



National Environmental
Research Program

LANDSCAPES AND
POLICY *hub*

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scenarios overview



Tasmanian Midlands

An overview of plausible scenarios in 2030

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Landscapes and Policy Hub

FOREWORD

The big challenge facing biodiversity conservation today is the ability to protect iconic species and communities, maintain the health and function of ecosystems, and at the same time keep our options open for the production of food and other commodities demanded by an increasingly affluent, urbanised and growing population.

The Landscapes and Policy Hub is taking an approach to this question that integrates social, economic and ecological perspectives to develop tools, techniques and policy options to support regional biodiversity planning.

An important element of this research is investigating plausible futures for the communities that live and work in these landscapes and the institutions that have responsibility for overseeing the governance of their natural resources. Led by Sue Moore and Michael Lockwood and supported by researchers Michael Mitchell and Sarah Clement, this team is using a combination of conceptual modelling, scenario planning, surveys, interviews and focus groups to develop a range of governance options to assist biodiversity policy and decision-making.

The material in this background document is built on the knowledge, experience and opinions of people who live and work in the region, are responsible for some aspect of its regulation, or have interests in its future.

We are particularly grateful for the generosity of all those who have participated in one-on-one interviews, workshops and focus groups and their thoughtful and candid contributions.

Ted Lefroy

Director, Landscapes and Policy Hub

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About this document...

The 2030 scenarios for the Tasmanian Midlands, detailed in this document, are provided as background reading for the scenario planning workshop on 25 March 2015. The scenarios were developed at a workshop on 1 March 2013, where we used scenario narratives to create strategic conversations around what a range of key stakeholders seen as being the key drivers of change, and what plausible futures may evolve, given our collective understanding of past and current trends in the Tasmanian Midlands.

On 25 March 2014, we will consider the two governance options presented in a separate document, 'Options to Improve Biodiversity Governance Arrangements in the Tasmanian Midlands'. The two governance options will be tested for their usefulness in improving biodiversity outcomes across all scenarios presented in this document.

Scenario Planning

Why we have created the scenarios

The Landscape and Policy Hub is undertaking research to identify tools, techniques and policy options that could assist landscape-scale conservation of biodiversity. Making plans to enhance biodiversity outcomes in the Tasmanian Midlands is complicated by considerable uncertainty concerning the future state of many of the key drivers of change, and their effects on the condition of ecological communities. Constructing future scenarios is a useful planning technique in such situations. Scenario planning allows people to identify plausible futures that can inform planning and decision making. We use social-ecological systems thinking to underpin our approach to scenario development.

Creating the scenarios

To create the scenarios based on a social-ecological systems analysis, we followed four steps.

- Step 1. Identify a focal system and associated biodiversity features.*
- Step 2. Generate and refine key biophysical and social drivers affecting the focal biodiversity features, together with governance influences regarded as pivotal for adaptive capacity.*
- Step 3. Develop a conceptual social-ecological systems model indicating relationships between important drivers, governance and management influences, and biodiversity features.*
- Step 4. Develop and validate four scenarios derived from two critical uncertainties.*

We summarise these scenario narratives and their anticipated effects on biodiversity outcomes on pages 7-11.

The scenarios were created under the assumption that governance arrangements will not change. This approach allows separate consideration of the impact of proposed alternative governance arrangements on biodiversity outcomes for each scenario.

Our proposed options for alternative governance arrangements are presented in a separate document, 'Options to Improve Biodiversity Governance Arrangements in the Tasmanian Midlands' compiled by Sarah Clement.

Climate change is consistent across all scenarios

The Tasmanian Midlands is projected to experience an increase in average temperature and temperature extremes; and an increase in rainfall variability. By 2030, the slight increase in overall temperatures and the reduction in very cold mornings could open up a range of new agricultural possibilities. An increase in the number of growing degree days could also mean that crops mature earlier, opening the possibility of additional growing seasons. However, the increase in the number and intensity of heat waves is also likely to affect agricultural choices and biodiversity outcomes.

While an overall increase in rainfall and run-off is expected by 2030, water availability for farmers is expected to become more difficult to manage, as rainfall patterns are less predictable. It is projected that rainfall will be more frequently received as heavy rainfall events, with a slight increase in the number of rain-free days overall. The previously reliable winter rainfall is likely to become less reliable, with fewer extended periods of light, soaking rain. When drought conditions develop, they are likely to be much more long-lasting, and often broken by high runoff rainfall events. Farmers will be under pressure to capture runoff for future use and to prevent erosion, and to also find other means to access and store water (information from Climate Futures for Tasmania).

Steps to Scenario Planning

To create the scenarios based on a social-ecological systems analysis, we followed four steps.

Step 1. Identify a focal system and associated biodiversity features.

The Tasmanian Midlands was selected as the focal system because of its classification as a biodiversity hotspot. The focal biodiversity features in this system are the **lowland native grassland ecological community** and its dependent species identified as **Matters of National Environmental Significance**.

