



Pathways to improved governance are best built on an understanding of how social and ecological systems interact.
Photo: Sarah Clament

From systems understanding to governance improvements in the Australian Alps

The biodiversity features of the Australian Alps face an uncertain future. However, with our ability to plan, take action and anticipate the future, we can navigate a way through the uncertainties, taking advantage of new opportunities and minimising the loss of things that we value.

We developed a new process to test options for improving governance arrangements for biodiversity conservation. The process involves developing scenarios based on a detailed understanding of the key drivers of change affecting biodiversity features of the Australian Alps. These scenarios are then used to test alternative governance arrangements aimed at enhancing the effectiveness of biodiversity plans and programs.

Summary for policymakers, planners and managers

- This document summarises the application of a process to the Australian Alps context, where proposed governance improvements are assessed using systems analysis and scenarios.
- We present a systems analysis for Australian Alps biodiversity features (pages 2–3). This systems analysis then forms the basis for developing a range of future scenarios (pages 4–5). These scenarios are then used to test the effect of proposed governance reforms (pages 6–7).

Key terms

Landscape-scale biodiversity — a shift in policy away from individual species protection alone towards broader appreciation of the function, structure and composition of the surrounding landscape.

Social-ecological system — a place-based representation of how humans and nature interact with each other as part of one co-evolving system. See pages 2–3.

Scenario — a narrative describing a plausible future. See pages 4–5.

Governance — the processes through which people share power and responsibilities as decisions are made: by whom, for whom, and in whose interests. See pages 6–7.



Social-ecological systems analysis

Social-ecological systems analysis involves identifying the key drivers of change affecting a particular issue in a particular place.

For the Australian Alps social-ecological systems analysis, the issue is the condition and extent of biodiversity features associated with the alpine and sub-alpine ecosystems of the region.

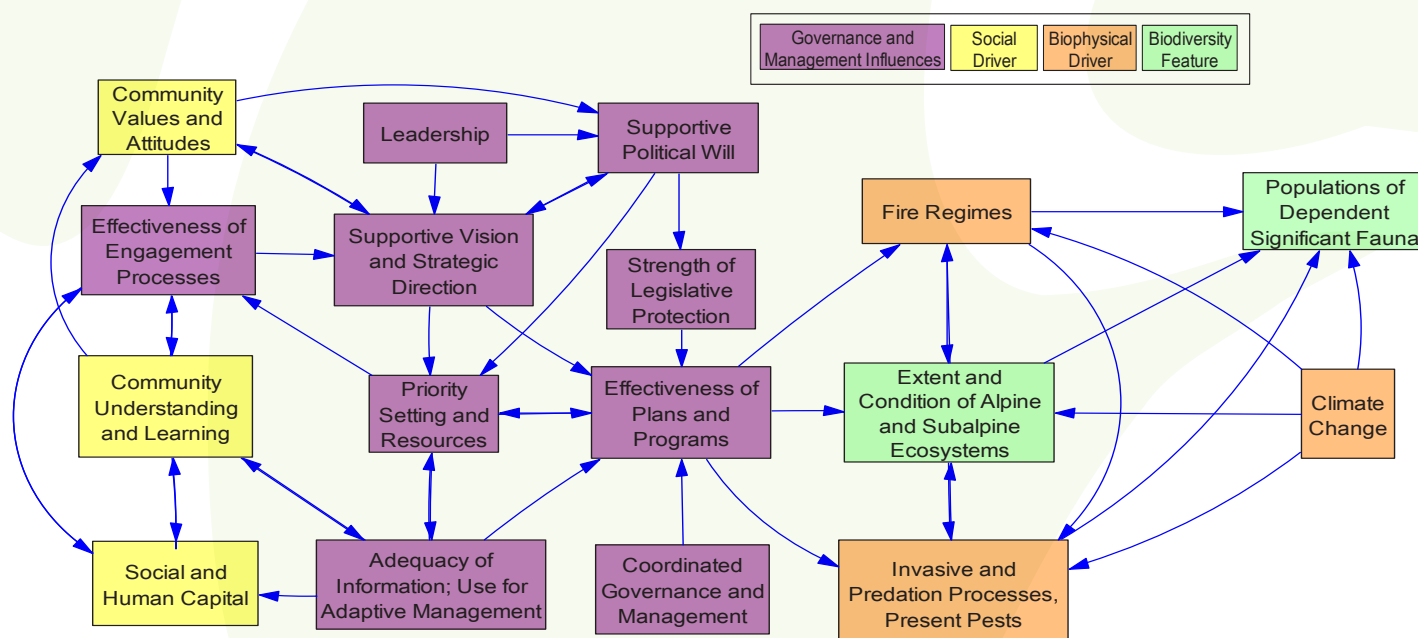
We present our analysis as a system diagram that traces how these drivers of change affect biodiversity outcomes (see below).

