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Landscape Futures Analysis

Planning to thrive: land uses to suit a changing climate and carbon economy

SUMMARY

Context

How we use our land and other resources is constantly changing, whether it is a major shift (such as from agriculture to urban) or more a subtle movement (such as increasing the area sown to a particular crop).

The factors driving changes are as varied as:

- new knowledge and technology
- changing markets or shifts in the economy
- new regulations
- changes in the environment.

Inevitably, changes are linked. A change in one factor (e.g. increased forest plantings) will influence others (e.g. water run-off and infiltration).

Some current drivers of change include the prospect of climate change, rapidly evolving energy policies and the development of markets for sequestered carbon; each brings a degree of uncertainty.

It is difficult to comprehend how each factor on its own may affect land use, let alone how they will interact, and what the flow-on effects of change will be. It is not possible to predict the future with certainty, but we must still plan for it.

Landscape Futures Analysis is a structured, science-based way to work through such complexities to better understand what the future may hold – the opportunities likely to arise and the challenges to be managed.

It does not make predictions about the future but allows users to investigate alternative future scenarios while asking 'what if' questions. Questions such as: "What if the climate changes as projected, and carbon was fetching $20/tonne: would it be better to grow wheat or sequester carbon in our district? What if carbon was fetching $30 or $50 a tonne?"

HIGHLIGHTS

Landscapes are always changing – and changes are interlinked.

Landscape Futures Analysis examines alternative future scenarios with 'what if' questions. It generates possibilities; it doesn't predict the future.

Landscape Futures Analysis is a rigorous, multi-featured, science-based planning tool.

Purpose

Landscape Futures Analysis is designed as a planning tool for regional Natural Resource Management (NRM) bodies. The information needed for 'climate-ready' or 'carbon-ready' plans enables people to identify:

- Vulnerable assets and critical linkages.
- Opportunities for new or adjusted land uses.
- Trade-offs that may be required.
- Priorities for investments by gaining a better understanding of where and where not to invest.
- The types of programs and partnerships likely to be needed in the future.

Besides building more cost-effective NRM programs, Landscape Futures Analysis is proving useful for:

- Issues and options for landholders. At a sub-regional scale, it is being used to help individual farmers assess future options.
- Implications of changes for industries, communities and governments. Local government, regional development organisations and industries, can plan to promote, or capitalise on, desirable changes while determining how to respond to challenges.

Applications

Landscape Futures Analysis has shown how external factors, such as climate change and a price on carbon, may drive changes to our landscapes.

These changes may be in land use, hydrology and the availability of water, the distribution and abundance of plant and animal species, and regional economies and communities. The science-based analysis has shown the importance of:

- understanding the interactions between the components of any landscape
- assessing trade-offs and setting priorities
- developing adaptation plans to manage risks and optimise opportunities
- clarifying the roles of different groups and the collaborations required for a 'climate-ready' future.

Landscape Futures Analysis can make important contributions to climate change adaptation planning in any part of Australia. It has potential to be a valuable contributor to the development of resilient communities, sustainable land uses and healthy environments across the nation.

Outputs

Maps are the main outputs from Landscape Futures Analysis. They clearly show how different locations may fare under alternative scenarios, helping people to 'connect' with the information and immediately see how it applies to 'their patch'.

The analysis can also generate graphs and reports.

Regional groups will be able to generate their own basic scenarios and call on specialists for more complex analysis involving multiple variables and scenarios.
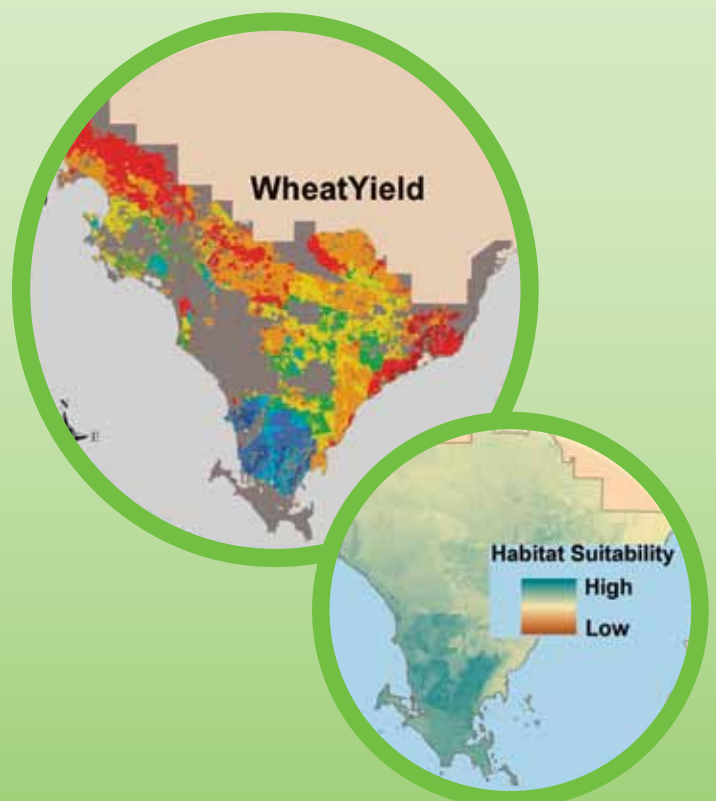
Components

Landscape Futures Analysis consists of several components:

- **Baseline data** – information about the region. This will include information on natural resources, economic and social features.

- **Landscape systems** – modelling the interactions between elements of the landscape. Models of climate change are coupled with other models (e.g. wheat production, economics and species vulnerability) to generate alternative future scenarios.