Step 2. Generate and refine key biophysical and social drivers affecting the focal biodiversity features, together with governance influences regarded as pivotal for adaptive capacity.

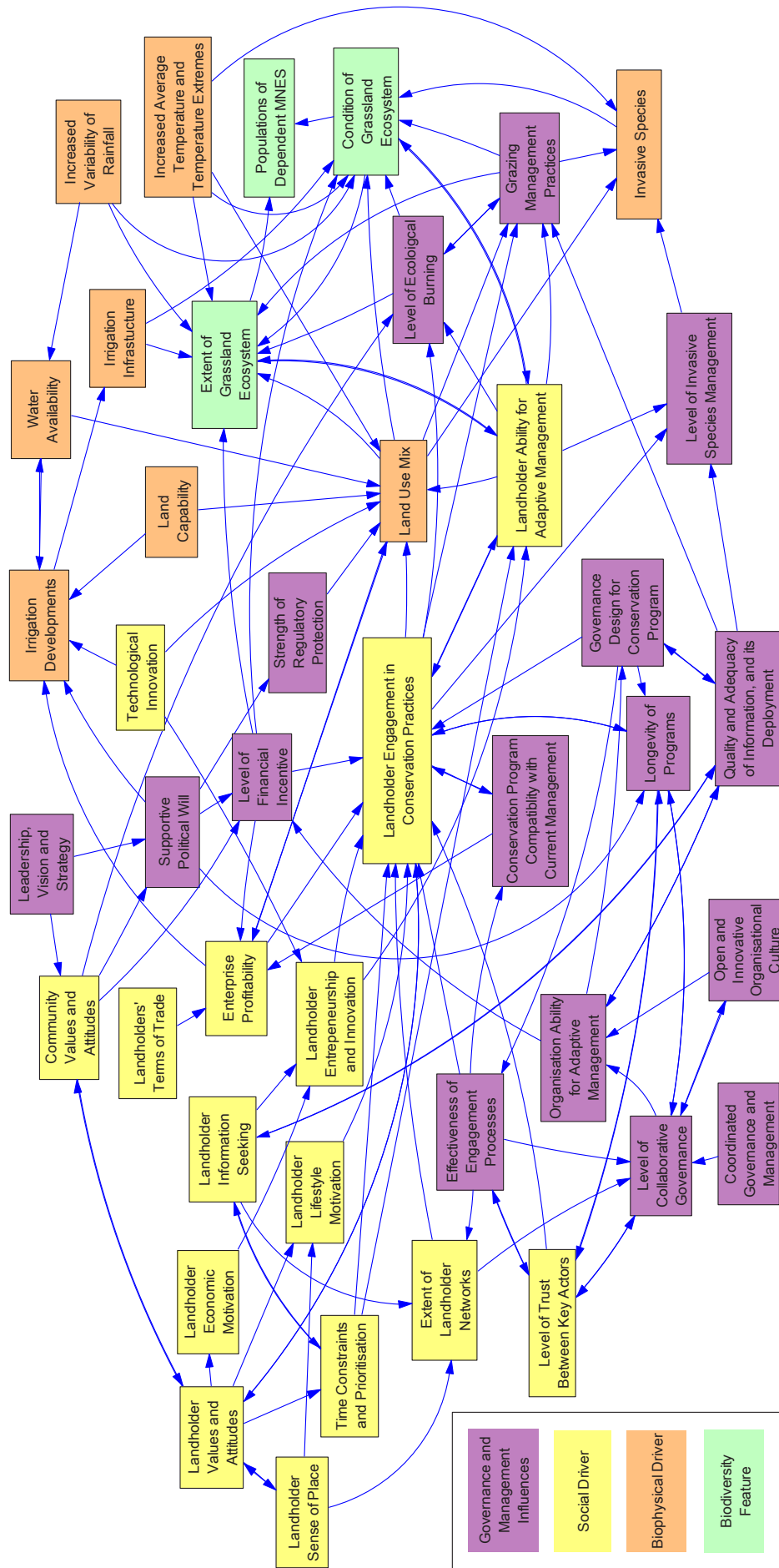
These were identified and refined by the research team in consultation with key informants, and then adjusted and validated at a one-day workshop with 32 stakeholder participants in March 2013. Participants then rated the importance of each driver and strength of each influence to identify a prioritised list of the most **critical and influences drivers**.

Top 15 Critical and Influential Drivers (ranked by category and in order of importance)	
Social and Economic Drivers	Governance and Management Influences
1. Enterprise Profitability	1. Longevity of Programs
2. Landholder Values and Attitudes	2. Effectiveness of Engagement Processes
3. Landholder Engagement in Conservation Practices	3. Grazing Management Practices
4. Level of Trust Between Key Actors	4. Supportive Political Will
5. Landholder Economic Motivation	5. Quality and Adequacy of Information, and its Deployment
6. Landholders' Terms of Trade	Biophysical Drivers
7. Time Constraints and Prioritisation	1. Irrigation Developments
	2. Invasive Species
	3. Land Use Mix

Step 3. Develop a conceptual social-ecological systems model indicating relationships between important drivers, governance and management influences, and biodiversity features.

