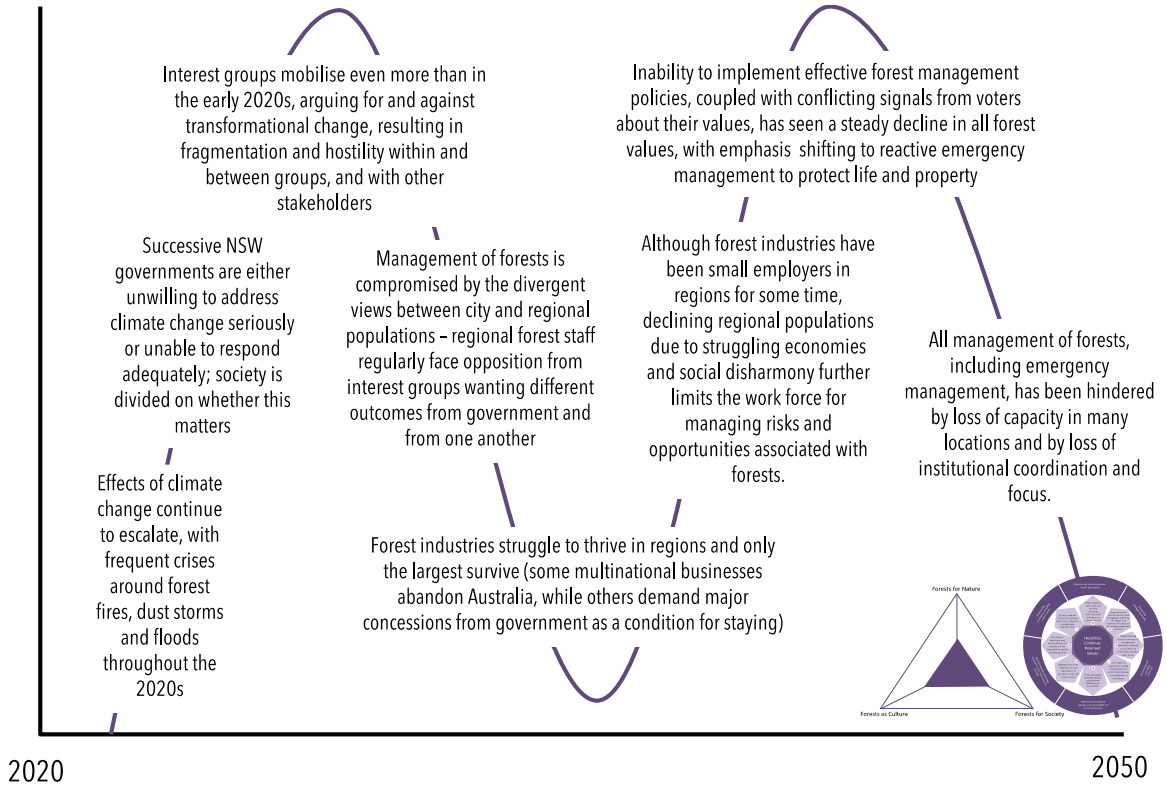


Hostilities Continue: Polarised Values

Brief summary

This scenario, in which hostilities continue between different actors, imagines a future in which society's values of forests are strongly divergent and contested, as they have been for periods of Australian history. Continuing contestation between advocates to manage forests for different values results in fragmented and divergent management across tenures, and in suboptimal outcomes for most values across landscapes. In various respects, this scenario is the alter ego of *Beautifully Aligned*.

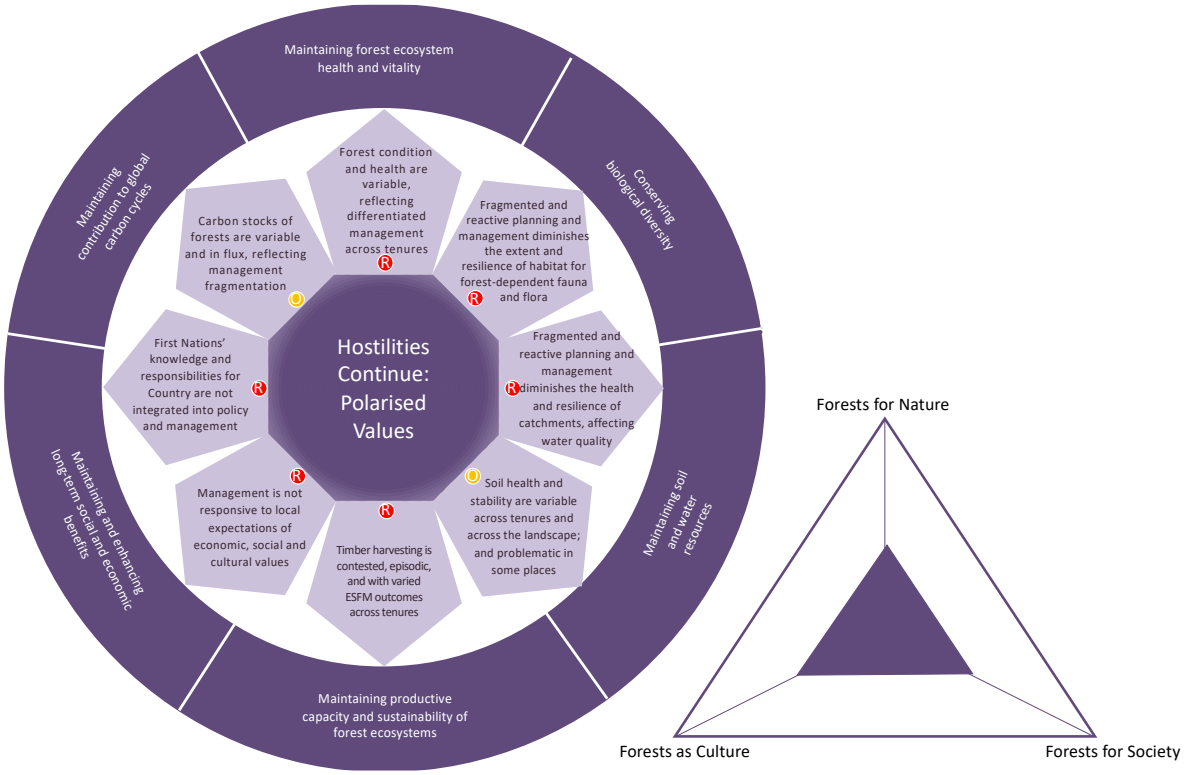
Possible timeline and uncertainties[17]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Values and culture diverge between city and country, and polarization of values occurs within regional communities between "locals" and "absentee landlords". Migration is focused on the capital and coastal cities, and there is little renewal of regional populations.	Stereotypic values associated with urban and rural populations are reinforced. Urban communities largely value forests for nature, and rural communities value forests for society. Cultural values, held strongly by First Nations Peoples and others, are marginalised. There are also unstable shifts in values as people view forests as having differing roles in responding to climate change.	Relevant technologies are used by forest managers, but there is little integration of their application across tenures.	The economy remains structured around conventional indicators and markets. Ecosystem services are not priced or explicitly accounted for in economic decisions,	Climate change is moderately severe, tracking mid-range RCPs. However, policy responses at national and state levels have not been coordinated, and so mitigation strategies are haphazard.	Governance is relatively centralised but politically dysfunctional. There is little effective coordination between ministries.

