ADAPTED FUTURE LANDSCAPES: FROM ASPIRATION TO IMPLEMENTATION

Milestone report 2: Current planning and proposed process

27 June 2012

Lead Organisation: University of Adelaide
Partner Organisations: CSIRO, EP NRM Board, SA MDB Board

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1 INTRODUCTION

1.1 FROM ASPIRATION TO IMPLEMENTATION – AN NCCARF FUNDED PROJECT

The National Climate Change Adaptation Research Facility (NCCARF) has recently funded the University of Adelaide, CSIRO Ecosystem Sciences, Eyre Peninsula (EP) NRM Board and SA Murray-Darling Basin (SA MDB) NRM Board to develop a trial NRM planning process. The resultant plan is to be climate change informed and built on the best evidence of regional natural resource condition and community well being. This process will be piloted in the EP and SA MDB NRM regions.

The project team will use processes for facilitating collective change - described here as an envisioning process - to develop a shared sense of how stakeholders should experience the NRM planning process. With this guiding ideal, options for future land use that give the region the best chance of adapting will be identified and maps of current resource condition and projections of possible future condition will also be generated. The envisioning process will occur through a series of workshops with NRM stakeholders.

1.2 PURPOSE OF THIS REPORT

This represents an interim report on progress with:

- Documenting the current way climate change adaptation planning is undertaken in the NRM regions; and
- Describe the first elements of a modified planning process that includes local experience, stakeholder envisioning, identifying indicators of success that reflect the shared vision, components of resilience based planning from other regions and LFA projections.

1.3 ACTIVITIES TO DATE

The following actions have occurred since commencement of this project:

- Development of a project team and steering committee
- Finalisation of the project work plan
- Development of a Communications and End-user Engagement Plan
- Preparation of a communication flyer
- Held envisioning workshops in Adelaide (27 April 2012) and Karoonda (17 May 2012) and set the date for the Port Lincoln envisioning workshop (31 May 2012).
- Held meetings to review current and past planning approaches in Port Lincoln (20 April 2012) and Murray Bridge (7 May 2012).

2 CURRENT CLIMATE CHANGE ADAPTATION PLANNING

Climate change adaptation planning can be approached as a stand alone activity or form part a broader climate change planning process such as with the development of a climate change action plan. Alternately, climate change adaptation can be considered as part of business or natural resource management planning processes of which climate change is one factor to consider amongst many. In South Australia the latter has predominantly applied with climate change being considered as one issue for consideration amongst many in developing a natural resource management (NRM) plan.

2.1 REQUIREMENT TO DEVELOP NRM PLANS

South Australia has 8 NRM Boards that work with communities and the State Government to decide NRM priorities and develop and implement regional plans. Their key functions are to:

- undertake an active role with respect to the management of natural resources within a region.
- promote public awareness and understanding of the importance of integrated and sustainable NRM within its region.
- undertake and support educational initiatives for NRM.
- provide mechanisms to increase the capacity of people to implement programs or to take other steps to improve the management of natural resources.
- prepare and implement a regional NRM plan in accordance with the *Natural Resources Management Act, 2004*.
- keep their NRM plan under review to ensure that the objectives of the *Natural Resources Management Act, 2004* are being achieved.

The South Australian *NRM Act 2004* sets out a number of requirements for NRM Plans, including that:

- a NRM board must prepare and maintain a plan for the purposes of its operations
- a plan must include information of a kind prescribed by the regulations as to:
    - the natural resources within the relevant region; and
    - the state and condition of the natural resources within the relevant region, and related trends; and
    - environmental, social, economic and practical considerations relating to the use, management, conservation, protection, improvement and, if relevant, rehabilitation, of the natural resources within the relevant region; and
    - the management of pest species of animals and plants;

- a plan must include information about the issues surrounding the management of natural resources at the regional and local level, including information as to:
    - methods for improving the quality or value of natural resources within the relevant region, and the health of those aspects of the environment that depend on those natural resources;
    - methods for the conservation, use or management of natural resources within the relevant region;
    - action plans to ensure proper stormwater management and flood mitigation; and

- arrangements to ensure proper management of wetlands and estuaries, and marine resources, with particular reference to the relationships between catchment, wetland, estuarine and marine systems.

The regional NRM plans sit below a State NRM Plan, a draft of which was released on 20 September 2011 for three months consultation. This plan establishes the direction for South Australia in its management of natural resources and is intended for the use of everyone involved in natural resources from land managers, community groups and agri-business to local government, government departments and the eight regional Natural Resources Management Boards. The plan sets strategic state-wide direction; actions will be expressed at the regional level in regional NRM plans. This recognises that every region faces different challenges and opportunities and it is at the regional level that the appropriate decisions are made. The Plan sets goals, indicators, considers future pressures on resource condition and establishes 14 state-wide targets to guide natural resources management in the State.

The vision and goals of the State NRM Plan are as follows:

- Vision - Communities caring for the land, water and sea that sustain them
- Goal 1 - People taking responsibility for natural resources and making sound decisions
- Goal 2 - Sustainable production and use of natural resources within limits
- Goal 3 - Improved condition and resilience of the environment

Question: Does our trial process have potential to influence regional NRM plans, the State NRM Plan, and if the former, at what level? e.g. guiding principles, resource condition targets (the long-term outcomes sought), management action targets (the medium-term outcomes sought) and the actions required to achieve these targets.

2.2 Regional NRM Plans

A region's NRM Plan includes the vision, goals, guiding principles, resource condition targets (the long-term outcomes sought), management action targets (the medium-term outcomes sought) and the actions required to achieve these targets. It also outlines the Plan development process.

