Building resilience into agricultural businesses in the Limestone Coast

Planning to adapt to a more variable climate

It is important to recognise that changes in climate patterns have always happened and that change will continue to occur. Although the projected changes in climate over the coming decades are greater than have been experienced since European settlement in Australia. There is natural variability in the climate of the Limestone Coast, and it is projected that climate change will create a different future climate with warmer and drier conditions. It is important for those working in primary industries to acknowledge the predicted changes and use the information to plan for the future to ensure their businesses are flexible and sustainable. To prepare businesses for climate change it is useful to look at climate projection models to assist with undertaking risk assessments and assist with selecting adaptation options.

Farmers, fishers and foresters are resilient and have an amazing ability to adapt to changes in weather conditions. Is your business ready to adapt to climate change?

What is Climate Change?

Climate change is a consequence of gases such as carbon dioxide, methane and nitrous oxide being released into the earth's atmosphere. These greenhouse gases trap the sun's energy in the atmosphere. Greenhouse gases occur naturally as well through human activity.

The more greenhouse gases there are, the more of the sun's energy is trapped and the greater the rate of change.

Key climate projections

Rainfall

- *Trend in decrease in Average Annual Rainfall:* Rainfall is projected to decline by 4.8% and 6.8% compared with baseline conditions by 2050 and 2070, respectively, under the intermediate concentration pathway.
- *Longer dry spells interrupted by heavier rainfall events:* Climate projections show an increase in daily precipitation intensity and an increase in the number of dry days, suggesting that future rainfall patterns will have longer dry spells interrupted by heavier rainfall events.
- Projected lower spring rainfall

Temperature

- *Increase in extreme temperatures:* An increase in the frequency of very hot days and nights is likely. Extreme heat could increase from 21 days per year over 3°C to 31 days per year by 2070 under the intermediate concentration pathway.
- *Rise in average temperature:* Median annual maximum temperature is projected to increase from baseline conditions by 1.1°C by 2050 and 1.4°C by 2070 under the intermediate concentration pathway

Evapotranspiration

- *Projected to increase over South Australia:* Evapotranspiration is the combination of evaporation from soil and water surfaces, and transpiration from plants. When these changes are combined with the projected declines in rainfall, an increase in aridity and drought occurrence is likely.

Changes in severe weather events

- *Higher bushfire risk:* the number of severe fire risk days is projected to increase by 36%.
- *Higher heatwave frequency* – increase in consecutive days over 35 °C
- *More frequent heavy rainfall events* (5%) often after long dry spells

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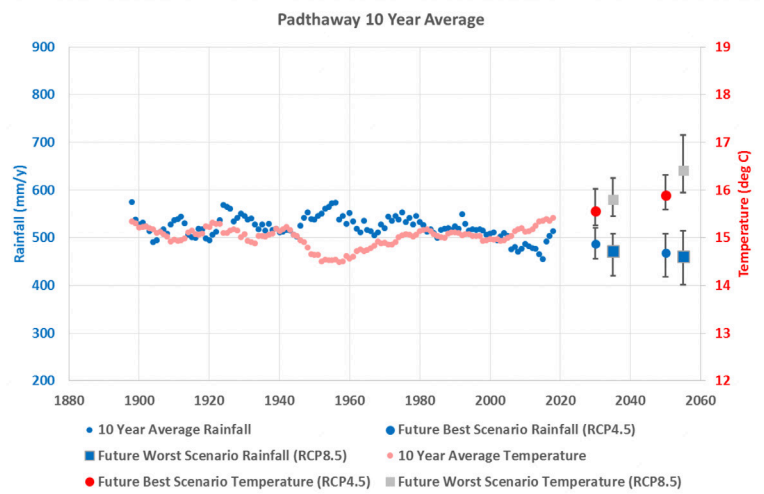
Climate projections

Climate projections are computer model simulations of the climate. Forecasting precisely what the future climate will be is not possible. However, complex models of the climate are used to project what future conditions might be like. These models take account of how much greenhouse gas might build up in the atmosphere over time as a result of industrial activity and changes in land use (such as removal of forests).

Climate predictions have been modelled for specific areas across the Limestone Coast region. Figure 1 shows the 10 year Average Graphs for Padthaway. This graph includes past recorded temperature, rainfall data and projections for 2030 and 2050. There is a clear trend of increasing temperature and decreasing rainfall projected. More regionally specific data for a variety of locations are available from the Limestone Coast Landscape Board website.



This shows the climate has gradually changed over the last century. The future projections are that of temperature increases and reduced annual average rainfall.