The research team developed an initial conceptual model, which was then modified by workshop participants in five groups. These suggested modifications were further analysed by the research team to identify elements that were common to most models, and the logic underpinning each relationship, before incorporating them into a final version, see **Conceptual Social-Ecological System** - page 5.

Conceptual Social-Ecological System

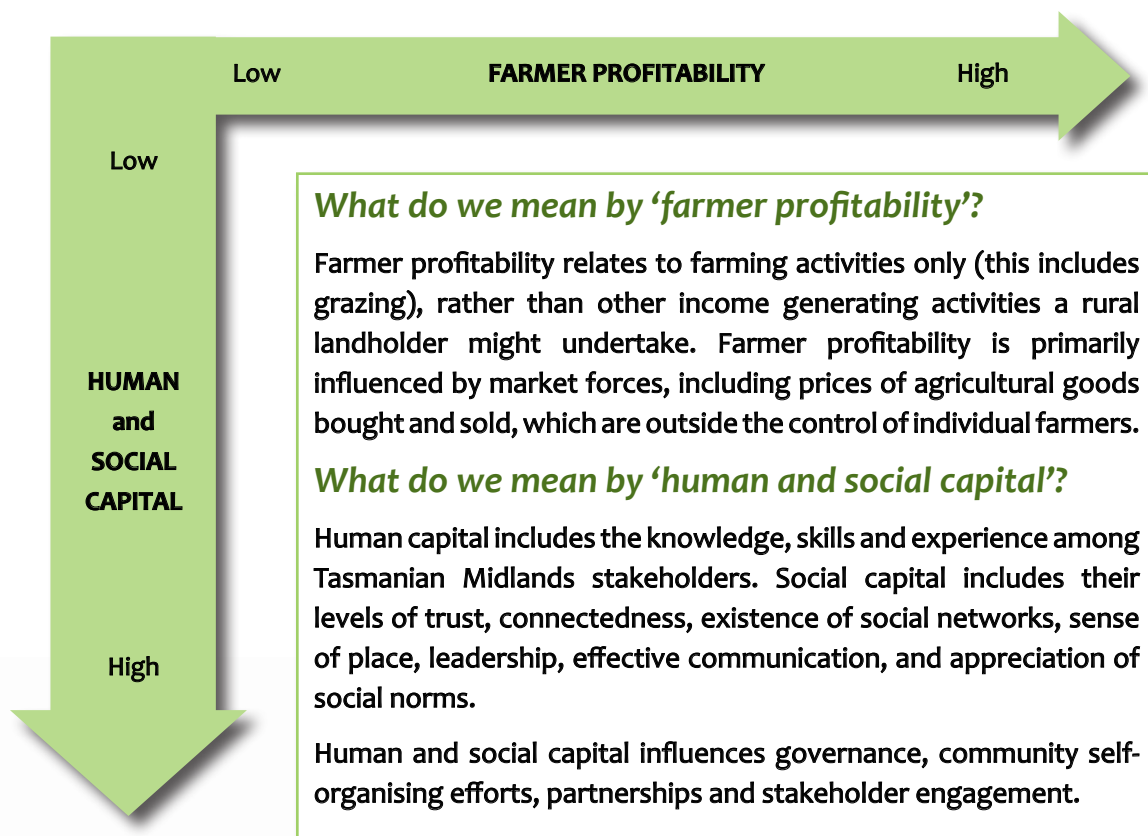


Steps to Scenario Planning cont

Step 4. *Develop and validate four scenarios derived from two critical uncertainties.*

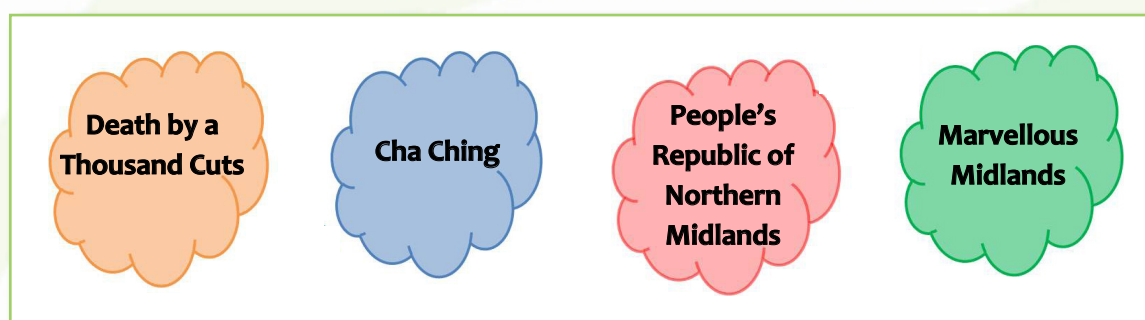
To identify **two critical uncertainties**, the most critical drivers identified at step 2 were further rated by participants according to the level of uncertainty associated with their future state in 2030. After some discussion and modification of terms, the two critical uncertainties were identified as farmer profitability and level of human and social capital, the meaning of which are explained below.