[17] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

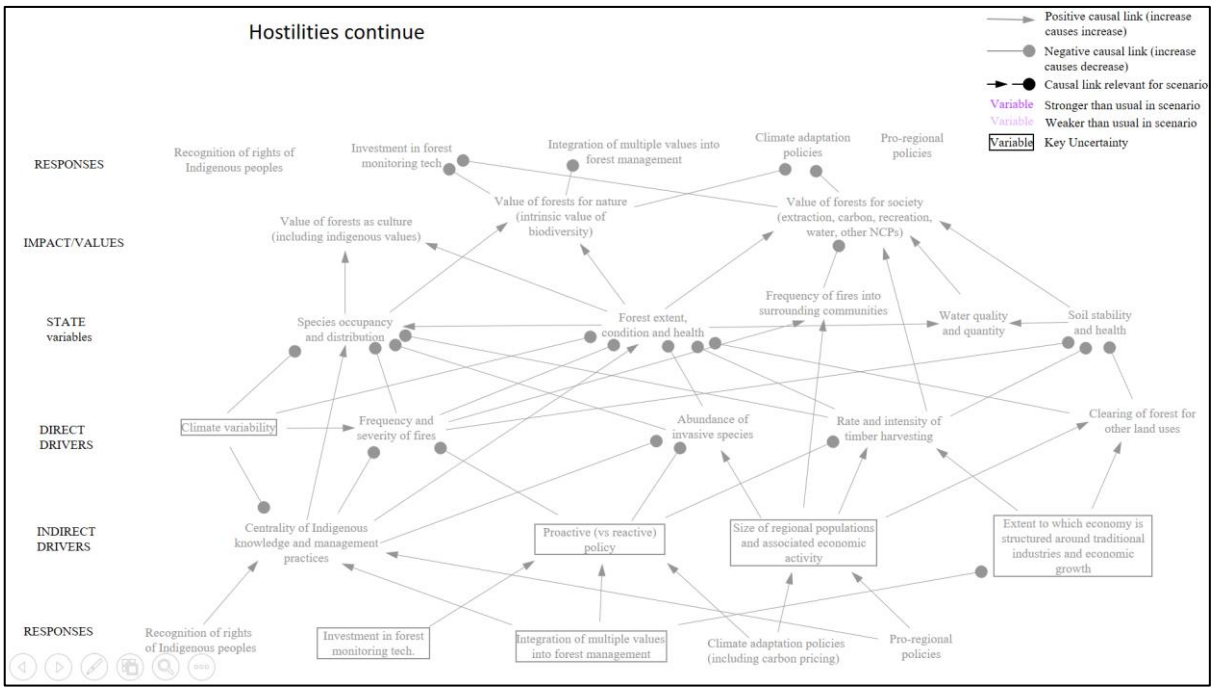


Issues to consider

Issues	Notes
Branching points/ early warning signs	• This scenario sees a similar outcome to *Neglect*, but in this case governments have tried, with limited success, to address issues as they arise (although addressing climate change has either been unpalatable politically or slow because of the later action). • There are already early warning signs of this scenario so continuation of divisions within society could see the scenario locked in. • On the other hand, resolution of these could see the scenario branch into either a more optimistic scenario (e.g., if serious action is taken to address climate change and managed multiple values proactively (*Beautifully Aligned*)) or another pessimistic scenario (e.g., if society loses interest in forests (*Neglect*)) .
Reinforcing/ balancing processes	• This trajectory could be reinforced if unrest in society is not addressed early, encouraging those who see advantage in seeking to foster hostilities. • One key reinforcing process would be ongoing inability of politicians to achieve results because of political deadlocks. • Growing hostilities could be dampened if society becomes weary of conflict and supports those championing consensus. • While ignorance of or indifference to the values of forests could be exploited to escalate hostilities, a rise in awareness of forest values (e.g., through concerted education/ communication campaigns by government, industries or civil society groups) could have the opposite effect.
Policy challenges/ opportunities	• An obvious challenge is the difficulty of developing and implementing forest policies in this highly contested environment. • Forest managers would recognize the need to prepare for emergency situations (which would be arising more frequently as climate change bites) but would be constrained by fluctuating political imperatives and limited resourcing. • It would be particularly important for independent bodies to play the role of honest and trusted information brokers and the risks of losing this status should be taken very seriously.

Issues	Notes
Challenges for monitoring and other management	• It could be very difficult to get political support and resources for sophisticated measurement and monitoring for managing multiple forest values. • The focus might be primarily on early detecting of emerging crises, especially around fires, air quality and floods, although there could also be disruptions to this monitoring by radical interest groups. • Effective sharing and use of information could be compromised if government departments and other institutions become aligned, intentionally or unintentionally, with different interest groups.
Implications of changes in the state of forests (flower diagrams)	• There is wide variation in forest health and condition within and across tenures, reflecting community and political disagreements, and differences in management and lack of coordination. Forest values and services reflect fragmented, uncoordinated, management; and generally decline across the landscape. • Ecosystem, cultural and social values all decline across much of the forested landscape.

Systems (causal relationships) diagram

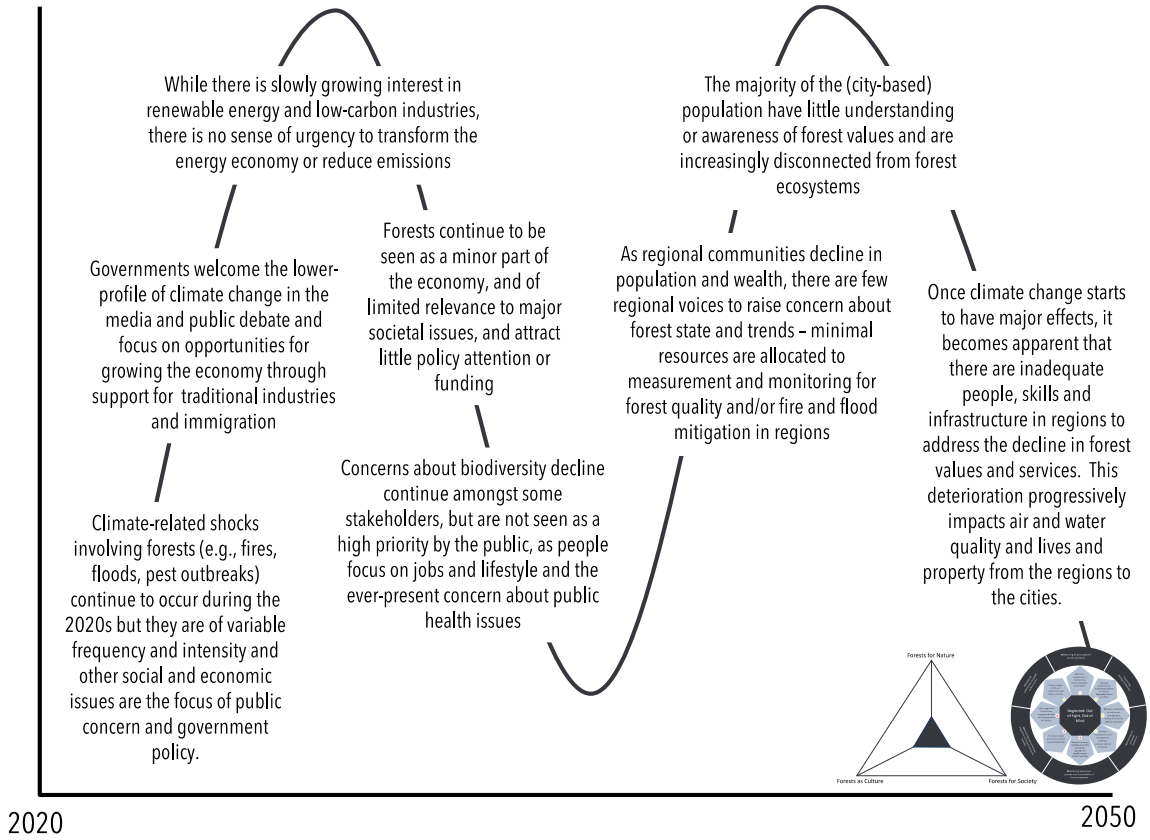


Neglected: Out of Sight, Out of Mind

Brief summary

Under this *Neglected* scenario, climate change tracks towards low to moderate trajectories, and there is little sense of urgency to protect or manage forests for multiple values. Society's focus is elsewhere, predominantly on the population centres in metropolitan and populated coastal regions, and in economic activity unrelated to forests. Awareness of and concern for forest issues is low. As a result, there is little political interest or public investment in forests, or support for private forest manager or Traditional Owners to support management of their forests. Resources for fire management are focused on response; populations of pest plants and animals increase, and the health of most forest ecosystems declines.