In the case of the SA MDB NRM Board's *Strategic Framework* (2007) a vision, broad 'cross-cutting' goals and guiding principles for NRM in the Region were proposed based on the equivalent elements in the *State NRM Plan* (2006), but with amendments to reflect the regional context. Together, the vision and goals support the concept of integrated NRM and landscape-scale management in the Region.

The SA MDB NRM Board's Strategic Framework (2007) also proposed an asset-based structure for the regional NRM plan that was closely followed throughout its development. As a consequence, the regional NRM plan is structured according to five asset classes of People, Water, Biodiversity, Land and Atmosphere, which specifically addresses climate change related matters. For each asset class an asset vision, long-term outcomes and resource condition targets (RCTs), medium-term outcomes and management action targets (MATs), and actions were identified.

The development and documentation of the outcomes, targets and actions—and their inter-relationships - was assisted by the use of a program logic approach[1] and the participation of a wide range of stakeholders. Development of the plans follows a number of steps. The steps for the SA MDB NRM Plan were:

Step 1: Concept Statement
A Concept Statement for the regional NRM plan was released in November 2006 for public consultation and outlined the Board's intention to develop a new regional NRM plan under the NRM Act

Step 2: Strategic framework
The SA MDB NRM Board developed and released a Strategic Framework document for public information which provided initial direction and impetus to the regional planning process proposing a vision, goals and set of guiding principles for the regional NRM plan, as well as the intent to follow an asset-based structure.

Step 3: Program logic and the target-setting process
Initial program logic models for each of the asset classes were developed by the SA MDB NRM Board in-house. The models were then tested and further refined with key stakeholders. These models provided the foundation for the development of quantifiable and timebound targets (RCTs and MATs).

Step 4: Drafting the regional NRM plan
The Strategic Plan was prepared drawing on the significant work undertaken through the logic development and target-setting processes. Background information on the state and condition of the Region's natural resources were collated and presented.

Specialist investigations and consultancies were undertaken in the preparation of the regulatory policies presented in Volume 3: Regulatory and Policy Framework. Of particular note was the consultation undertaken with all local governments in the Region in regard to development planning matters.

Prioritisation of investment choices was guided by an innovative study conducted with the CSIRO Sustainable Ecosystems. This sought to identify priorities for investment, based on detailed analysis of the SA Murray-Darling Basin community's values in regard to its natural resources.

Step 5: Consultation on the draft regional NRM plan
The Natural Resources Management Act 2004 sets out the consultation requirements for a draft regional NRM plan. Copies of the draft plan were provided to bodies identified under

[1] Program logic was used to help design and evaluate plans or programs and aims to record the expected cause and effect relationships between the components of a plan (e.g. between goals, RCTs, MATs and actions).

the NRM Act 2004. A communication strategy was prepared to guide the process and ensure that all regional communities and wider NRM interests were:

- aware of the draft regional NRM plan and its implications
- aware of all opportunities to comment on the draft
- encouraged to contribute their ideas and opinions on its strategic direction and investment choice.

Over 1,900 comments were received during the formal consultation period and feedback from this process significantly influenced the finalised regional NRM plan.

Step 6 - Formal adoption of the plan
The South Australian Murray-Darling Basin Natural Resources Management Plan 2009 came into effect when it was formally adopted by the Minister for the River Murray. At this stage the Plan became binding on the SA MDB NRM Board (and other NRM Boards) and state government agencies.

2.3 How is climate change dealt with in the current version of the NRM plans?

Climate change has previously been addressed in NRM Plans through the development of long-term and intermediate outcomes, associated targets (RCTs and MATs) and the actions required to achieve the asset vision for each of the natural resource assets of the regional NRM plan, of which "Atmosphere" was one.

By way of example, the following long-term and intermediate outcomes, associated targets (RCTs and MATs) and the actions required to achieve the asset vision were described ion the SA MDB NRM Plan for the Atmosphere asset:

Asset vision - A clean and healthy atmosphere with effective adaptation to climate change

Asset components - Greenhouse gas emissions; carbon pollution mitigation; climate change adaptation.

Long-term outcomes (RCTs) sought:
A1: Reduce net greenhouse gas emissions
RCT: Reduce greenhouse gas emissions in the SA Murray-Darling Basin by 60% by 2050

A2: NRM in the Region is adaptive to climate variability and climate change
RCT: 100% of natural resource managers incorporating climate change adaptation into their forward planning or management by 2030

Intermediate outcomes (MATs) and required actions
The following four MATs were developed to help the NRM Board reduce net greenhouse gas emissions.
A1.1: Promote the uptake of renewable energy by the Region's community and businesses

MAT: Voluntary renewable energy use at 20% and support for renewable energy generation in the Region by 2014

Required actions to meet A1.1 are:

- promote renewable energy developments within the Region
- promote energy efficiency strategies within the Region
- promote and raise awareness of demonstration sites
- raise awareness on climate change and mitigation responses

A1.2: Encourage natural resource dependent industries to respond to climate change challenges
MAT: Natural resource affecting industries adopting climate change sector agreements by 2014

Required actions:

- raise awareness of potential climate change scenarios for natural resource based industries and potential mitigation responses
- provide climate change awareness and response training and technical support to key external stakeholders
- promote and raise awareness of industry sector agreements.

A1.3: Demonstrate leadership in energy use efficiency
• MAT: By 2014 increase carbon efficiencies of SA MDB NRM Board vehicle fleet and buildings by 20% and 10% respectively

Required actions:

- conduct an energy audit of SA MDB NRM Board operations
- develop and implement SA MDB NRM Board carbon neutral plan
- promote and raise awareness of energy efficiency and incentive opportunities.