- **Landscape Futures Analysis** – the development of alternative scenarios of the future and presenting the information as maps and/or graphs. This involves:

  - developing alternative primary scenarios, e.g. the effect of different prices on profit or the vulnerability of different species to climate change

  - analysis of multiple variables and their interactions, e.g. the likely response of producers to different combinations of climate and carbon price, or the optimal land use to achieve different objectives,

  - selecting appropriate formats to present the results.

DEFINITION

Landscapes ...

have physical, social and economic dimensions. Their components range from natural resources such as soil, water and native ecosystems to crops and livestock, as well as people and communities. Landscapes also include the built infrastructure and economic activity.
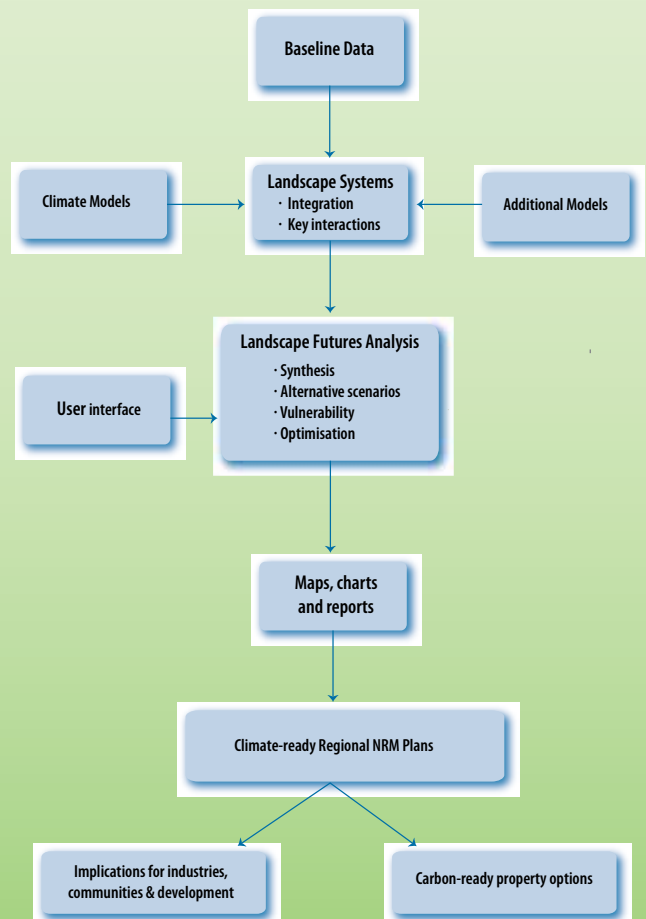
Process

People involved with developing Landscape Futures Analysis have found the experience as informative and rewarding as the end result.

Every application is a collaborative effort with numerous partners. Researchers steer the technical components but regional NRM planners and local resource managers and landholders provide essential local knowledge as well as highlighting the questions for Landscape Futures Analysis to answer.

The highly collaborative approach results in researchers and potential users all learning and improving their capacity for such work. It also contributes to the development of a better and more robust product.

Landscape Futures Analysis process flowchart.

Baseline Data

Climate Models → Landscape Systems
· Integration
· Key interactions ← Additional Models

Landscape Futures Analysis
· Synthesis
· Alternative scenarios
· Vulnerability
· Optimisation
User interface →

Maps, charts and reports

Climate-ready Regional NRM Plans

Implications for industries, communities & development

Carbon-ready property options

Benefits

Landscape Futures Analysis has contributed to:

- **Awareness and understanding**. It has raised awareness of climate change projections and understanding of the likely consequences.

- **Engagement and relationships**. Researchers, industry and community groups have collaborated with local, regional, State and even national level administrative agencies.

- **Clarity and confidence**. Understanding the risks and opportunities that are likely to arise has generated confidence to deal with the future.

- **Increased capacity**. Researchers, community and industry representatives, planners and administrators have all enhanced their skills through working with and being involved in Landscape Futures Analysis.

- **Clearer roles and responsibilities**. Landscape Futures Analysis has shown that there are roles for organisations and institutions to:
  - share and communicate information
  - develop skills and understanding
  - facilitate and mentor positive changes – including the removal of any barriers
  - provide appropriate strategic direction, infrastructure and services
  - install appropriate checks and balances to manage unwanted changes.

- **Adaptation planning**. The regions involved in the Analysis are now able to instigate further, tightly focused, strategic planning, as well as immediately applying the findings for their own planning use.

- **Spin-offs**. New insights have strengthened the importance of ancillary projects, e.g. the Eyre Peninsula Regional Sector Agreement through the Future Farming Landscapes project.

Collectively, these benefits will ultimately result in more resilient landscapes, characterised by:

- **Functioning ecosystems** – maintaining natural environments and crucial natural cycles such as those associated with water, carbon and nutrients.

- **Sustainable livelihoods** – fitting land uses with the environment and economy, and managing natural resources such as soil, water and vegetation in sustainable ways.

- **Informed, confident and proud communities** – people with shared understandings and well-founded plans for the future.

Planning for the future

Landscape Futures Analysis offers exciting opportunities for regions and industries across Australia as they plan for their future. It enables people to systematically assess options and to consider how changes (e.g. in climate, in the prices of commodities - including carbon, or in conservation priorities) may – individually and collectively – affect land use.

That understanding paves the way for strategic planning, investment and development planning, and the design of programs to build the capacity of landholders to adapt and thrive under changed conditions.

To see how Landscape Futures Analysis can help your planning for the future, contact the Landscape Futures Program at the University of Adelaide or CSIRO Ecosystem Sciences.