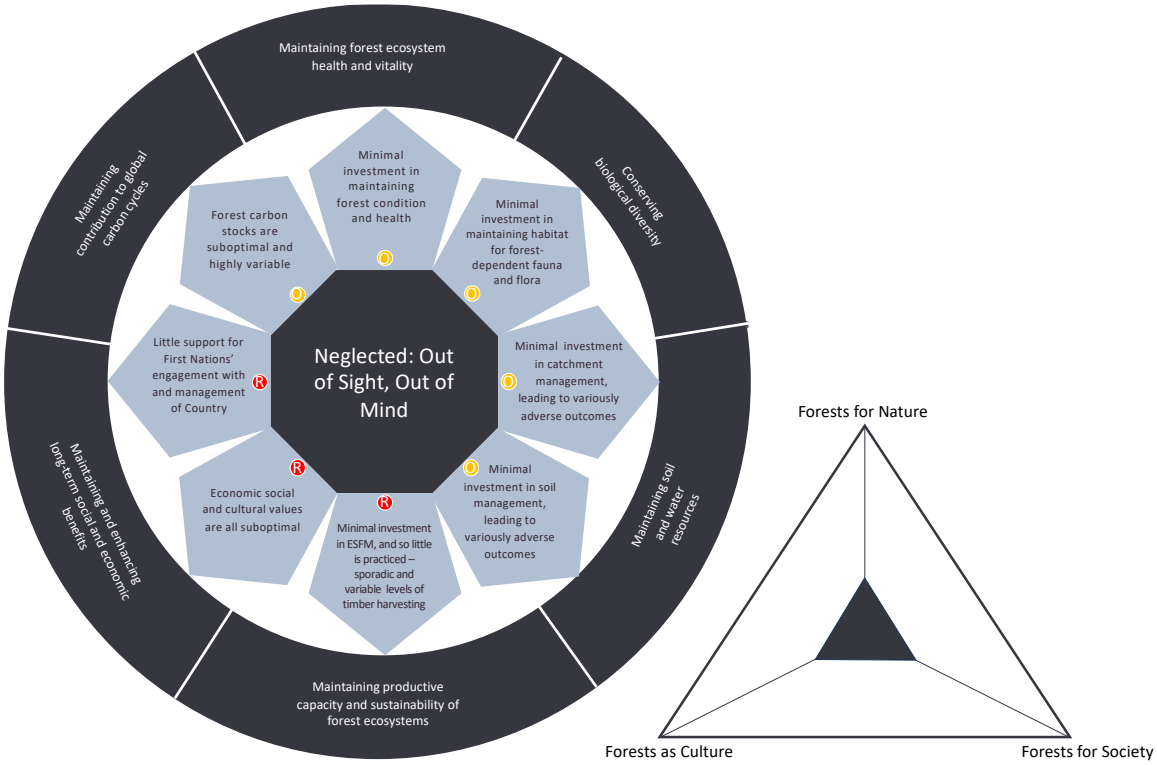
Possible timeline and uncertainties[18]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
Regional populations decline because society in general does not value living outside major cities. Rural infrastructure has declined. Forests and other ecosystems are left to take care of themselves with minimal investment in regional agency staff or in supporting First Nations management.	Society is focused even more strongly on economic progress and monetary wealth. Society is not focused on values from nature and the awareness of multiple values that was rising in the 2010s has declined.	Technological development focuses primarily on manufacturing and mining. Technologies for monitoring forests ecosystems are seen as low priority as "forests can take care of themselves".	The focus of economic policy is services and mining. More broadly-based regional development is a low priority.	Climate change tracks towards the lower temperature increases envisaged by the IPCC's RCPs. More severe impacts are anticipated in the 2030's, leading to complacency in the 2020s.	Government and other institutions are highly centralized, focused on supporting the growth of Australian mega-cities. Regional development and co-design of policy with communities are seen as unnecessary diversions from core priorities for policy and administration.

[18] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

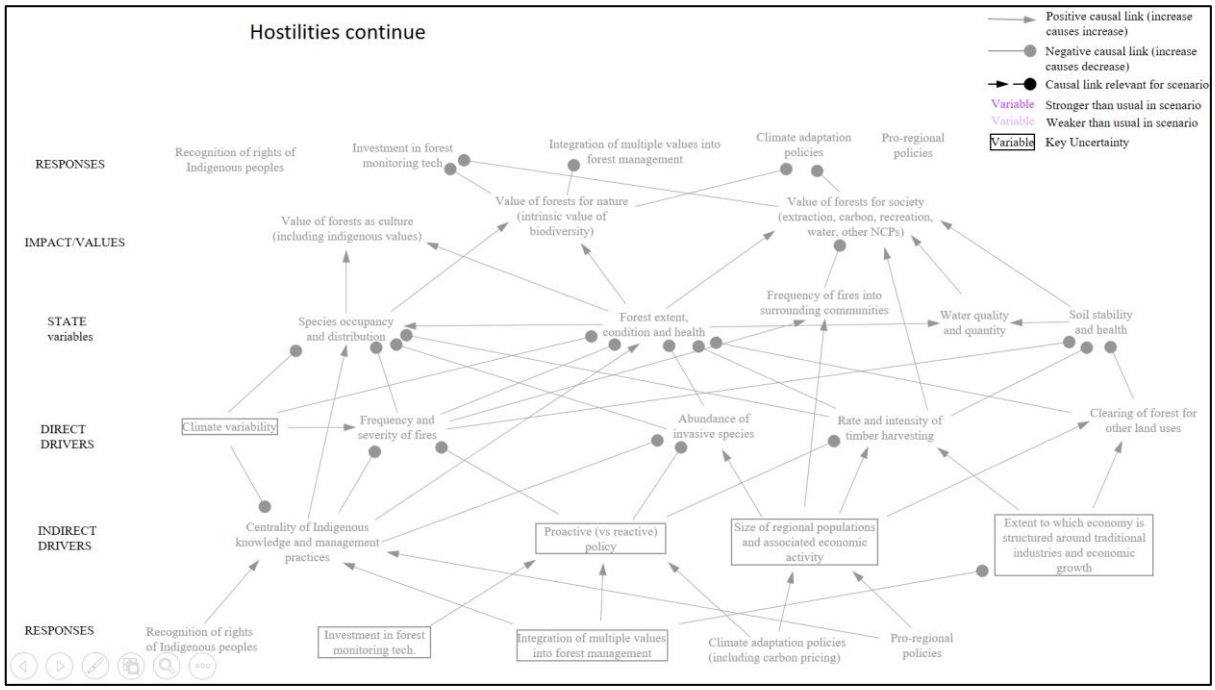


Issues to consider

Issues	Notes
Branching points/ early warning signs	• In 2022 there is rising concern about climate change, but most of society sees forest management as a minor issue except when fire or floods threaten communities, homes or businesses. This scenario envisions a future in which concern about climate change plateaus or decreases and forests are almost totally ignored because other issues demand the public's and government's attention. For example, it might be that climate change tracks a mild to moderate trajectory while NSW faces a series of economic challenges, and public health threats as anticipated by many experts in 2022. • People may focus on responding to extreme weather events as their primary focus for climate change response, combined with reducing GHG, with forests as the 'piggy in the middle' that get little attention as we focus on solar/wind energy, and on disaster response. Here, there is much less emphasis on the 'in-between' of sustainable forest management or on maintaining and promoting ecological, social, cultural values that are also being lost progressively over time, but almost invisibly at any point in time (viz., the 'frog in the pot on the stove' phenomenon).
Reinforcing/ balancing processes	• This scenario would be reinforced if climate change does not bite seriously until the 2030s or 2040s and if peoples economic security grows. • A decline in regional communities would also be a reinforcing process, as there would be few champions for regional issues.
Policy challenges/ opportunities	• This could be a very challenging scenario as declining regional populations and economies would make it hard to maintain high quality regional staff and funding for managing regional forests would be minimal. • There would inevitably be crises associated with fires and floods, even if climate change proceeds along lower RCPs, and this could require panic responses with poorly equipped workforces. • It is probable in this scenario that responsibility for forest policy and management would become an even more minor part of some larger department with a primary focus elsewhere (e.g., manufacturing and or extractive industries).

Issues	Notes
Challenges for monitoring and other management	• It would be very difficult to maintain staff to run a high-quality measurement and monitoring program and investment in the required technology would be a low priority for government. • Nevertheless, some measurement and monitoring would be needed to minimise disasters, especially around major urban centres. • Perhaps measurement and monitoring would be focused around major centres only? • Perhaps there would be a strong bias towards monitoring for protection of lives and property rather than managing for multiple values?
Implications of changes in the state of forests (flower diagrams)	• Forest health, values and services decline locally and across the forested landscape; pest plants and animals disturb and displace native ecosystems, and novel ecosystems emerge as a mix of native and exotic species. • Ecosystem and cultural services delivered by forests decline due to lack of management. • Populations of many threatened and iconic species decline, displaced by more aggressive native and exotic competitors.