A1.4: Promote the offset of emissions by carbon sinks with NRM benefits (biodiversity and salinity)
MAT: Revegetation for future carbon (CO2-e) sequestration of 126,000 tonnes by 2014

Required actions

- identify, evaluate and promote regional carbon sequestration opportunities for the SA MDB NRM Region
- identify and evaluate carbon trading schemes
- contribute to research on climate change resilient species and planting techniques
- facilitate capacity building activities in relation to carbon sequestration opportunities
- provide incentives for carbon sequestration with NRM benefits
- identify preferred zones for carbon sequestration plantings in development plans
- promote inclusion of environmental plantings in carbon offset markets
- promote practices that increase soil carbon levels.

3 REVIEW OF PAST PLANNING PROCESSES, TOOLS, DATA AND EVALUATION APPROACHES

The project team held two separate meetings with staff from the South Australian Murray-Darling Basin NRM Board and the Eyre Peninsula NRM Board on 20 April 2012 and 7 May 2012, respectively, to review the strengths and weaknesses of the past planning processes and use of tools, data and evaluation approaches. The same questions were asked at both meetings (Table 1) and full notes taken from both meetings. A summary of the key findings is provided below.

3.1 SA MDB NRM BOARD

Processes

The SA MDB region NRM plan took approximately 3 years to complete, with work being done on 4 separate volumes (Figure 1) concurrently during the period. The main steps were:

- November 2006 - Development of the concept statement
- Early 2007 - Developed cross agency working group
- January to June 2007 - Development of the strategic framework through five workshops with board members, staff and NRM groups members.
- March 2007 - Development of a community engagement strategy
- December 2006 to June 2007 - Review of the existing plans (e.g. INRM, catchment, soil board plans, LG development plans)
- April 2007 to May 2008 - Engage wider community on program logic models through 11 theme based workshops
- Apr 2007 to May 2008 - Developed a target working group based on an expert panel approach
- Nov 2007to Nov 2008 - Determined the regions environmental value from a community perspective in partnership with CSIRO (surveys , interviews, mapping values)
- June 2007 to September 2008 - Development of the state of the region report.
- September 2008 - Commissioned a levy analysis.
- February to October 2008 - Developed the regulation and policy framework
- December 2008 to February 2009 – Draft Plan for consultation

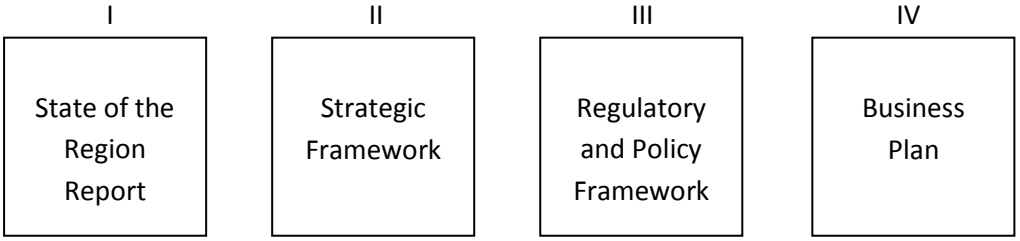


Figure 1. Volumes of the NRM Plan

The strengths of the approach were three fold. First, there was a strong state agency contribution and high level of Board member participation during development of the Strategic Framework. Second, the consultation process was regarded as being excellent with over 1,000 responses received on the draft plan. Third, there were strong linkages between the strategic framework and the monitoring and evaluation framework.

On the other hand, the development of the plan faced at least two major challenges. There was little guidance from state agencies regarding the format of the state of the region report. Perhaps as a consequence a large part of the work conducted on this component by a consultant was redone by the Board. There were also difficulties encountered in the translation of the strategic framework into prioritised actions in the Business Plan. There was an attempt at this through a project run by CSIRO, however, this struck a number of hurdles including that the Board did not have trust in the modelling and the results that were produced were counter to what were commonly held views about where investment should be directed. It appeared that the Board felt it could not justify spending funds in the manner directed by the model. The difficulty in translating the strategic framework into prioritised actions in the business plan appears to have been an ongoing issue since the plan was adopted and remains an outstanding issue.

There has been limited engagement with the plan by state agencies since its adoption, despite their strong participation in its development and it is now unclear as to whether the plan actually guides regional public sector investment in the region at all. A major reason for this is that the State and regional NRM plans do not have the status of each agency's corporate plans and furthermore, no funding was assigned to the implementation of the State NRM Plan. There has also been limited agency engagement with the annual evaluation of the plan.

Information/data

The state of the region report (one of the volumes of the NRM Plan) required the most data but by the time the report was complete the data was already one year old. Access to data was relatively straight forward though and came largely from people already involved with the targeted planning groups. There was also a recognition that while quantitative data had been used where available, there was a growing need to use story based information (case studies) and qualitative information.

Tools

A variety of tools were used through the process of developing the NRM Plan including:

- the program logic tool clear horizons which was applied by staff after a 2 day training session; and
- Interplan, which was used to inform action plan development and implementation.

It was noted that there is a growing push toward resilience thinking, however, it remains unclear to staff what real value it has at a practical, onground level.
There were strong views expressed by NRM Board staff as to what features and functionality they would prefer in future tools, including the ability to inform:

- the state of the region report and translate this information into the target development stage in the strategic framework (e.g. RCTs and MATs);
- priorities for investment at multiple spatial and temporal scales;
- the balance between setting priorities and managing community expectations;
- transference i.e. how much you plant versus how much you clear;
- development of a quantitative evidence base of why you would prioritise an action in one place versus another; and
- the role risk plays in setting priorities for landscape management.

The group discussed the type of engagement processes that are needed to underpin application of the tool. This again highlighted the need to build trust in the modelling tool and support communication of the outputs in a way that the community can relate to e.g. where should and where should we not be placing carbon plantings?