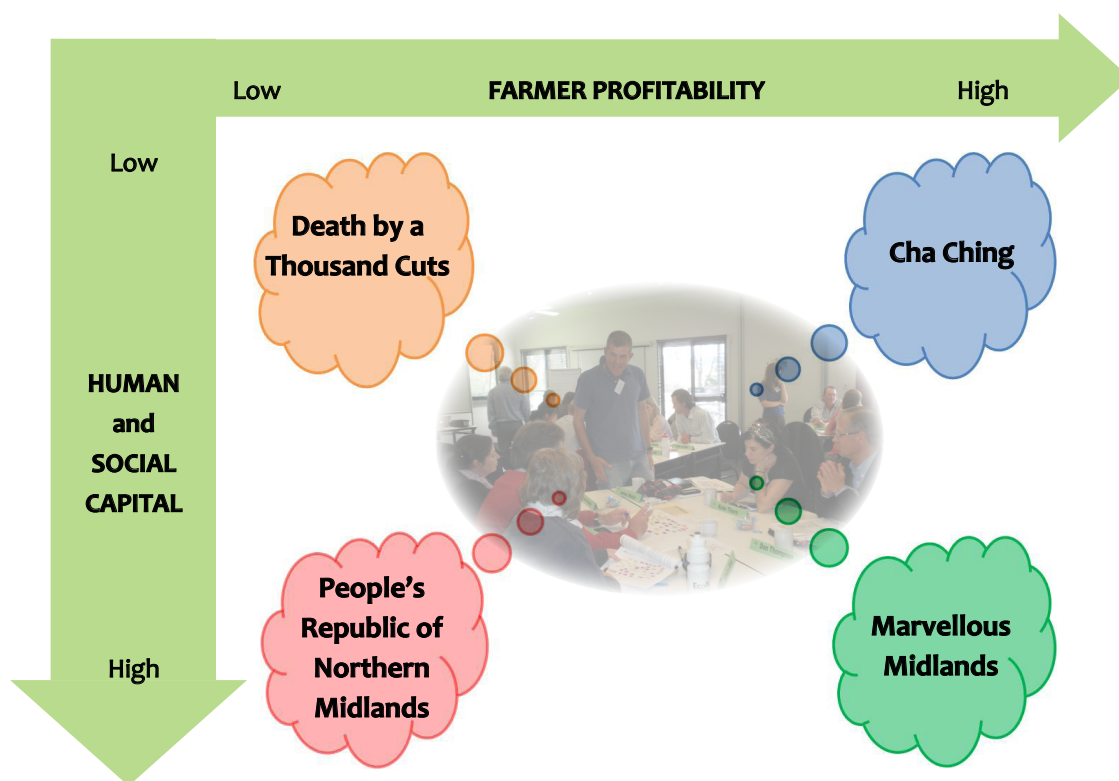
The Two Critical Uncertainties







Participants then established extreme levels of these critical uncertainties, which enabled the identification of four scenario spaces (see below and **Scenario Snapshots** on Page 7). Workshop participants briefly characterised each scenario, which were further developed by the research team. The resulting scenario narratives were refined and validated by ecologists and economists from the Landscape and Policy Hub.

2030 Scenarios





Plausible Biodiversity Outcomes under the 2030 Scenarios

Death by a Thousand Cuts	Cha Ching	People's Republic of Northern Midlands	Marvellous Midlands
Native Grasslands Extent Small increase in area	Native Grasslands Extent Large decline in area, and non-existent in lowland areas	Native Grasslands Extent Small increase in area	Native Grasslands Extent Initial small decline in area, then stable by 2030
Native Grasslands Condition Poor to very poor	Native Grasslands Condition Remaining grasslands along the foothills are in poor to moderate condition	Native Grasslands Condition Poor to good	Native Grasslands Condition Good but altered condition given climate change impacts on grassland composition
Dependent Species Small decline in populations, small contractions and shifts in distributions	Dependent Species Large decline in populations, large contractions and shifts in distributions	Dependent Species Small decline in populations, small contractions and shifts in distributions	Dependent Species No change in populations, some contractions and shifts in distributions
			



DEATH BY 1000 CUTS

*Low farmer profitability
Low human and social capital*

Water

An over-allocation of water for irrigation has resulted from Tasmanian Midlands farmers placing too much faith in irrigation to circumvent their dwindling financial returns from agriculture. Most allocations are now under-utilised due to competitive price hikes during dry periods when irrigation is needed¹. Hydropower companies and external corporate farming businesses are buying irrigation shares at greatly reduced prices as smaller-scale irrigators decide to opt out. Waterlogging has become an issue for salinity affected farms, while other farms are more affected by drought conditions. Farmers tend to respond in an ad hoc reactive way to increased run-off and erosion, capturing whatever they can in existing on-farm dams. During extended dry periods, on-farm dams dry out more rapidly, and most farmers cannot afford to remedy this.