Systems (causal relationships) diagram

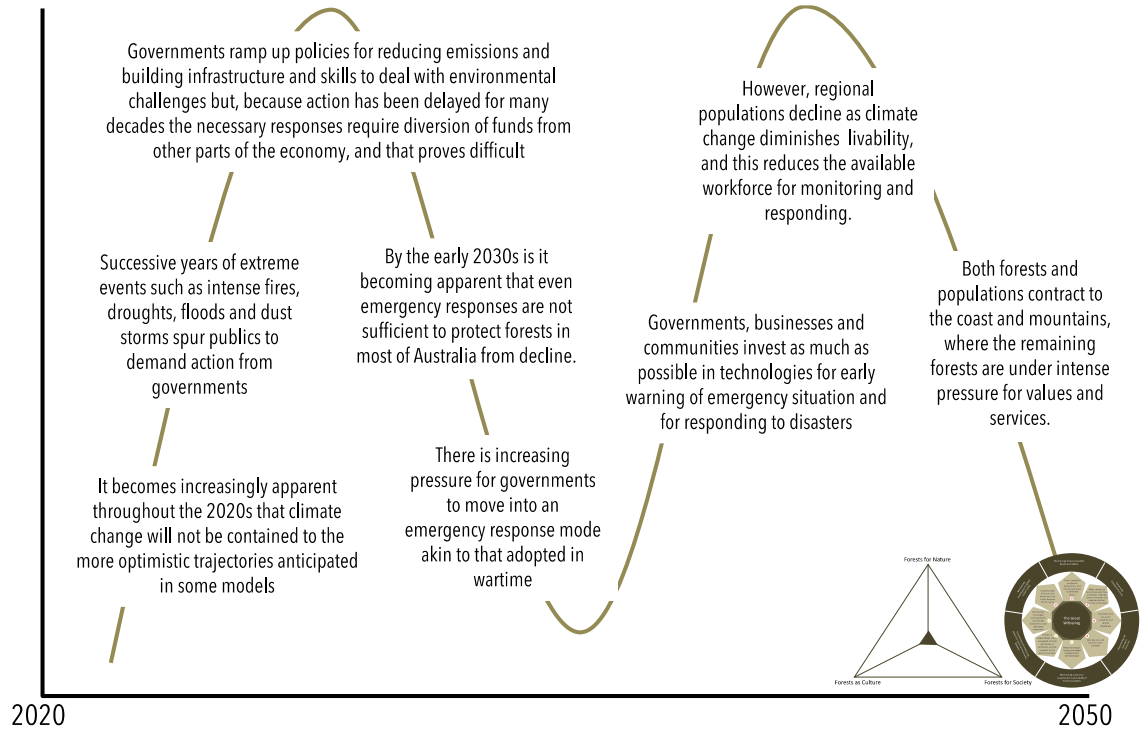


The Great Weathering

Brief summary

The Great Weathering alludes to Michael Christie's novel Greenwood, in which the world suffers a great withering of soils, vegetation and other life due to direct effects of climate change and indirect effects such as infestations of pests and diseases. In this scenario, extreme dry spells are interspersed with exceptionally high rainfall leading to drought, dust storms, floods, and increasing risks to human health and wellbeing. The impacts are so severe that no actions by governments, industries or communities can prevent major contractions and declines in most forest ecosystems. Whole ecosystems have been replaced by different assemblages of species that have different climatic requirements and different functions. There is widespread loss of many wetter forests and their values and services. As a result, both First Nations and local knowledge associated with these forest types are progressively lost.

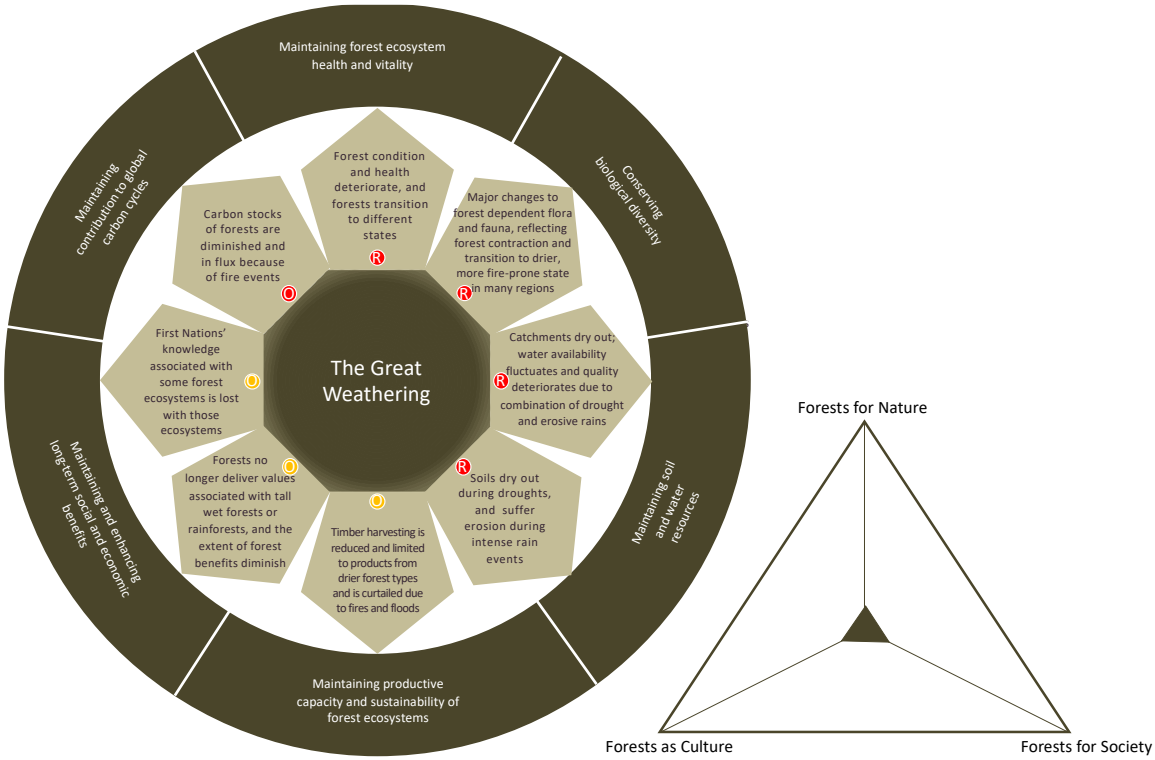
Possible timeline and uncertainties[19]



Demography	Values	Technology	Economy	Environment/Climate	Governance/Politics/ Law
In this scenario climate change has been severe and addressing it in respect to forests has not been a high priority for society. Therefore, it is likely that regional populations have had to adapt in ways that result in smaller regional economies not tightly linked to forests and forest-based industries, although some connections continue.	There has been some improvement in understanding of multiple forest values, as many of these values (notably those associated with wetter forests) are lost due to drying out of forests, in some regions, associated with climate change. There has been a degree of adoption of First Nations People's knowledge, but that which is relevant is limited to drier forests and their management.	We might imagine that there has been progress in developing new technologies to cope with a flush of timber availability from drought-killed forests, and the effects of climate drying on product qualities. The development of better measurement and monitoring technologies to allow targeted interventions to deal with effects of drying on multiple social and economic values. has not been able to change the trajectory of the impacts of the "Great Withering" on forests.	Whilst there has been some movement towards intervention to recognize and manage broader social and cultural values in governments' economic policies, forests are delivering fewer ecosystem services as a result of their contraction and altered ecology. More generally, the economy has struggled due to the actual and opportunity costs associated with extreme change in climate.	This scenario is driven by strong climate change resulting in significant heat stress and periods of extreme drying, interspersed with extreme and unseasonal rain events. This has has resulted in increased frequency and severity of bushfires, droughts, floods, dust-storms and associated mental and physical health implications across society.	In this scenario, the extreme change in climate has been exacerbated by society not being prepared adequately. Established institutions and institutional arrangements are not well-suited to the new challenges, which require agile and timely preparations and responses. Policy and management responses are piecemeal and focus on addressing local crises and disasters that frequently escalate to catastrophes.