Evaluation

Evaluation at the time of the release of the plan was qualitative and there was no negative feedback, suggesting it was either accepted or people had not read it. The limited comments received were about whether the targets were right.

The plan was viewed as having a positive impact, helping to provide direction for funding applications. The level of ownership was considered high (but not universally so) amongst government agencies but low amongst the community and farmers.

With respect to what could be done better next time, there was a desire to learn how to:

- create more accountability around the State NRM Plan and regional NRM plan;
- engage with the DENR corporate plan, the regional NRM plan and the state IVA framework;
- improve ownership of the plan amongst the broader community; and
- develop and implement the plan so that it plays a greater role in directing funding and investment decisions in organisations other than the NRM Board.

3.2 Eyre Peninsula NRM Board

The Eyre Peninsula region NRM Plan was developed under the direction of a sub-committee of the EP NRM Board. It guided the development of the plan over the period July 2005 to July 2009 with the following important steps:

- July to October 2005 - Committee formed and regional options paper prepared
- April to August 2006 - Concept statement prepared and approved

- March 2007 - Vision statement prepared with support of a Consultant
- June 2007 to Early 2008 - Tendered and appointed a consultant to deliver plan
- August to September 2008 - First draft of the plan developed
- November 2008 to February 2009 - Community consultation on the draft plan
- April 2009 - Amended and approved draft plan
- May 2009 - Minister endorsed plan for implementation in July 2009

The planning process occurred at a time when there was high staff morale (i.e. pre-centralisation of the Board to DENR), the Board members were equipped with increased leadership skills (e.g. Board members were placed in a company directors course) and community consultation was undertaken in a targeted way focussing on likely antagonists.

A number of challenges and limitations to the NRM planning process were also identified, including

- a lack of guidance about the content and structure of the NRM plan and limited tools to support planning and reporting (the latter being retrofitted to the plan using Interplan);

- tensions between establishing a plan that met the requirements of the NRM Act versus developing a plan that could drive on ground action in the region. It was "sold" as a plan for the region rather than an organisational plan, but multiple stakeholders wanted to have input and the negotiations became very complex.

- the long timeframes for approval of the NRM plan (5 years) meant that the NRM Board lost the community along the way. It was reworded many times and contained too much 'spin' as a result with no relevance to the region;

- the unrealistic amount of statutory requirements that needed to be met; and

- that the availability of funds drove investment rather than the direction of the plan.

It is understood that NRM plans now also need to engage with the development of Climate Ready NRM Plans. Key to this will be (a) alignment with the National Corridors Plan (b) resilience thinking and (c) spatially explicit planning for carbon in the landscape and (d) community engagement.

<u>The consultation process</u>

The consultation process occurred over three months and was well attended from across a broad range of stakeholders. It yielded over 1600 comments, many of which were quite emotive. Feedback was captured in a database and entered along with the planning officer's comments and the Board's response. The limitations of the process were that the state of the region plan did not reflect the 'best available' science, the priority strategies were largely influenced by local opinion and partner NRM agencies did not always support the consultation process.

Information and data

It was recognised that there is a significant amount of data available to inform the development of the plan but that not all of it was used. Important to future information gathering is the need to collect only the data relevant to making decisions.

Tools

The NRM Plan was developed using program logic to build the management strategies and reporting approach and the pressure-state-response framework to understand the drivers of the plan and to identify what further planning steps were needed.

The weaknesses in the approach were that the model was not used for implementation of the plan and there was limited connection between the resource condition document and the work plans for individual staff and monitoring, evaluation and reporting arrangements. Perhaps as a result reporting on the state of the regional environment has not occurred, which is meant to be an annual requirement.

The next generation of the tool to support climate change adaptation needs to:

- better link the pressure and response model to resource condition, monitoring, evaluation and reporting;
- enable reporting against different timelines at which demonstrable change can be observed (e.g. 2, 5, 10 years and beyond),
- describe the risk to residents of key drivers;
- explain the connection between measurable targets and steps toward achieving actions that have relevance to individual landholders;
- utilise data that is useful for a specific purpose;
- outline a process for agreeing to high priority assets;
- consider levies and how they are to be used; and
- better prioritise assets and targets.

In considering engagement processes for the next NRM Plan the region needs to start from a better understanding of risk (e.g. environmental, social, property) and the Board needs to have a genuine desire to engage stakeholders in development of the plan, based on an understanding of an engagement framework (e.g. inform, consult and empower). Once engagement begins communication needs to be tailored to different stakeholders and should consider how to respect both local knowledge and scientific facts. There was also a desire to link social benchmarking to biophysical and economic assessments (i.e. linking Pannell's INFERR and social benchmarking).

Evaluation

The Plan has influenced but not driven the work of the EP NRM Board because in the end it was largely a plan that ticked the boxes required under the NRM Act, but lacked the details needed to drive real on-ground action.
To develop a plan that drives on-ground action the following is required:

- a vision and set of assets that are agreed upon by the region's stakeholders;
- the plan must be structured so that different components are written in a way that different audiences can understand and relate to;
- effective monitoring and evaluation of assets;
- improved communication and engagement strategy;
- greater focus on resilience and risk;
- use of scenario planning to look at tradeoffs between different options and the resultant costs and limitations;
- improved information about climate change projections.

4 REVIEW OF RELEVANT STATE AND FEDERAL INITIATIVES

The aim of this project is to trial and encourage adoption of a modified climate change informed NRM planning processes. While this requires understanding of changes that may occur to existing NRM planning processes, consideration must also be given to other Federal and state initiatives that will influence the planning approach.