What is new?

What is new about our approach to social-ecological systems analysis is the inclusion of the key governance influences on system dynamics. Not only are key social and biophysical drivers identified, but we also explore how these interact with governance influences. As we expect the system to undergo rapid change, we concentrated on governance attributes that help managers adapt their responses, and if necessary deal with a transforming environment.

By improving our understanding of complex system interactions, we can identify new ways to govern the system that are likely to enhance biodiversity outcomes.

Australian Alps social-ecological system model



Key features of our approach

- focuses on identifying the key drivers of change
- encourages greater awareness and incorporation of key governance influences on system dynamics
- encourages greater awareness and incorporation of key social drivers of change
- reveals governance attributes that can support adaptation and/or negotiate system transformation
- is context specific, but the process can be applied to other contexts and enable testing of a range of alternative governance arrangements

What we've learned

Developing a social–ecological system model is an efficient and effective method to identify and understand key drivers of change.

The model reveals interactions between governance influences, socio–economic and biophysical drivers, and how together these shape biodiversity outcomes. Importantly, the model can be progressively adjusted and improved as our knowledge increases.

Focus on one issue

It is important to first identify a specific issue on which to focus, and then define a related focal scale for the system.

In our case, as the focal issue was the extent and condition of alpine and sub–alpine ecosystems, the spatial extent of these ecosystems was an obvious choice for our focal scale. Of course, it is also critical to identify how factors external to the focal system (such as community values, climate change and national legislation) affect biodiversity outcomes in the focal system.

Workshop participants discussing the Australian Alps social–ecological system model used to develop the 2030 scenarios (Falls Creek, Victoria, April 2013)

Identify key drivers

From all the drivers of change affecting the focal issue, a key step is to identify the most important. This is because there are so many drivers and interactions that the complexity becomes overwhelming, leading to confusion rather than understanding.

Filtering to identify the most important drivers is an iterative process involving literature reviews and consultations with scientists and managers.

A systems understanding

Once the model has been developed, it can be used to better understand how the system has evolved in the past, and to develop plausible trajectories for the future.

A useful framework for this exploration is the ‘adaptive cycle’ which identifies how the system passes through a series of phases. We used such an analysis to identify that the alpine and sub–alpine ecosystems have historically moved from a conservation phase to a release phase, followed by some limited reorganisation.

In the future, the system is likely to re–enter a release phase resulting in transformation, with severe consequences for alpine communities and species.

These findings suggest that current management objectives and strategies will need to change, and that more adaptive governance will be required to negotiate these changes. As explained on the next page, we then explored plausible futures in more detail using scenarios.



Further reading

- Lockwood M, Mitchell M, Moore SA & Clement S (2014) Biodiversity governance and social–ecological system dynamics: transformation in the Australian Alps. *Ecology and Society* 19(2): 13. <http://dx.doi.org/10.5751/ES-06393-190213>.
- Mitchell M, Lockwood M, Moore SA & Clement S (2015) Scenario analysis for biodiversity conservation: a social–ecological system approach in the Australian Alps. *Journal of Environmental Management* 150: 69–80. <http://dx.doi.org/10.1016/j.jenvman.2014.11.013>.

Plausible scenarios for 2030

Developing scenarios can be an effective way to identify the breadth of future possibilities and help people prepare for these futures. To contribute to planning, these scenarios need to be plausible, and not too far off into the future. It is also useful to develop a diverse range of scenarios. This allows policymakers, planners and managers to develop strategies that consider scenarios ranging from worst case to best case.

What is new about this approach?

We developed scenarios using the social-ecological system model described on the previous page.

This systems approach to developing scenarios enables us to imagine the most diverse range of scenarios in a consistent way. Having such a diverse range of scenarios ensures robust testing of alternative governance arrangements. The proposed governance reforms would need to make a positive difference for biodiversity under the full range of scenarios.

What is also new is that initial scenario narratives were developed assuming that current governance arrangements persist largely unchanged. It is then possible to compare these 2030 scenarios with how they might appear under alternative governance arrangements. That is, we can assess whether the alternative governance arrangements would improve outcomes, and if so, how, and to what extent.

Key features of our approach

- scenario development draws on region-specific social-ecological system understanding

- the most critically uncertain drivers are used to create a diverse range of scenarios from worst case to best case extremes
- the scenarios are plausible and within a planning time horizon
- by creating scenarios assuming governance arrangements do not change, it is possible to assess the impact of proposed alternative governance arrangements.