[19] Note that the shading in each column indicates where the scenario sits within the spectrum of uncertainties

ESFM outcomes and values triangle

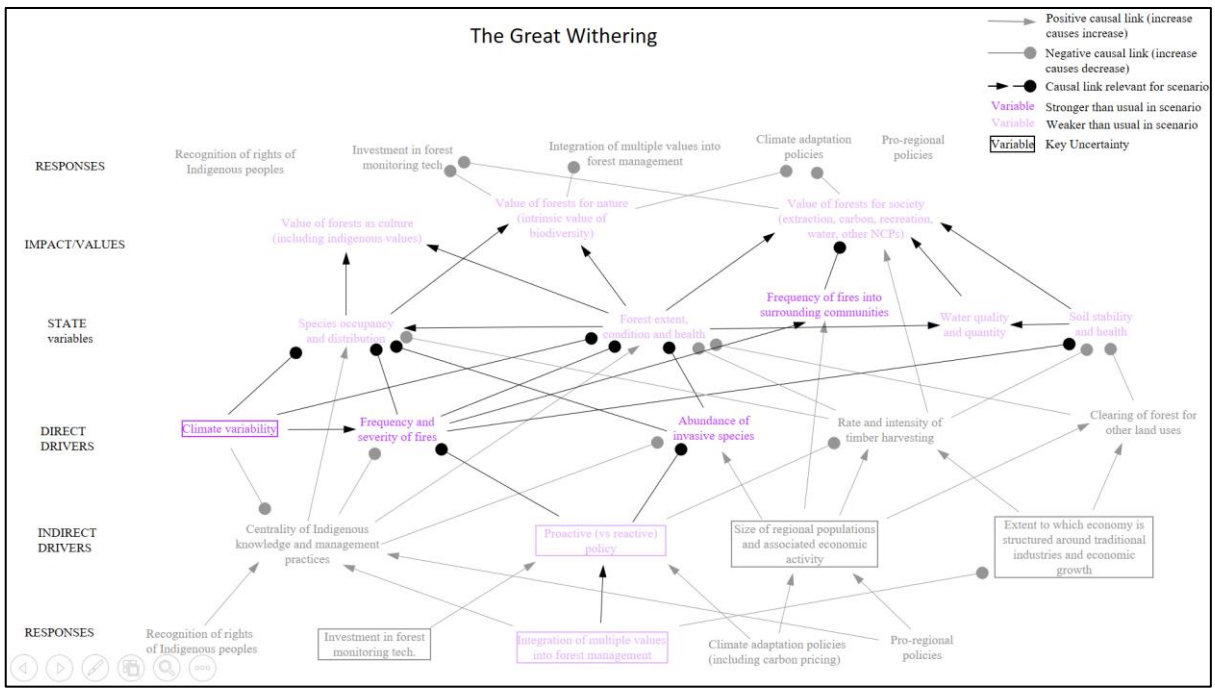


Issues to consider

Issues	Notes
Branching points/ early warning signs	• This is a truly bad scenario, but it is one in which all parts of society eventually (although far too late) get serious about addressing climate change and the management of forests that have been long neglected. • Current climate, forest-state, political and social indicators are consistent with this scenario possibly emerging, although they don't confirm it or even make it strongly likely. • Indicators of climate trajectories and actions by governments, businesses and communities at all scales from global to local in the next 5-10 years will give early warning of whether or not NSW, Australia and the world could be on this trajectory.
Reinforcing/ balancing processes	• This scenario is driven primarily by strong climate change and its effects reinforce themselves. • If this scenario unfolds, it will have been reinforced by inadequate preparation across society and it could be further reinforced by the need to divert financial and other resources from other parts of the economy to address climate-driven disasters. • Declining livability of regions (climatically and economically) could further reinforce the scenario by reducing available workforce for regional action. • Thinking optimistically, the cooperative action generated by this scenario could see some alleviation of the climatic effects. • At an extreme level, this scenario could see a degree of collapse in some aspects of Australian society but a reorganisation into systems that cope better with a more variable and harsher climate
Policy challenges/ opportunities	• In some respects, the policy challenges are obvious – severe climate effects; the need to deal with frequent disasters; high expectations from the public but an inability to respond adequately because of limited resources and inadequate or declining infrastructure. • Optimistically, if the scenario unfolds more slowly then some of these limitations could be addressed in the next decade and this could allow more effective responses when needed. • In resilience theory, it is recognised that all systems eventually reach unstable complexity and "log jams" and they require renewal, either by frequent disruption or by partial or total collapse and reorganisation (i.e. transformation). To a large extent, governments working with industries could prepare the ground for an effective transformation of NSW/ Australia in the face of this scenario.

Issues	Notes
Challenges for monitoring and other management	• In this scenario, we have envisaged major investment in technologies for measurement and monitoring to not only anticipate and deal with disasters but also manage forest values as well as possible. • A major challenge could be being ready to act quickly when the opportunity/ demand for such technologies arises. • Another challenge is finding a workforce with skills to implement this regime and locating them where they can maintain the systems adequately.
Implications of changes in the state of forests (flower diagrams)	• The extent, condition and health of forests are greatly diminished; some drought- and fire-adapted novel ecosystems arise • Most forest-dependent species decline; many are heading to extinction. • Forest values and services are catastrophically reduced, and those that remain are under great human and environmental pressure.

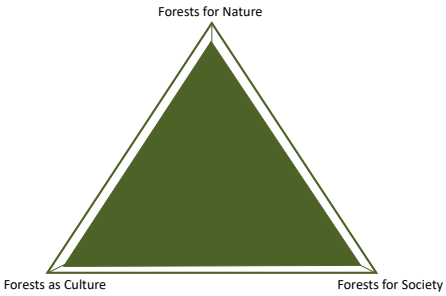
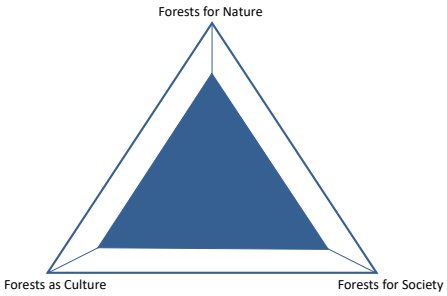
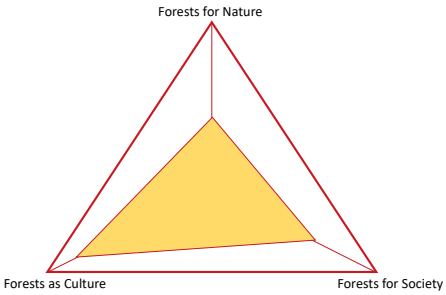
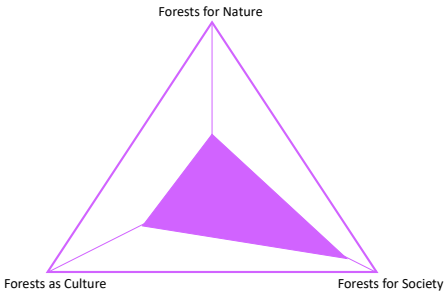
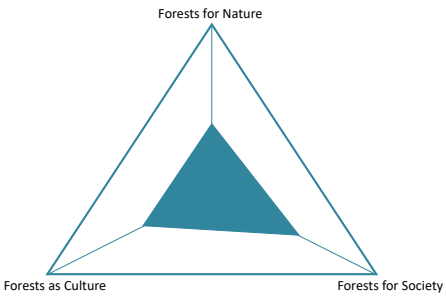
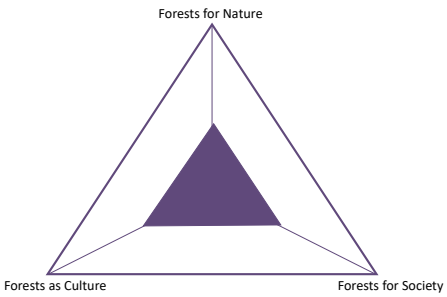
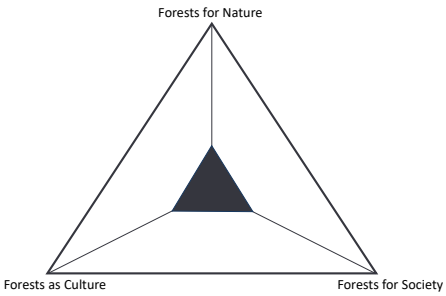
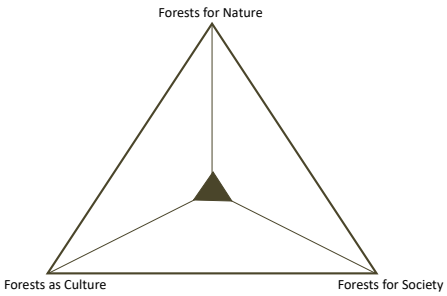
Systems (causal relationships) diagram



Values outcomes – comparisons across scenarios

Table 8 compares values triangles outcomes across the scenarios

Table 8: Value triangles compared across scenarios

Scenario	Value triangle	Scenario	Value triangle
Restored NSW		Beautifully Aligned	
Respecting Country and People		A Vibrant Bioeconomy	
Regional Devolution		Hostilities Continue	
Neglected		The Great Weathering	

Implications and actions - the next steps

Once a broader range of stakeholders have had the chance to immerse themselves in these scenarios, and the scenarios have been refined as a result, the next step is to consider implications for decision-making in the short, medium and longer terms. Below, we outline two potential approaches to this sort of analysis.