Land and property

The region has experienced a slow death of farming enterprises and an increase in land no longer used for farming. There is less capacity among farmers to adjust to successive extreme climate events. Crippling debt has resulted in crashing property prices in the worst affected areas, and many farmers cannot attract buyers. Most young people have chosen to leave, and those who remain are focused on enabling the next generation secure more prosperous futures outside the area. Many seek alternative sources of income, including on-farm tourism and recreation activities and payments for provision of conservation outcomes, but most properties carry the stain of rural depression, making them unattractive to tourists. Rural decline has affected community values and attitudes as well those of landholders. Landholders are disillusioned by reduced government services, and the lack of investment in research and development (R&D) to support technological innovations. Some corporate agribusinesses have started buying up cheap land for mass cheap production of biofuels. Governments encourage these new land owners by providing attractive conditions for investment in large-scale agriculture. The new landholders have less connection to the land, and reduced ability for adaptive management. They also possess fewer skills for managing native grasslands, or to combat invasive species, and only respond to providers of conservation programs if those programs can help them financially.

Conservation and invasive species

A positive outcome from a conservation point of view is that plunging property prices and large swathes of disused land have boosted the campaign for purchase of land by philanthropists and the government that could form a connected set of conservation native grassland reserves. However, these conservation organisations face a battle convincing politicians to support their vision, and to secure financial commitments for ongoing management. The priorities of politicians are on other means to boost a weakened rural economy. While some privately owned land is also being managed for conservation purposes, there is little capacity or interest for good practice conservation management. Grasslands are mostly left to fend for themselves against the effects of a changing climate, and struggle to compete against invasive weeds. Rats and rabbits flourish in the under-grazed weedy grassland areas, resulting in an explosion in cat and fox numbers, also reducing populations of threatened native fauna.