4.1 REGIONAL NATURAL RESOURCES MANAGEMENT PLANNING FOR CLIMATE CHANGE FUND

At a national scale, the Australian Government's Regional Natural Resources Management (NRM) Planning for Climate Change Fund, an initiative under the Clean Energy Future Plan, will provide support for regional Natural Resource Management (NRM) organisations to incorporate climate change mitigation and adaptation components into existing regional NRM plans.

The Regional NRM Planning for Climate Change Fund will fund:

- NRM regions to plan for climate change impacts;
- production of NRM plans in each region to a highly professional, nationally consistent standard, to guide where biosequestration projects (tree plantings, avoided deforestation) should be located in the landscape to avoid unintended negative impacts and maximise carbon co-benefits for biodiversity, water and agricultural production; and
- research and analysis to produce regional level climate change information in the form of scenarios on regional climate change impacts.

The fund is divided into two streams:

- Stream 1: Will provide $28.9m over five years to support the 56 regional NRM organisations revise existing regional NRM plans to help identify where in the landscape adaptation and mitigation activities should be undertaken. This stream will be administered by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC);

- Stream 2: Will provide $15m over five years to support development of regional-level information in the form of scenarios about the impacts of climate change (water, temperature, storms) which can be used for medium term regional NRM land use planning. This stream will be administered by the Department of Climate Change and Energy Efficiency (DCCEE).

DSEWPC is currently developing a model for the roll out of climate ready NRM plans. This will be guided by experts on an Advisory Group. It is understood that by identifying where in the landscape adaptation and mitigation activities should be undertaken, NRM plans will be used to guide where investment in projects under the Biodiversity Fund and the Land Sector Package in general is directed.

Question: How will the climate ready NRM planning process influence NRM Plans? Will it be through influencing guiding principles, resource condition targets (long-term outcomes), management action targets (medium-term outcomes) and the actions required to achieve these targets? What else is known about the requirements of this Fund?

4.2 South Australian Government Climate Change Adaptation Framework

The project is consistent with targets under the state strategic plan and in particular Target 62 – "Develop regional climate change adaptation plans in all State Government regions by 2016". This project also needs to be consistent with and address the policy direction of the SA Adaptation Framework (Action Plan for the Climate Change - Adaptation Framework in South Australia 2011-2014), South Australia's Greenhouse Strategy (2007-2020) and the broader state-wide context of climate change vulnerability assessment.

Table 1. Summary of policies, plans and legislation at a federal, state and regional level relevant to this project.

	Federal	**State**	**Regional**
Relevant policies, plans and legislation	Regional Natural Resources Management Planning for Climate Change Fund	South Australia's Strategic Plan South Australia's Adaptation Framework South Australia's Greenhouse Strategy NRM Act 2004 requirement to develop a State NRM Plan	NRM Act 2004 requirement to develop regional NRM Plans

4.3 KEY FINDINGS TO DATE

Review of current NRM Plans, relevant federal and state government policy and meetings with people involved in development of NRM plans in the SA MDB and EP has revealed a number of key insights that need to be considered as this project is further refined in the coming months. These are outlined below. A key point is that the success of an NRM plan is determined not just by how it was developed from a technical standpoint, it is how the development of the plan is "experienced' (e.g. do key stakeholders have trust in the process, do they feel they were consulted, do they have confidence in the results).

What is a climate change informed NRM Plan? Names like carbon ready, climate ready and climate changed informed NRM planning are often used interchangeably. Yet this risks confusing projects that seek to develop climate change informed NRM plans. This must be countered by asking stakeholders what they mean by "climate change informed" NRM planning and even NRM planning itself. It remains unclear whether NRM Boards will respond to Federal Government directives to make NRM plans climate change ready by developing stand alone carbon investment plans or whether this will be done by modifying the existing plan.

Is the plan for the region, the Minister or the NRM Board? Ultimately there is only one NRM plan that needs to be prepared per region (with multiple volumes). Yet there is much debate about how to strike the balance between preparing a plan that meets the requirements of the NRM Act versus one that is considered relevant and useful to the community and that can drive on-ground action. There is also a difference between a plan for the region and one for the Board. Understanding "what" plan is being informed is essential for the relevance of the project outputs.

What part of the planning process are we contributing to? Without timing, a useful product will be of little use to end users. NRM plans in South Australia are developed under the NRM Act and must be reviewed every 5 years and re-written every 10 years. The Business Plan is reviewed annually. Modelling outputs from this project and the envisioning process could be used to directly inform the strategic review, be used to prepare the annual business plan or only used in the 10 year review of the NRM Plan. The planning process has been applied in different ways in different regions such that regions like Adelaide Mt Lofty Ranges NRM has already completed its NRM plan review, EP is using this project to start the review and the interaction with the SA MDB planning process still needs to be determined.

How to connect the vision with on-ground action? A common theme for both planning processes was the challenge encountered in trying to link development of a high level vision with developing and implementing a more operational business plan. The translation from one to the other appears to be at the interface of the Strategic Framework and the Business Plan where prioritisation of actions occurs. This is a difficult step because the actions developed by a broad range of stakeholders needs to be prioritised by the Board.

Both scientific information and local knowledge have a role to play in informing decisions making. Most of the methods developed by planners and scientists have a strong scientific basis to them. Where the results of modelling using scientific data clash with local observations or expectations there is potential for mistrust in modelling results. Clearly this is difficult to address because local

anecdotal knowledge can be subjective. Even though this may be the case, recent plans contained priority strategies that were largely influenced by local opinion and so this must be addressed. Incorporating local knowledge and qualitative data therefore becomes an important feature of future landscape scale analyses.

Continued engagement with end users? This project has had a strong focus on end user engagement as already evidenced by briefings with end users. Based on demand and feedback from previous meetings, this will now continue with state and federal agencies throughout the duration of the project. A further result outcome of previous briefings will be the addition of a South Australian Department of Environment and Natural Resources staff member onto the project steering committee, in addition to the existing representatives from the two NRM Boards.