P-A-R-K Analysis

P-A-R-K analysis is similar to S-W-O-T analysis (strength, weaknesses, opportunities, threats). It prompts us to consider how we might operate in different futures. Firstly, it asks what things we currently do (or what resources we currently have access to) and we might want to **P**rotect because they are likely to still be helpful in a given alternative future. Considering alternative futures challenges us to ask *why* and *how* these aspects of the present are useful and, therefore, *why* they might also be useful in the future.
P-**A**-**R**-K analysis then asks us to consider what new capabilities and/or resources we might need to **A**cquire to prepare us for a different future, or what things we might want to stop doing or **R**emove because they won't be appropriate in the alternative future. Finally, P-A-R-**K** analysis prompts us to ask what traps to avoid (**K**eep out) – what things we might be tempted to adopt but which might be unhelpful in some futures.

Table 9 presents an example from one of the workshops in this Project. It is compiled from the rough notes of the workshop group considering the more optimistic scenarios.

Table 9. Example of P-A-R-K analysis

Protect (skills, resources, processes etc. that could still be beneficial in this scenario)	Government and institutional capability, momentum at the moment.
Acquire (new skills, resources, processes etc. that could be beneficial in this scenario)	Whole of government stake in the outcome. Bringing in the private sector – institutional capital. Richer understanding of the issues. Integrated approach across government. Common language. Hackathons. Needs a national approach and international approach. Linkages with other states. National consistency. Opportunity to lead that debate nationally. Natural capital accounting: making it a more explicit goal. Being able to measure and account – private sector – and also for governments. Property rights – provides a legal framework around it. Cross subsidy from things we don't value.
Remove (current skills, resources, processes etc. that might be unnecessary or a disbenefit in this scenario)	Data and technology barrier – single view of what is happening. Single point of truth. Underpinning data isn't shared, should be publicly available. Proprietary systems. Transparent. Oversimplification. Institutional and people barriers.
Keep out (things to avoid if you seem to be heading for this future)	Keep out – Pandemics, global conflict. Reactive approaches to emergencies. Minimise distractions. Extremes of views. Build the reasonable middle ground.

P-A-R-K analysis could be used in a range of ways in the context of this project, including:

- to help identify critical interventions to achieve a given scenario as an outcome;
- to identify actions that could contribute to a particular scenario (desirable or otherwise) emerging; and/or
- to understand what stakeholders might need to do to under a given scenario to achieve a preferred future vision.

Three-horizons planning

The three-horizons thinking approach was introduced early in this project as an example of the ultimate application of the insights from the scenarios. We did not have the opportunity to take this project to this stage, but we offer the following example (Figure 9) as an illustration of how the scenarios commenced in this project could be applied in later phases.

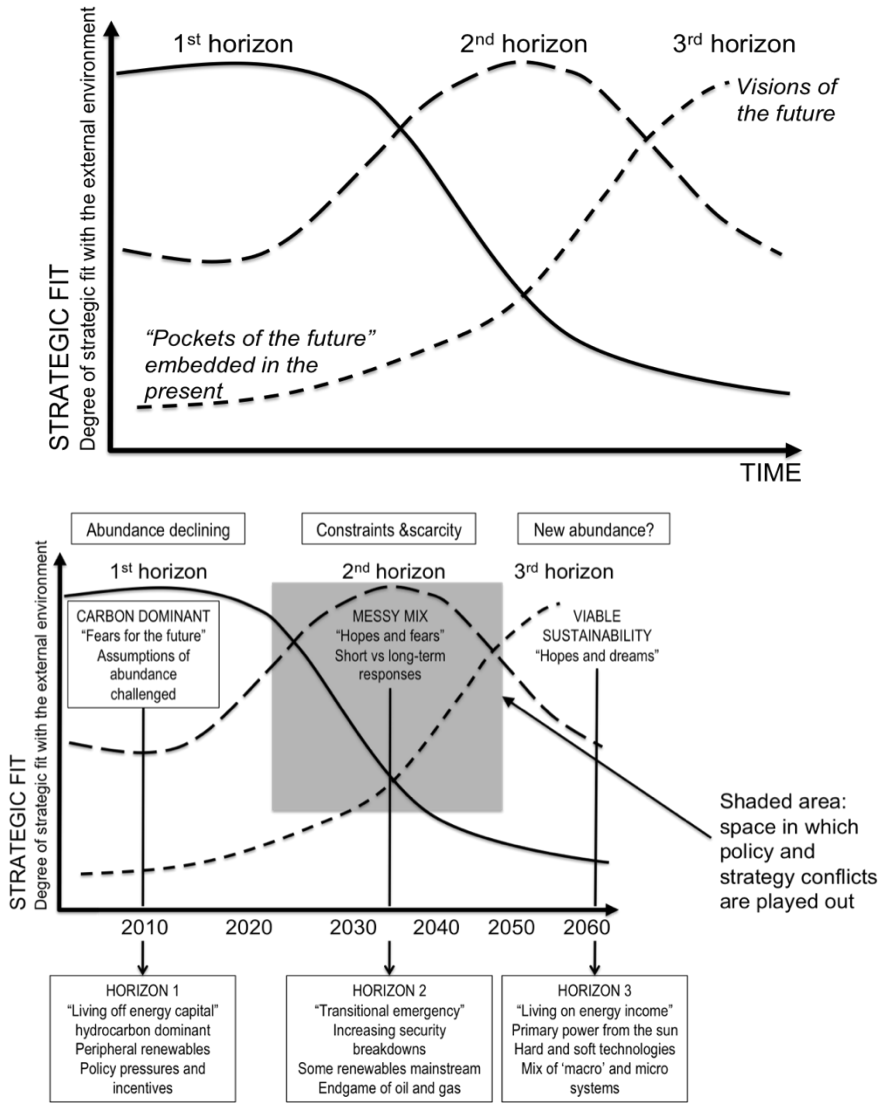


Figure 9: In the three-horizons approach (top figure), planning for the immediate future (Horizon 1) concerns aspects of current policy and practice, some of which might be continued and some of which might be phased out. Horizon 3 is the futures that want or need to prepare for. These might involve small efforts now that may or may not be ramped up once we see what future is emerging. Horizon 2 is the (sometimes messy) transition period, during which incremental adjustments might be made to provide the link between the past, present and future. The bottom figure gives an example for energy (from Curry & Hodgson,[20] but see also Pereira et al.[21] for a discussion of other applications of this approach)

20 Curry A, Hodgson A. 2008. Seeing in multiple horizons: connecting futures to strategy‖. Journal of Futures Studies. 13(1):1–20
21 Pereira LM, Davies KK, Belder E, Ferrier S, Karlsson-Vinkhuyzen S, et al. 2020. Developing multiscale and integrative nature–people scenarios using the Nature Futures Framework. People Nat. 2(4):1172–95

Discussion

Refining the scenarios

The scenarios presented above intentionally have minimal details. Many scenarios in the literature have more detail (e.g., see the Millennium Assessment scenarios or the IPCC *Shared Socio-economic Pathways* scenarios); these are much more mature scenarios that have been used as communication devices. As we note in the Introduction, developing the NSW Forest Futures scenarios to this more mature stage will require further engagement with a wider range of experts and stakeholders, across the topics considered in the morphological table.

One means of doing this could be to establish a working group across relevant parts of NSW Government, industry and communities to consider how the current scenarios could be used as a catalyst for a process that meets the principles of foresight (see Annex 2), including (most importantly):

- participation of the full range of stakeholders;
- support from all levels of authority; and
- embedding futures-thinking as part of the culture of all relevant organisations.