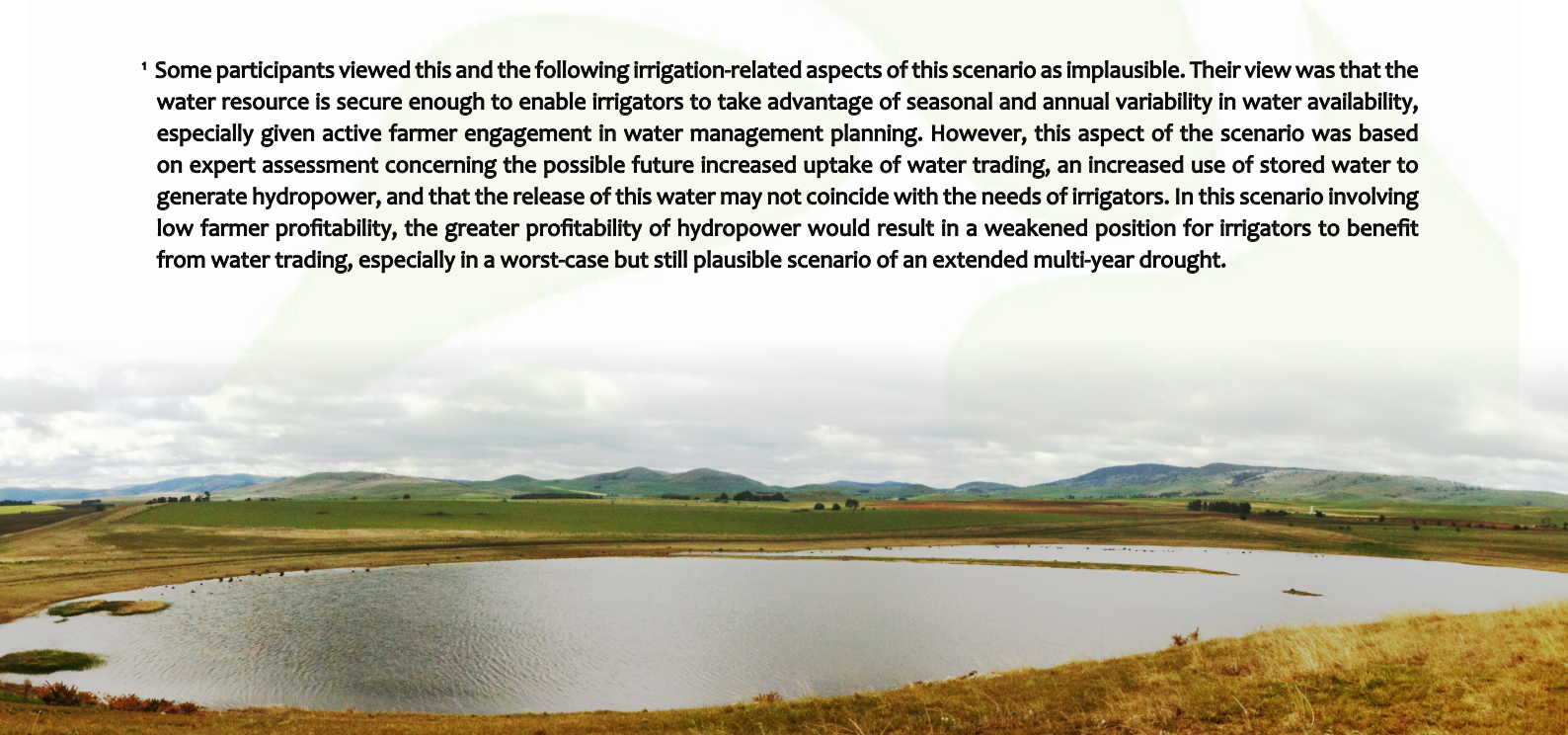
Death by a Thousand Cuts

**Native Grasslands
Extent**
Small increase in area

**Native Grasslands
Condition**
Poor to very poor

Dependent Species
Small decline in
populations,
small contractions and
shifts in distributions

¹ Some participants viewed this and the following irrigation-related aspects of this scenario as implausible. Their view was that the water resource is secure enough to enable irrigators to take advantage of seasonal and annual variability in water availability, especially given active farmer engagement in water management planning. However, this aspect of the scenario was based on expert assessment concerning the possible future increased uptake of water trading, an increased use of stored water to generate hydropower, and that the release of this water may not coincide with the needs of irrigators. In this scenario involving low farmer profitability, the greater profitability of hydropower would result in a weakened position for irrigators to benefit from water trading, especially in a worst-case but still plausible scenario of an extended multi-year drought.





Cha Ching

*High farmer profitability
Low human and social capital*

Water

Using irrigation to compensate for increased variability in water availability is the norm, and pursued vigorously. Increased concentration and corporatisation of farming businesses has resulted in increased concentration of irrigation water allocations. Corporate farming businesses can afford to pay for external expertise to identify technological solutions to improve the effectiveness of irrigation infrastructure and practices, with many consulting businesses competing for these services. Wealthier farmers with multiple and larger properties benefit from a more extensive range of on-farm storages, and are more effectively able to manage and benefit from flood events. Water trading has become a lucrative way to make an additional profit, but this practice privileges irrigation provision and timing to highest profit crops, exacerbating environmental problems associated with timing of release and flows for irrigation. The high profitability of irrigated crops has resulted in an over allocation of water used for irrigation at the expense of that needed to maintain hydrological ecosystem function and for biodiversity conservation. The focus on short-term profits by landholders is beginning to affect the longer term agricultural productivity of some properties due to waterlogging and associated salinity, and affected land managers tend to look for quick-fix technological solutions.

Land and property

Improved profitability has attracted corporate players into the region, resulting in a fewer number of larger farming businesses that are increasingly corporate and/or foreign-owned. Governments encourage new agribusiness land owners by providing attractive conditions for investment in large-scale agriculture. Predominant values and attitudes among landholders have substantially shifted, and most are solely driven by the pursuit of profit and oppose any environmental restrictions on achieving that goal. Land use decisions are no longer influenced by a concern for the local area and its natural and cultural heritage. Social capital and local experiential knowledge is highly eroded as new comers have little sense of place and minimal commitment to place. Local loss of skills and interest in agricultural work has forced land managers to employ overseas workers, which has cost-saving benefits, but the increasingly transient labour force exacerbates break down in social cohesion. The improved ability to hire labour has relieved time constraints on many landholders, enabling them to explore new opportunities to secure improved financial returns. Irrigation and warmer temperatures has enabled the pursuit of a whole suite of new agricultural ventures. Every hectare of land that can benefit from irrigation is used. Those areas that cannot be profitably used for irrigation are less of a priority, but every effort is used to find some way to make a profit from these areas. Landholders invest in new innovations that might help increase returns, including interest in genetic modification of crops to make them more resistant to both drought and the range of diseases that appear during extended wet periods.

Conservation and invasive species

On balance, grassland conservation is a very small part of the land use mix. Grasslands no longer exist on productive land and have become extremely rare. Some time-strapped farmers are willing to abandon use of some of their less productive land, or choose to reserve some of their 'back country' for conservation, as they can make more money by doing this than from any other activity. Different approaches and levels of awareness about invasive species is exacerbating tensions between landholders in the region, with old timers frustrated by the cavalier attitude of the new arrivals, especially in the lesser used 'run country'. Rabbits have become a costly menace, and overgrazing has resulted in increased bare ground, with stop gap measures employed to reduce erosion. Increased presence of deer has led to lobbying by landholders for deer hunting enabling greater income generation from tourism activity on their properties. Government and non-government organisations are treated as service agents, and this increase in client-type relationships prompts private players to enter this small fee-for-service market. There is a minority element among the broader community that see the intensive agricultural development in the Tasmanian Midlands in a negative light, but their protests are ineffective as the contribution of Tasmanian Midlands agriculture to the broader economy ensures most in the community lack interest in hearing about its impact on biodiversity. Financial incentives for conservation tend to be applied only where it can be demonstrated that they can contribute to and not undermine income generation for rural landholders, which often results in the loss of high biodiversity valued grasslands.