5 THE MODIFIED PLANNING PROCESS

5.1 CONTEXT

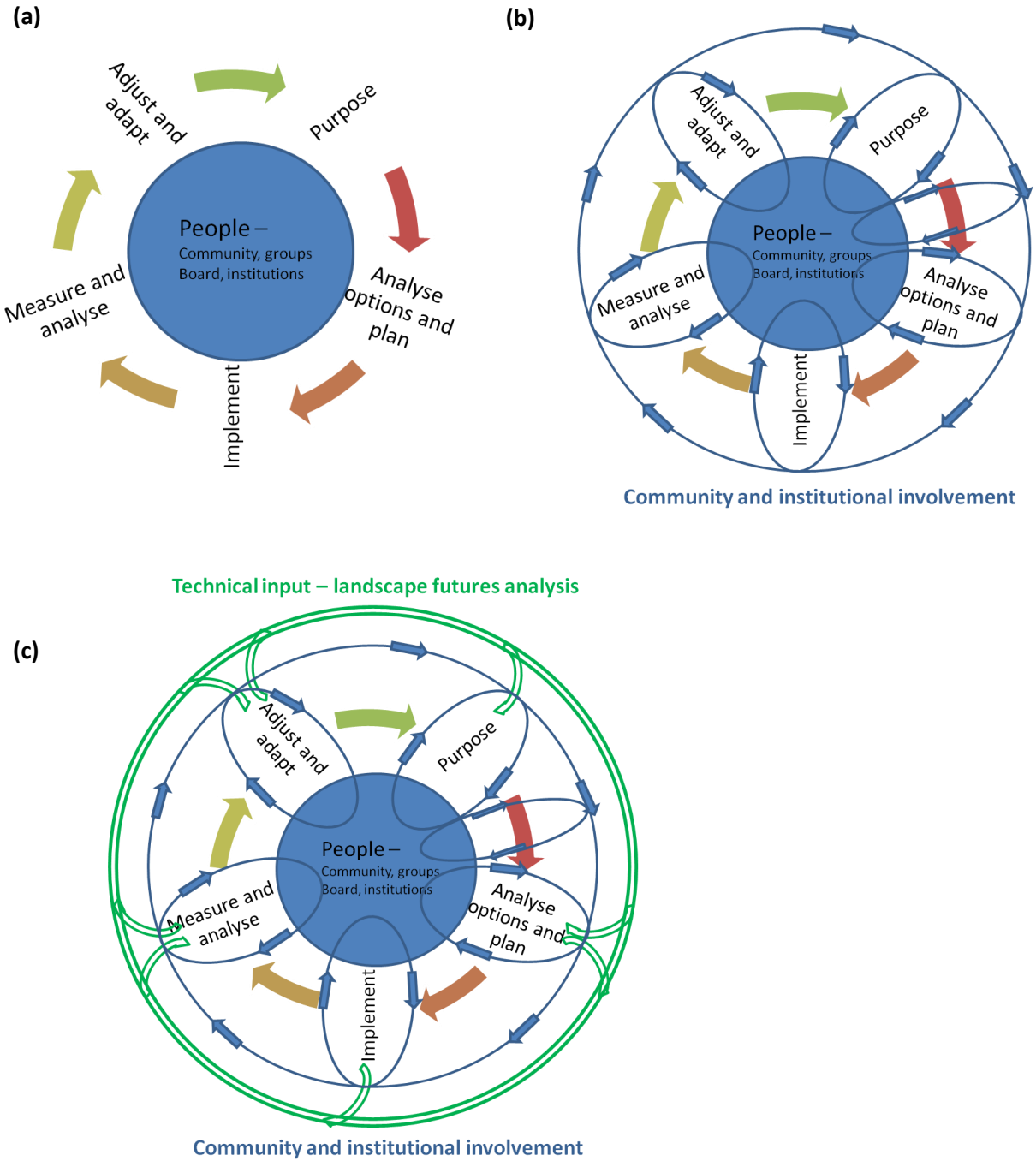
Natural resource management planning and climate change adaptation planning can both use scientific data and complex modelling tools to describe future landscape scenarios. These scenarios can incorporate different future climates, carbon prices, commodity prices and other variables and weigh up alternate land use management options. The aim of developing these scenarios is to inform implementation plans and drive on-ground action. However, experience shows that getting the science right is not enough and that without engagement of key stakeholders on ground action is unlikely to occur at best, and at worst, stakeholders can be alienated from the process and reject the science outright. Future land use planning approaches, whether they are designed to support NRM planning or climate change adaptation planning need to consider how to integrate social science and biophysical science into the planning process.

5.2 THE APPROACH

The modified planning process, described here as the Adapted Future Landscapes "Approach" brings together previously separate processes, to establish a new participatory approach to land use planning that can be used either to inform NRM planning or climate change adaptation planning. It combines (1) envisioning, which seeks to establish how stakeholders want to experience the planning process, (2) analysis of the motivation for an organisation to undertake planning, including the purpose of the planning process and the outcomes and outputs required (3) the Landscape Futures Analysis method, which combines linear programming optimisation with scenario analysis to quantify the environmental, economic and social impacts associated with achieving environmental targets, on a landscape scale.

The starting point for the Approach is a traditional management planning cycle, which forms the basis of most/all planning approaches (Figure 2a). The planning cycle is encompassed by a process for community and institutional involvement, which in the case of this Approach is envisioning (Figure 2b). The integrated planning and community and institutional involvement process is then periodically informed by technical input from landscape futures analysis (Figure 2c).

Figure 2. The Approach (a) the management planning cycle with people at the centre, (b) integrating community and institutional involvement in the planning cycle and (c) technical input from landscape futures analysis added to planning cycle.