Some practical next steps in such a process could include:

- Consider refining the scenarios with broader engagement, including stakeholders outside government;
- Continue to challenge the plausibility of the scenarios by interviewing experts and incorporating new knowledge, and through an ongoing horizon scanning process;[22]
- Encourage those engaged with forest policy and/ or management processes to regularly revisit the scenarios;
- Encourage dialogue about the scenarios to be a regular topic in informal (e.g. morning teas, lunches) and formal planning meetings. Embedding futures-thinking in an organisation's culture means that staff at all levels are watching for signs of change, which in turn minimises the risks of responses based on rushed strategic thinking should a crisis threaten;
- Focus attention on the P-A-R-K tables as a mechanism for identifying future needs and preparations for them;
- Build on the systems diagrams as a way to link the narrative scenarios with quantitative models (e.g., in the Millennium Assessment, quantitative models linking population, food preferences, area and type of agriculture, water use and climate were run to explore environmental outcomes; these models were parameterised from assumptions drawn from the narrative scenarios). This might most easily be done at a regional scale;
- Consider what early warning signs might be included in monitoring programs (see below).

[22] While this might require a significant effort initially, it can be maintained through regular scanning of media and academic publications. Many organisations have found that this task is an ideal way to engage staff who might not otherwise have had the opportunity to contribute to organisational futures-thinking and a way to encourage greater interaction among staff across the organisation.

More about early warning signs

It is helpful to consider early warning signs: what they, are and how they can be used.

In the context of the NSW Future Forest scenarios, early warning signs could include social and economic indicators, as well as the biophysical indicators traditionally included in measurement and monitoring programs. Ideas about early warning signs could be developed as a wider range of stakeholders think about how the different futures might emerge. In particular, stakeholders should be encouraged to think about:

- what sorts of current **barriers to change** might fade away; and
- what **missing enablers of change** might emerge.

Shifting coalitions of interest amongst key stakeholders might be one early warning sign. For example, this might include key individuals or groups of people starting to work together when they have not done so in the past (e.g. the emergence of Landcare at the national level in the late 1980s). Such coalitions might also emerge as a result of stakeholders drawing on technologies combined in new ways that make it possible to achieve ends not previously attainable (e.g. fire researchers and communications businesses employing new remote sensing and surveillance technologies for wildfire detection and suppression).

Some early warning signs have already been identified in the tables accompanying each scenario. Others can be extracted from the flower diagrams. For example, in the table following *Respecting Country and People,* it is noted that, for this scenario to emerge, there would need to be a stronger movement towards recognising rights to Indigenous self-determination among the public and governments. Scanning of opinion polls and/or careful analysis of media could be included in monitoring to give early warning of such a scenario emerging.

In each scenario there is discussion about the availability and role of measurement and information-handling technologies. Early warning signs could include: the amount and type of investment in technologies; who is investing in such technologies, and where; and the policy and governance arrangements around gathering and dissemination of information relating to forests.

In the flower diagrams for each scenario there are suggestions about how the physical environments of forests might change. Thinking about the processes by which these physical changes might occur could yield ideas about lead indicators that anticipate other changes, and these could be included in monitoring.

A major advantage of foresight scenarios is that they support thinking about a wider range of possible early warning signs (including social, technological, economic, environmental, political and legal indicators) than is usually considered in monitoring programs. Fink *et al*. (2004)[23] provide a detailed discussion about how scenarios support strategic early warning processes in business environments.

[23] Fink A, Siebe A, and Kuhle J (2004) How scenarios support strategic early warning processes. *Foresight* 6(3): 173–85

Reflections on the process

The process followed in this Project was constrained by time and resources, in the breadth of its engagement, and by COVID restrictions limiting meetings to virtual mode. The process benefited from a group of participants who engaged very constructively and insightfully throughout; we thank them, and NRC staff, sincerely. Although we were unable to conduct a detailed horizon scanning process, participants provided insights on their understanding of emerging trends that could influence the future of forest policy and management in NSW. The usual caveats of errors and interpretation in this report being the Facilitation Team's apply.

The process appears to have helped participants think "outside the box" and gain insights about both future risks and opportunities. Participants consistently offered feedback about details that are not currently explicit in the scenarios (e.g., climate changes impacts). We took the view that, for this project, it was better to start with less detail in the scenarios and allow those using them to explore for themselves how these details might play out in different scenarios. We note that adding too much detail at the start is likely to constrain people's thinking and give the impression that the scenarios are more forecasts of the likely futures than serving the intended exploratory purpose.

In addition, we have downplayed some key political and power dynamics processes that should be explored as those involved in forest policy and management engage with these scenarios. For example, governments might be expected to be cautious about devolution of responsibility to lower levels of governance and could limit resources and other support as a result, creating a self-fulfilling prophecy of community inability to adequately manage these complex realities. The inevitable cycle of policy change as governments change is another issue that merits more consideration than given in the scenarios at this exploratory stage.

Foresight (see Annex 2) is most valuable when it becomes part of an organisation's (or society's) culture and is regularly revisited and reinterpreted. The example of Sydney Water might be helpful in this regard. Sydney Water has used their scenarios as ways to challenge their thinking and look for early warning signs of emerging challenges and opportunities. They have not expected the scenarios to contain all details of possible futures, but rather as launching points for lateral thinking across the organisation.

Linking these scenarios with planning cycles

There are obvious mutual benefits for scenario-thinking about NSW forests being embedded within wide NSW Government strategic planning cycles. We note the Integrated Strategic Assessment (ISA) process for long-term planning across the NSW Government, and had the opportunity to learn a little about it through this Project. Our impression was that scenarios such as this Project began to develop could be one step within a series of linked "cogs" in that process. An integrated approach ensures that longer-term thinking about alternative futures is considered in planning cycles that might otherwise consider a more limited range of possible futures over relatively short time frames.

As explained in Annex 2, we suggest that there is also a role for foresight that it less tightly coupled with planning cycles. In this context, scenarios are constantly evolving as assumptions are tested and new insights and trend analysis are incorporated. The scenarios become a focus for ongoing "strategic conversations" that build and maintain a culture of "future responsiveness" (see Figure 12 in Annex 2)[24].

[24] For further discussion of the use of scenarios in this way, see, for example, the writings of Richard Slaughter, Pierre Wack, and other members of Royal Dutch Shell's scenarios team, Kees van der Heijden, Peter Schwartz, and Jim Dator.

Annex 1: Background brief

These slides from a NRC presentation in 2021 provide background to this Project.

Future Scenarios

Working proposal

NSW FOREST MONITORING AND IMPROVEMENT PROGRAM

Natural Resources Commission

Why?

- The Premier's terms of reference specifies that the program strengthen the NSW Governments ability to strategically and adaptively manage forests.
- 2020 has been a pivotal moment – NSW Bushfire Inquiry, drought, COVID-19
- Now is the time to think about what we want for the future of NSW forests, pathways to get there, and consequences of different decisions.
- Scenario development provides a forum for strategic conversations that improve our ability to anticipate and plan now for future circumstances.
- The scenario development process can assist in simplifying the overload of information, challenge prevailing mind-sets, promote cross disciplinary action and develop a shared understanding across diverse stakeholder groups.

Stage 1 - Review

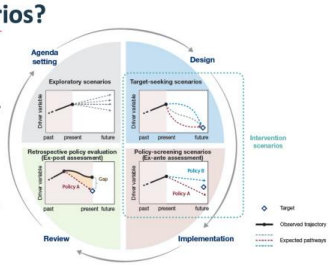
- Identify and review existing and relevant futures work
- Synthesise relevant strategic scenario activities by governments, academia and industry including – for example: Common Planning Assumptions Group (CPAG), NSW Water, Natural Capital Assessment Method, CSIRO, forest industry, conservation, tourism, etc.
- Analyse trends and potential shocks that may impact NSW forests. Identify potential large-scale changes at the intersection of multiple policy domains that are likely to influence the future of NSW forest management

Learning and insights to date

- Numerous futures frameworks and approaches are available
  e.g. Strategic Foresight, Nature Futures Framework, Sustainable Future Scenarios
- Agreed definitions are available
  e.g. CPAG definitions for *Scenario Planning* and *Plausible Future Scenario*
- Climate projections (NARCliM) and research on climate change impacts on some forest components is available
  e.g. AdaptNSW – Regional Vulnerability Assessment, Biodiversity adaptation, Bushfire, Soil properties and erosion, Water resources
- **No existing integrated scenarios to address state-wide evaluation questions**

What type of scenarios?

- Plausible future scenarios are **stories**, not predictions, about how the future could unfold
- Scenarios capture a range of future possible outcomes and interactions - combinations of **good**, **bad**, **expected** and **surprising**[1]
- There are different types of scenarios for different purposes and phases of policy development
- Plausible scenarios can explore the likely key decisions that the NSW government may make
- **Evaluation of scenarios can explore the impact on NSW forest values and forest dependent communities**



[1] Common Planning Assumptions Group

Source: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) https://ipbes.net/scenarios-models/what/scenario-methodologies

What can we use scenarios for?