Cha Ching

Native Grasslands

Extent

Large decline in area, and non-existent in lowland areas

Native Grasslands

Condition

Remaining grasslands along the foothills are in poor to moderate condition

Dependent Species

Large decline in populations, large contractions and shifts in distributions



People's Republic of Northern Midlands

Low farmer profitability
High human and social capital

Water

Tasmanian Midlands irrigators have formed a cooperative, aiming to facilitate fair allocation among users without jeopardising the sustainability of irrigated agriculture in the region. This cooperative is organised into smaller sub-units to enhance collaboration around a shared resource, whether that be a local pipe, canal or river, and to identify alternative means to secure water availability by combining local hydrological knowledge with that of scientific expertise. Hydropower dominance over water pricing, storage and release has prompted a well-supported campaign for government intervention to support irrigation, pitched at saving the rural heritage of the Tasmanian Midlands. Some irrigators have sold part of their water allocations to collectively invest in trials of alternative irrigation practices. Farmers have become increasingly resourceful in capturing runoff on properties and managing natural water variability through shared and coordinated water storage and retention works within each sub-catchment area. Areas surrounding wetlands and water courses have been revegetated to reduce evaporation losses, providing habitat for recovering numbers of native fauna. Threatened plant species have been successfully translocated and vegetation along rivers help provide shelter and thermal refugia for native aquatic species. There is also increased appreciation of the role of ephemeral wetlands for native plant regeneration, and their flooding attracts native birds which entices fee-paying bird lovers to the property.

Land and property

Declining terms of trade and competition have made almost all farming activities unprofitable, but landholders have energetically taken up the challenge to find alternative sources of income, including through collective bargaining on products sold, payments for ecosystem services such as for biodiversity conservation and carbon offsets, rural escapes and tourism, and other off-property sources of income. A strong sense of place and lifestyle motivation means that most landholders are committed to staying on the land, supporting each other as a community, and inspiring articulation of a long-term positive vision for the region. Strong connectedness has spurred broader community support to defend the rural way of life and to promote rural-friendly and pro-environmental policies. Economic motivation is also very high, and being pursued through ingenuity and solidarity. A number of innovative cooperative enterprises have emerged as landholders pool their resources to help fund the infrastructure needed (for example, small deer abattoir, fine wool handicrafts, etc.). Exchanges with Aboriginal historians has uncovered knowledge about native foods, and local landholders explore ways to adapt their land management practices to nurture these native foods as an alternative additional source of income.

Conservation and invasive species

There is well-developed capacity and interest for good practice conservation management among Tasmanian Midlands landholders, bolstered with support from academic researchers, but efforts are constrained by the difficult financial conditions. The high level of self-organising capacity among landholders has made it much easier for government and non-government organisations to work with these networks, and landholder support for such programs has enhanced their longevity, enabling trust between key actors to be considerably improved. However, it is difficult to translate that political will into government provision of financial incentives, especially for conservation. The prevailing way of thinking among policy developers and the broader community is to rely on philanthropic funding sources for conservation channelled through the highly successful Tasmanian Midlands Conservation Fund. With less land under cultivation there has been an explosion of invasive weed species, and rats, rabbits, cats and foxes have returned as a menace across the increasing areas of under-grazed grassland. However landholders have a high degree of awareness of the damage this is creating, and most volunteer a considerable amount of their time to the physical removal of weeds, and replacement with native vegetation, often working collectively. There is also a concerted effort to protect native animals, including introducing native grazers to help compete against prevalence of rabbits. The increased presence of deer has inspired a group of farmers to seek permission for a deer hunting and meat production facility to provide a local source of good quality cheap food.

People's Republic of Northern Midlands

Native Grasslands Extent

Small increase in area

Native Grasslands Condition

Poor to good

Dependent Species

Small decline in
populations,
small contractions and
shifts in distributions





Marvellous Midlands

*High farmer profitability
High human and social capital*

Water

Irrigated agriculture has become a useful part of the diverse mix farmers are pursuing, with strong localised collaboration among farmers to identify strategies to manage increased variability in water availability. These networks source the best available knowledge to understand their local hydrology, and how their farming activities impact on the environment. Only the best land is used for irrigated agriculture. In other areas, farmers rely as much as possible on shared and coordinated dams and chain-of-ponds water retention techniques to manage water availability. Farmers whose properties cover areas that were once naturally occurring wetlands have the motivation and support to rehabilitate the wetland ecosystems and dependent species to healthy conditions and to incorporate the wetlands system as part of their water use and storage scheme. This includes ephemeral wetlands, which when flooded attracts native birds and fee-paying bird lovers to the property. All these efforts have helped to ensure adequate provision of water for the environment and the maintenance of an environmentally appropriate water flow regime. Landholders with access to the Tasmanian Midlands Water Scheme collectively trade water with hydropower companies to supplement their income. They have also developed strategic collaboration to capture water released for hydropower generation during peak electricity demands for redirection to on-property storages.