5.2.1 MOTIVATION AND PURPOSE OF THE PLAN

As illustrated in Figure 2 the core purpose of the plan is to have people affected through implementing the plan at its core and to have them involved at all appropriate stages of this cyclical system management process. Developing this conceptual construct helps emphasise what outputs and outcomes are expected and it highlights that any plan is not done in isolation of previous experience. It is therefore possible to learn about those actions that worked and those that did not. Importantly there is the explicit recognition of the critical involvement of different expertise in an iterative learning and developing process. To be successful, the people responsible for managing this process need to be aware of the important values that all involved will be looking for. It is highly unlikely that the desired outcomes of the plan will be fully achieved if those involved don't experience a process that is inclusive, straight forward, credible, acknowledging and trustworthy.

There are at least three audiences for establishing the purpose of the plan. There is the team responsible for developing the plan, which in the case of an NRM Plan is the NRM Board staff and Board members. Then there are those involved providing process and technical advice and then the broader stakeholder group who will be initially involved with the envisioning process.

5.2.2 ENVISIONING

Developing a values rich vision

The traditional one-line 'vision statement' is analytically developed, handed down 'from the top' at the beginning of a planning process, and progressively left behind as the process unfolds. Stakeholders are invited to 'buy in' to the vision, but it is seen as disconnected from the plan..."Vision, Mission, Values" are seen as precursors to planning and implementation, but separate from them.

Envisioning brings together representatives of all the stakeholder groups to co-create a shared vision and prompt action to bring it into being. Rather than the high-level description of a hypothetical end-point, the shared vision reflects the things that are most important and that we value most highly. In other words, it is a story rich with our shared values.

Stakeholders may differ in terms of their individual, operational perspectives, but the values-rich vision that they create together tells the story of the 'whole' and provides a shared, interconnected context for the whole planning process. In fact, an important outcome of the process is that it brings people together around shared values, rather than dividing them.

5.2.3 INDICATORS OF PROGRESS

In order to build a bridge from the values-rich vision to action on the ground, participants identify the 'core messages' of their shared vision. Around each core message, a small number of 'indicators' of progress are developed in response to the question "What will we observe if we are making good progress towards bringing our shared vision into being?"

These are lead, not lag, indicators and those identified by participants are often qualitative and subjective rather than quantitative and objective. Indicators are chosen carefully, with the knowledge that the indicator, itself, is likely to affect the system that it is designed to monitor. It is also recognised that an indicator may not be 'right' – participants will continually refine or replace

indicators as they learn about the behaviour of the complex social-ecological system they are engaged with.

In addition to providing an indication of progress towards realising the co-created vision, indicators also contribute to the decision-making process that selects strategic pathways for action – if indicators reflect what we hope to observe as we bring our vision into being, then which actions are most likely to produce those signs of progress?

5.2.4 LANDSCAPE FUTURES ANALYSIS[2]

Formalise the envisioning indicators into broad NRM targets

Qualitative indicators developed during the envisioning assess the successful implementation of the shared values-rich vision about the experience of the planning for climate change adaptation. To link this to the NRM plan (or climate change adaptation plan) requires another iteration of envisioning, lead by the NRM Boards with their community stakeholders focussing on the question "How do we really want to experience living and working in our landscape?" The envisioning follows the same model outlined above to identify core messages (or key values) embedded in the co-created and shared vision, and lead discussions to develop indicators of progress for each community. It is at the point of considering indicators and selecting strategic pathways, that the Landscape Futures Analysis tool is added to the envisioning approach to shape an approach that integrates both the best of physical science and community engagement to facilitate on the ground action.

This additional iteration of envisioning (including indicator development) requires capacity building within the NRM Boards to enable them to engage with their local communities about their landscapes and use the Landscapes Futures Analysis interactive tool to explore different scenarios.

The process therefore needs to bring together the values indicators with the quantitative measures that will guide priorities and investment and also be another set of measures of success. The outcomes are therefore couched in terms of physical actions that are seen to be credible and sensible and that the people involved trust and respect the decisions that were made. In setting the priorities for actions within the plan there will be recognition that there needs to be consideration of indicators of progress with time frames of 20 years and intermediate outcomes with timeframe of 1 to5 years arising from previous and the current regional NRM plans that are required by the State NRM and Strategic plans. Not all envisioning indicators about the desired future landscape will or can be mapped into NRM objectives but some will provide broad regional objectives needed for the next step of pathway analysis. Examples are provided in Table 2.

[2] Landscape Futures Analysis provides an assessment of regional and rural land use management options, and does not extend to marine based systems or consider tradeoffs such as between infrastructure or health.

Table 2 Mapping of envisioning indicators to equivalent NRM objectives

Envisioning indicator	**NRM objectives**
Adaptive, innovative and productive landscapes	Support resilient farming systems Protect high value production land Decrease in soil erosion risk
Native vegetation	Native vegetation re-established in priority areas
Biodiversity	Protect, restore and expand ecosystems
Facilitate changing land use regimes in response to climate change	Understand impact on land uses to climate change

Choosing the land use pathways within the landscape futures analysis – Land, water and biodiversity objectives

The concept of rural community trajectories, pathways and transitions (Wilson, 2010) to obtain land uses with multiple benefits (economic, social and environmental) across the landscape provides a conceptual model for the NRM planning process. Given the current state and stock of resources which are spatially distributed, a multitude of land use pathways can be used to transition to either weaker multifunctional landscapes which increase the vulnerability of landscapes, or stronger multifunctional landscapes which help rural communities flourish. Wilson (2010) suggests that strong multifunctionality is best understood as pathways that enable the emergence of resilient and sustainable rural communities. The concept of resilience and pathways to improve it are well suited to land use change and NRM planning. This concept provides a process that links community learning with a willingness to take responsibility and ultimately, more control of rural development pathways. The outcome of this process is rural communities with improved adaptive capacity and greater resilience (Wilson, 2010).