- Scenarios can be used to examine a range of plausible futures, based on potential trajectories of drivers. They can contribute significantly to high-level problem identification and forecasting the important decisions that will be made.
- Exploratory scenarios are used to identify the scope of policy or management alternatives that may be considered and identify the likely decisions that will be made.
- A shared understanding of the information requirements to support future decisions can drive the adaptation of the forest monitoring program. It provides for the allocation of monitoring resources to those programs that will generate the information of most value.

Annex 2: Some resources to support foresight

Minzberg's seven ways of seeing

Noted strategic thinking theorist, Henri Minzberg, recognised seven types of thinking ("seeing"):

- thinking about the past (*seeing behind*);
- thinking about not just the future we see emerging (*seeing ahead*) but also what might plausibly emerge under some circumstances (*seeing beyond*);
- thinking about the big picture (*seeing abo*ve) as well as the details (*seeing below*);
- thinking outside the constraints of our current jobs, disciplines, cultures, political preferences etc (*seeing beside*); and
- thinking about how to turn our thinking into action (*seeing it through*).

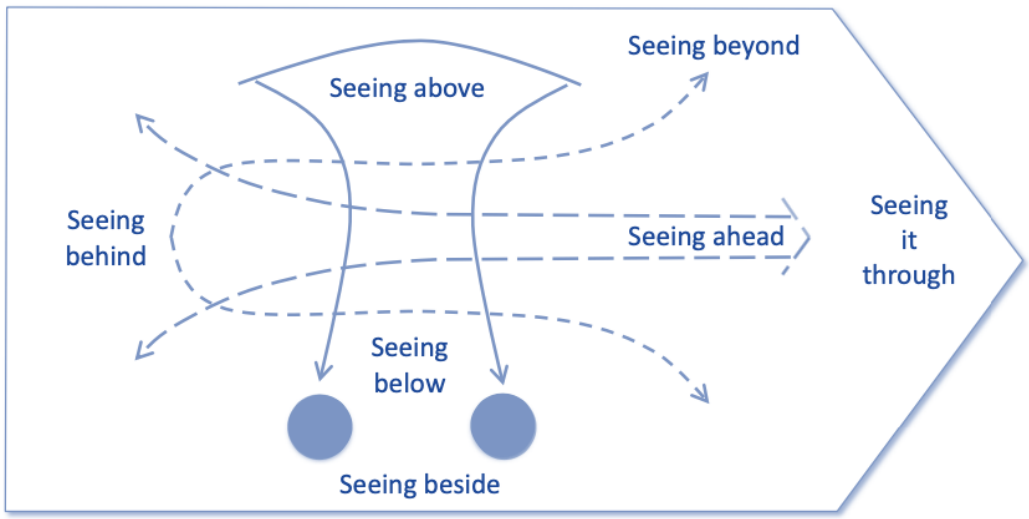


Figure 10: Mintzberg's seven ways of seeing as a metaphor for strategic (futures) thinking[25]

The approach taken in this project is far more than thinking *ahead* and *beyond*. We have tried to consider historical events and trends and big picture as well as detailed aspects of forest policy and management. And we have tried to involve people outside the mainstream of forest policy and management to encourage *seeing beside*. The three-horizons thinking and P-A-R-K analysis, although currently incomplete, are designed to be the link to *seeing it through*.

[25] Mintzberg H. (2003) Strategic thinking as 'seeing'. In: Developing Strategic Thought (ed B. Garratt). Profile Books, London

When is foresight warranted?

Scearce *et al.* (Figure 11) provide a decision tree for deciding when scenario thinking might be warranted.

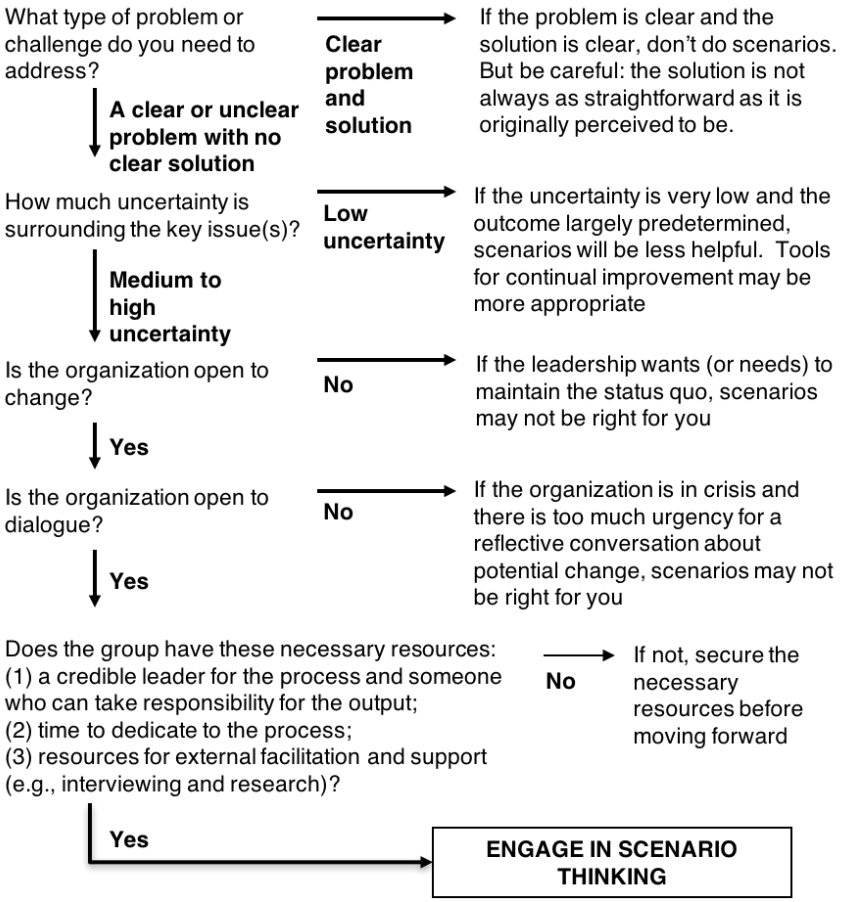


Figure 11: A decision tree to help decide when scenario thinking might be warranted and effective in organisations [26]

Henley Centre principles of foresight

The Henley Centre[27] in the UK published a very helpful report in 2001 outlining some principles of foresight that apply equally today. These principles are:

- Start early
- Clarify objectives and intended uses
- Use for rehearsal rather than knowledge
- Be patient – benefits might take time
- Ensure senior management buy-in and involvement
- Ensure key stakeholder buy-in and involvement
- Give the right people a licence to be different
- Ensure appropriate balance of internal and external inputs
- Align methodology with purpose and culture
- Use feedback mechanisms to create a virtuous cycle of learning

[26] Scearce D., Fulton, K. & Global Business Network Community (2004) *What if? The Art of Scenario Thinking for Non-Profits*. Global Business Network, Emeryville, California.

[27] The Henley Centre (2001).Understanding Best Practice in Strategic Futures Work. The Henley Centre, UK.

Achieving a futures-responsive culture

Figure 12 outlines the steps that Richard Slaughter, who established Australia's first centre for training in strategic foresight, concludes are required to achieve a futures-responsive culture in organisations and societies. We suggest that the current state of futures-thinking across most of Australian organisations and society is not far above Level 1.

Stages		Indicators
	A futures-responsive culture	
Level 5:	Social capacity for foresight as an emergent property	Long-term thinking becomes a social norm
Level 4:	Futures processes, projects and structures embodied in a variety of applications	Foresight routinely applied in most organisations
Level 3:	Futures tools and methodologies increase analytic power	Widespread use of standard fs and methods
Level 2:	Futures concepts and ideas enable a futures discourse	Futures concepts and ideas become influential via discourse
Level 1:	Raw capacities and perceptions of the human brain-mind system	Unreflective use of forward thinking in daily life of individual
	A past-driven culture	

Figure 12: Steps towards a futures-responsive culture in organisations and societies[28]

[28] Slaughter, R. A. (2006) *Pathways and Impediments to Social Foresight*. Monograph Series 2003-2006 No. 10, Strategic Foresight Program, Swinburne University, Melbourne, Australia