What we've learned

For a scenario planning approach to be effective, it is important that the intended beneficiaries of the approach, in our case the governance authorities and managers of the Australian Alps, are engaged throughout the process. This helps ensure they have a belief in and sense of ownership of the scenario narratives.

The scenario narratives developed for the Australian Alps case study were based on initial work by key stakeholders participating in a one-day workshop in 2013. They were then further developed in consultation with experts. This was a useful exercise to push boundaries in thinking as well as enhance the scientific validity of the scenarios and the anticipated outcomes for biodiversity.

Our scenario development process resulted in four scenarios for 2030, constructed around two critical uncertainties: community attitudes and invasive processes (see diagram on next page). Detailed narratives were developed for each scenario, each describing a plausible future in terms of the future states of key system drivers and associated outcomes for biodiversity.

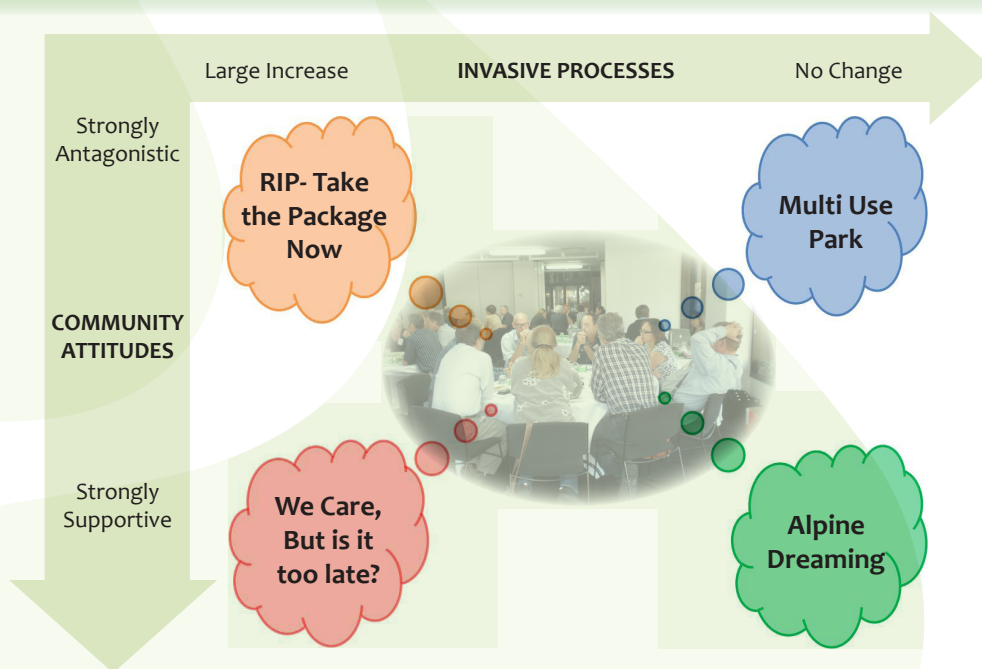


Workshop participants discussing the impact of the governance reforms on the best case scenario 'Alpine Dreaming' (Bright, Victoria, April 2014)





Further reading

Mitchell M, Lockwood M, Moore SA & Clement S (2014) *Australian Alps: an overview of plausible scenarios in 2030*. Landscapes and Policy Hub, University of Tasmania, Hobart.

Mitchell M, Lockwood M, Moore SA & Clement S (2015) Scenario analysis for biodiversity conservation: a social-ecological system approach in the Australian Alps. *Journal of Environmental Management* 150: 69–80. <http://dx.doi.org/10.1016/j.jenvman.2014.11.013>.



Plausible Biodiversity Outcomes under the 2030 Scenarios

RIP Take the Package Now	Multi Use Park	We Care, But is it too late?	Alpine Dreaming
Wetlands Extent Large decline and continuing Wetlands Condition Very poor & worsening Grasslands Extent Moderate decline Grasslands Condition Degraded Heathlands Extent Some expansion Heathlands Condition Moderate Boulder Heath Extent Moderate decline Boulder Heath Condition Very poor Snowpatch & Feldmark Extent Almost disappeared Snowpatch & Feldmark Condition Very poor	Wetlands Extent Large decline but slowing Wetlands Condition Poor & worsening Grasslands Extent Small decline Grasslands Condition Good Heathlands Extent Some expansion Heathlands Condition Moderate Boulder Heath Extent Small decline Boulder Heath Condition Poor Snowpatch & Feldmark Extent Declining Snowpatch & Feldmark Condition Poor	Wetlands Extent Large decline but slowing Wetlands Condition Poor & worsening Grasslands Extent Moderate decline Grasslands Condition Degraded Heathlands Extent Some expansion Heathlands Condition Moderate Boulder Heath Extent Moderate decline Boulder Heath Condition Poor Snowpatch & Feldmark Extent Declining Snowpatch & Feldmark Condition Very poor	Wetlands Extent Moderate decline but slowing Wetlands Condition Poor to good depending on location Grasslands Extent Small decline Grasslands Condition Good Heathlands Extent Some expansion Heathlands Condition Good Boulder Heath Extent Small decline Boulder Heath Condition Moderate Snowpatch & Feldmark Extent Declining Snowpatch & Feldmark Condition Moderate
			