While the shared vision, indicators and formalised NRM objectives help frame qualitative planning boundaries, there is a need to understand the impact of different goals and policy options on not only the landscape but the social-ecological system itself. These questions can be addressed through computer modelling. Similarly, planning for competing land, water and biodiversity objectives should take place at a landscape level (a whole of landscape process) but also incorporate and consider inputs at subregional and local scales. These different scales account for variation within regions and help identify how alternative pathways interact with this regional variation. Planning for and analysis of these objectives is dependent on the interaction of a range of factors in this study identified in land, water, biodiversity and climate change categories (Table 3).

Table 3. Categories and factors affecting pathways to NRM objectives

Category	**Factor**
Land	Commodity and carbon prices, erosion risk, changes to groundwater
Water	Exclusion areas based on state water allocation planning policy, effects of drainage on quality
Biodiversity	Species and native vegetation extent, connectivity and magnitude of areas,
Climate change	Projections on impacts of the three categories within the region and sub-regions

Understanding the range of pathways for a region and its sub-regions is dependent on the current natural resource base or state of the region. This provides a starting point from which a range of pathways and alternative land use options can be identified. The viability and potential impacts of these different pathways can then be examined by identifying short term land use options and how these may play out in the long term under potential future scenarios (e.g. climate change, market changes and policy options). Alternatively, the method of backcasting can be used which involves focussing on future opportunities or constraints to give direction for either planning for or avoiding certain land use pathways. Analysing the impacts of these future scenarios on potential pathways identifies their long term viability and significance. Applying these methods helps identify land use pathways based on possible landscape futures so that ideas and strategies for regional NRM planning can be discussed with an informed evidence base. Engaging within the community with these scenarios facilitates an 'adaptive change process' that will assist in 'implementation' or decision making at the micro level that forms the emergent strategy at the macro level.

5.3 APPLICATIONS OF THE APPROACH

While envisioning leads to an ongoing engagement process that has general and widespread application, the landscape futures analysis can provide a range of different outputs that may be of interest to NRM or climate change adaptation planners. These are as follows:

Establishing the "State of the Region"

Initial investigation of the broad objectives for an NRM or climate change adaptation plan can be achieved with the use and analysis of baseline spatial datasets. This step utilises spatial data to describe the state of the region presently and the spatial extent of the past and current on-ground activities. A spatially based sensitivity analysis provides a "first pass" to prioritise areas based on the base layer information. This analysis quantifies "where" and "how much" land use change can occur at the current time to possibly achieve the broader NRM objectives without incorporating constraints.

Outcome: Maps of priority areas based on sensitivity analysis of single input base data sources. Summary tables of base layer specific statistics extracted by NRM region and sub region to help report on the current state of resources. For the user it provides an initial step in understanding the significance (power) of using spatial data in decision making.

Targeting short term investment decisions in an NRM business plan

To investigate intermediate outcomes over a 1 – 5 year timeframe a spatially explicit analysis will integrate base layers of competing resources based on user defined priorities (undertaken in the state of the region) and factors that affect the adoption of particular land use pathways (Table 3). For dryland agriculture, spatial priorities can be identified based on land (production, erosion risk, carbon sequestration), water and biodiversity data layers. Alternative priorities, pathways and trade-offs can be examined by changing the magnitudes of the interaction factors and NRM objectives (e.g. % revegetation targets). Output of these priorities provides input into targeting short term investment decisions in the NRM business plan.

Outcome: Maps of spatial priorities, areas of trade-offs based on a range of interaction factors and NRM objectives within the current climate. Summary tables of statistics quantifying the trade-offs extracted by NRM region and sub region. NRM planners to identify a variety of land use pathways.

Impacts of climate change on long term decision making

Spatial modelling of the impacts of climate change can inform longer term planning (e.g. 20-100 years). Scenarios have been developed for the years 2030 (+2˚C, -15% rainfall, 550ppm CO_2) and 2070 (+4˚C, -25% rainfall, 750ppm CO_2). These scenarios and the landscape futures analysis can be used to explore land-use trajectories such as changing levels of production or impacts on biodiversity. Alternative priorities and trade-offs can be identified by changing the magnitude of interactive factors (Table 3) and NRM objectives (e.g. % revegetation targets).

Outcome: Maps of spatial priorities, areas of trade-offs based on a range of interaction factors and NRM objectives to the years 2030 and 2070. Summary tables of statistics quantifying the trade-offs extracted by NRM region and sub region.

Comparisons between the outcomes of the short term and long term decision making – strategic and tactical options

Spatial and temporal land use prioritisation through landscape futures analysis at the short and long term decision points provide an illustration of what can be potentially achieved for the identified NRM objectives. The emergence of potential land use pathways are analysed through this forecasting method and as an end product provides a visualisation of a desired future for the region. The incorporation of backcasting can help understand options for achieving this future by connecting the future to the present by illustrating what land use pathways need to be established. Undertaking this method can highlight trigger points of land use change in different regions and understand what can be achieved or what can be avoided. Overlaying these spatial priority layers provides evidence of long and short term land use continuity which can inform the strategic and tactical focus of the region.

Outcome: Maps of potential land use pathways for the region based on forecasting (landscape futures analysis) and backcasting methods. Summary tables of statistics quantifying the trade-offs extracted by NRM region and sub region.

REFERENCES

Wilson, G. (2010). "Multifunctional 'quality' and rural community resilience." Transactions of the Institute of British Geographers **35**(3): 364-381.