Agricultural businesses have demonstrated their resilience through adapting to the past climatic changes.

Acknowledging the future projections allows a business to plan further adapt and prepare for the future.

Figure 1. Padthaway weather monitoring station. The graph shows a 10-year running average of annual rainfall (blue) and annual average temperature (pink) for the period 1899 – 2018, together with predicted range of future average temperatures and rainfall for 2030 and 2050

What these projections may mean for agriculture in the Limestone Coast

Agricultural businesses are highly influenced by weather conditions. The projected changes in climatic conditions including weather patterns is likely to impact many different sectors of agricultural production and may have a significant impact on production. For example, businesses reliant on livestock grazing systems are likely to see negative impacts in production due to direct impacts of climate change on pasture production and quality. Heat stress reduces milk yield in the Australian dairy industry by 10-30 % and up to 40% in extreme heatwaves.

Climatic changes also have the potential to impact viticultural production. Higher temperatures can lead to earlier ripening which results in a reduction of grape quality, particularly for some red varieties. The general warming trend and erratic rainfall events may lead to challenges for disease management.

Most forestry species are also projected to have a decreased growth rate if trends of increased temperature and decreased rainfall continue. The increased bushfire risk could impact tree survival.

Farmers are responsible for managing much of Australia's native ecosystem areas with 48% of Australia's land privately owned or leased for agricultural production. This land consists of around two-thirds of Australia's remnant native vegetation. As is true across Australia, many agricultural businesses Limestone Coast managed are responsible for managing native ecosystem areas. As the climate change progresses it is important to assess the management of biodiversity and the natural environment to assess if new strategies are required to ensure its ongoing protection.

Adapting to climate change

There are many ways farming businesses can adapt to sustain productivity in an environmentally responsible way. Some examples of adaptations are:

- Continuously reviewing and changing farming practices when necessary
- Incorporating climate change impacts into farm infrastructure planning (building confinement feeding pens, increasing shade and shelter for livestock)
- Selecting new crop, livestock, pasture species or genetics better adapted for the changing climate
- Building resilient soils through the addition of organic matter to improve soil structure and water holding capacity
- Adopting technology to improve water use efficiencies
- Responding to market signals for environmentally responsible farming practices (signing up for accreditation programs)
- Developing preparedness plans for higher bushfire risk days and periods of drought or shorter rainfall seasons years.
- Using seasonal forecasts to manage production risks
- Monitoring and responding to emerging pests

Planning for change

Agricultural businesses in the Limestone Coast region of South Australia need to prepare for climate change, as well as help mitigate global warming by reducing greenhouse gas emissions.

Understanding which adaptation options to pursue in response to climate change remains a challenge. However, by combining the expert knowledge that a landholder has of their own business and considering climate predictions key risk areas can be identified.

The tool on the following page encourages you to think about how your agricultural business can manage the risks associated with the projected climate change. Each individual business will have its own priorities. Further resources to assist in developing a plan can be found on the PIRSA website.

The purpose of this information is to provide the agricultural industry in the Limestone Coast with information to allow informed decisions to be made. It is important be prepared for change and to be robust enough to adapt to long term changes in climate. This general information is intended as a guide only. For further information on your own specific situation, please seek expert advice.

This project is supported by the Limestone Coast Landscape Board, through funding from the Australian Government's National Landcare Program.

Identify ways your business can adapt to climate change

1. List all the strengths, weaknesses, opportunities and threats you can identify for you businesses' ability to adapt to climate change.
2. Identify goals for your business by linking your businesses strengths with opportunities and threats. You may identify new opportunities that will help create solutions for your business.
3. Identify goals for your business by linking your businesses weaknesses with opportunities and threats.
4. Then add timeframes to the goals, measurable outcomes and self-assess how these goals fit with other business goals and resource priorities.

	Business Strengths (those things within our control) 1. *Example 1: Farming land has already some existing trees stock utilise for shade* 2. 3.	**Business Weaknesses** (those things within our control) 1. *Example 2: We struggle to have labour to meet supplementary feed requirements of livestock* 2. 3.
Outside Opportunities (those things outside our control) 1. *Example 1: Opportunity to receive carbon credits* 2. *Example 2: New technology* 3.	**Goals:** *Example 1: Research information on the potential to receive carbon credits for growing trees*	**Goals:** *Example 2: Utilising new technology to reduce labour requirements to supplementary of feeding of livestock*
Outside Threats (those things outside our control) 1. *Example: Opportunity to receive carbon credits* 2. 3.	**Goals:** *Example: Plant more trees in specific location to provide shade and shelter to reduce heat stress*	**Goals:**