Land and property

The Tasmanian Midlands area has become the place to combine the good life with excellent profits. The community of rural landholders is vibrant, enthusiastic, well-educated, well-informed, has a shared vision, and implements long term adaptive programs to achieve this vision. The land has become hotly sought after by farmers from all over Australia, and some landholders have started to sub-divide their properties. Recognising their privileged condition compared with other parts of Australia affected by climate change, many landholders welcome incoming farmers who are committed to strengthening the local economy and the natural and cultural values of the area. Irrigation and warmer temperatures have opened up a whole suite of new agricultural ventures that can be pursued. Vignerons have set up small boutique organic and biodynamic wineries, and the area has become renowned for its high quality local produce, and the associated tourism industry is booming. Landholders experiment with a range of innovative income-generating and value-adding activities, and there is active discussion among landholders concerning sustainable futures, such as carbon neutral farming practices. There is a well-established collective history and use of organic, biodynamic and permaculture farming techniques, with widespread use of associated certification mechanisms to add further value to produce. Innovativeness and entrepreneurship among landholders coupled with available funds strengthens human and social capital among landholders, as well as among government and non-government organisations they work with. This collaboration and active adaptive management has greatly enhanced trust between key actors.

Conservation and invasive species

Landholders and the rural community are supportive of conservation efforts, and actively work with each other and external experts to enhance conservation of grassland remnants and associated biodiversity. This solidarity and commitment has translated into political will at the local level, backed up by commitments at state and federal levels of government, with strong coordination in policy matters related to conservation across the tiers of government. Many farmers also draw on the Midlands Conservation Fund to support their conservation efforts, and are prepared to sign perpetual covenant arrangements to ensure that future generations remain committed to their protection. There is an active landholder-driven 'Friends of Grasslands' group and local networks have formed to manage privately-owned grassland remnants for biodiversity purposes through a range of grazing regimes, including agistment arrangements and monitored rest periods. These grassland reserves provide landowners with added revenue from fine wool production, recreation, education and research. Cooperative relationships with Aboriginal organisations have led to knowledge retrieval about native foods and their health benefits, and new industries have formed to tap this native food potential as insurance to help protect the grassland ecosystems. Tasmanian Midlands landholders are also praised for their innovative approaches to invasive species management, especially in the non-irrigated back country using adaptive grazing management of native pastures that incorporates grazing by deer and rabbits. Landholders meet regularly to discuss and improve their strategies. Increase in deer numbers has helped open up new areas for native grasslands, and sparked an enterprising boutique organic deer meat industry.

Marvellous Midlands

Native Grasslands

Extent

Initial small decline in area, then stable by 2030

Native Grasslands

Condition

Good but altered condition given climate change impacts on grassland composition

Dependent Species

No change in populations, some contractions and shifts in distributions



Acknowledgements

We are particularly grateful for the generosity of all those who have participated in one-on-one 'key informant' interviews and workshops. Throughout the research, we have engaged with more than 150 people who live and work in the region, or are responsible for some aspect of its regulation, or have interests in the future of the Tasmanian Midlands. The development of the scenario narratives would not have been possible without their knowledge, experience and opinions.

In particular, we acknowledge and thank Louise Gilfedder for her guidance and advice on our engagement activities with the people of the Tasmanian Midlands. Her wealth of understanding and empathy for people who live and work in the area has meant that we have involved the right people at the right time, gaining the right information to feed into the scenario planning process. Louise's passion and knowledge of the natural and human ecology of the Tasmanian Midlands has been invaluable.

Finally, we appreciate the contributions to both the consultation process and the production of the background documents by Suzie Gaynor, the hub's Communication Manager. Suzie's talent at taking our text and massaging it into readable, accessible publications has contributed enormously to the success of our communications.

Schedule of consultation and engagement

In their research, the Social and Institutional Futures Team (Sue Moore, Michael Lockwood, Michael Mitchell and Sarah Clement) has liaised and consulted with people from the Tasmanian Midlands and the Australian Alps, and all levels of government with an interest in these areas. The key engagement activities included workshops, interviews, surveys and focus groups as follows:

Key Informant Interviews (<i>Michael Mitchell</i>)	Aug 2012
	Jul & Oct 2013
Stakeholder Interviews (<i>Sarah Clement</i>)	Feb-Apr 2013
Scenario Planning Workshops - round 1	
Tasmanian Midlands	1 Mar 2013
Australian Alps	10-11 Apr 2013
Focus Groups on Governance Options	Feb 2014
Scenario Planning Workshops - round 2	
Tasmanian Midlands	25 Mar 2014
Australian Alps	1-2 Apr 2014

About the Landscapes and Policy Hub

The Landscapes & Policy Hub is one of five research hubs funded by the Australian Government's National Environmental Research Program, 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 and involves researchers from the University of Tasmania (UTAS), The Australian National University (ANU), Murdoch University, the Antarctic Climate & Ecosystems Cooperative Research Centre (ACE CRC), Griffith University and Charles Sturt University (CSU).



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