Testing governance improvements

Global concern about the consequences of expected environmental, social and economic change, including climate change, has led researchers to consider the kind of governance arrangements that might help planners, policymakers and managers be more adaptive. However, it is proving difficult to convert such theoretical ideas into pathways towards improved governance arrangements, and there is no effective means to test whether proposed governance reforms are likely to have practical benefits.

What is new about our approach

Our approach uses scenario planning to assess the extent that proposed governance reforms would result in improved outcomes, which in this case study are related to biodiversity outcomes. Our approach also uses social–ecological system analysis as the basis for a staged series of workshop activities.

The logic behind the staged approach is to:

1. explore the effect of the governance improvements on key drivers of change, and then
2. assess how any changes to the action of drivers as a result of governance reforms might affect the scenarios, and finally
3. come to some conclusions about whether the reforms can reasonably be expected to improve biodiversity outcomes.

We summarise below the proposed governance reforms used for our case study. To understand how they were developed, see separate summary: *Understanding and designing fit-for-purpose institutions for conserving biodiversity*.

Current governance arrangements	OPTION 1: Partnership for One Park One Plan	OPTION 2: Transboundary Statutory Authority
The Australian Alps Cooperative Management Plan provides a great starting point, but more is needed to enhance consistency and collaboration across jurisdictions.	The One Park One Plan provides common goals and objectives but allows agencies in each jurisdiction to pursue achievement of those goals and objectives in their own way.	Under the legislation, each agency is accountable to the statutory authority for the delivery of strategies and actions that address the One Park One Plan goals and objectives.
The Australian Alps Cooperative Management Program reference groups are the lifeblood of transboundary cooperation and shared experience, but their potential is stymied by lack of high-level support.	The Australian Alps Cooperative Management Program reference groups are revitalised and extended as a means of building partnerships that enable increased stakeholder input into all of alps strategic planning.	The roles and memberships of the Australian Alps Cooperative Management Program reference groups are formalised in the legislation.
Decision-making mostly takes place at senior bureaucratic levels, and its effect on biodiversity outcomes can be adversely affected by politics, lobby groups and perceived public concerns.	Agencies respect and are committed to the ideal of increased devolution of responsibilities and program design and implementation to local and regional managers.	The authority has the power to direct agencies to devolve appropriate degrees of responsibility and autonomy to local and regional managers.
Accountabilities are fractured across multiple jurisdictions, driven by regularly changing party political influences.	Accountability is through demonstrating performance against One Park One Plan objectives.	Accountability is through statutory requirements to report on performance against One Park One Plan specified outcomes, including identification of ongoing challenges and strategies to address them.

Key findings

- Social–ecological systems models are a powerful way to represent and understand system dynamics.
- Scenarios developed on the basis of social–ecological systems understandings allow managers to plan for a range of plausible futures.
- The system model, scenarios and staged workshop approach provided a method to test options for governance reform.
- Alpine and sub–alpine ecosystems are likely to undergo transformation. Managers will need to continuously adapt to changing social and environmental conditions. Governance arrangements that devolve more responsibility to managers, better integrate science into decision making, improve collaboration across jurisdictions and between stakeholders, and diversify funding sources are likely to improve biodiversity outcomes.

Who are the researchers involved?

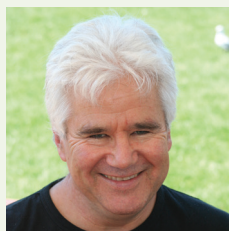
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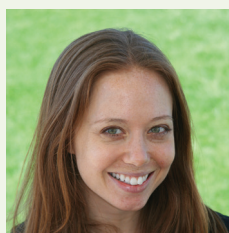
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About the NERP Landscapes and Policy Hub

The Landscapes and Policy Hub is one of five research hubs funded by the National Environmental Research Program (NERP) for four years (2011–2014) to study biodiversity conservation.

We integrate ecology and social science to provide guidance for policymakers on planning and managing biodiversity at a regional scale. We develop tools, techniques and policy options to integrate biodiversity into regional-scale planning.

The University of Tasmania hosts the hub.

www.nerplandscapes.edu.au



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