Australian Government
Land & Water Australia

key learnings

knowledge for managing Australian landscapes

Climate Variability

Variability is a feature of the Australia's climate that primary producers, natural resource managers, water suppliers and government know only too well. In 1992 several industry Research and Development Corporations and the Australian Government combined resources to initiate the Climate Variability in Agriculture Program. The following key learnings have been compiled from research conducted through this program (1992-2002) and its successor, the Managing Climate Variability Program (2003-2007).

- Major droughts are closely associated with the occasional and sustained warmer temperatures of the central and eastern tropical Pacific - an El Niño event. This is particularly true in eastern Australia. The opposite cycle, La Niña, is a major factor in wetter years and is characterised by cooler ocean temperatures in the central and eastern tropical Pacific.

- The Southern Oscillation Index (SOI) is a measure based on the difference in atmospheric pressure between Tahiti and Darwin, and is a good indicator of the strength of an El Niño or La Niña event. These events often develop in our autumn and persist into the next year. Analysing historic rainfall data against the SOI provides a statistical basis for seasonal forecasts of rainfall probabilities. For example, historical data shows that during an El Niño year the chance of receiving average rainfall during winter/spring is halved for much of eastern Australia. The most widely used statistical forecasts include:

    - The Bureau of Meteorology's seasonal outlook (based on sea surface temperatures in the Indian and Pacific Oceans at www.bom.gov.au), and
    - Forecasts based on the five phases defining the trend of the Southern Oscillation Index (Queensland Department of Primary Industries at www.longpaddock.qld.gov.au))
    - Software packages such as Rainman + Streamflow, which contains rainfall data for more than 3,800 Australian locations, and enables users to generate localised analysis of rainfall patterns using the SOI and Sea Surface Temperatures (SST).

- The Southern Oscillation Index (measuring changes in atmospheric pressure) and Sea Surface Temperatures (measuring changes in the oceans) are both useful for seasonal forecasting because they work at different time scales. A range of forecasts based on these indicators have been developed, and the forecasts generated can differ for a variety of reasons, such as the lead time involved and the observations used in the forecast. Users of forecast information need to take these factors into account.

- The value of seasonal rainfall forecasts is usually amplified when they are supplemented with temperature forecasts (seasonal maximum and minimums) and translated into applied outcomes such as seasonal stream-flow, crop yield or pasture growth. The use of these forecasts can be helped by local managers or independent experts who can show how they help with business decisions such as forward selling produce, purchasing feed or water, timing stock sales or sowing crops.

- Global temperatures have been gradually increasing for several decades and each major drought has been hotter than those previously recorded. Seasonal forecasts that incorporate trends in climate change will be needed to effectively adapt to and manage the risks of an increasingly variable climate.

- Global climate models that couple oceanic and atmospheric dynamics promise to be better at accounting for climate change; as well as being able to generate more accurate forecasts, with longer lead times.

The Managing Climate Variability R&D Program focuses on research and development aimed at improving climate prediction delivering more accurate seasonal forecasts with longer lead times, providing access to climate information, developing tools for tactical decision making and adapting agricultural and natural resource management practices to Australia's unique circumstances.

The Managing Climate Variability Program has access to tools and capacities developed by its predecessors which allow rapid assessment of climate variability and climate change impacts for any location and industry. Overall the Program looks to increase the profitability and sustainability of Australian agriculture. Its success will be judged by the number of farmers who factor seasonal climate forecasts into their management decisions.

The Program also recognises that the impacts of climate variability are social, economic and physical by nature and the portfolio of research and development activities required should address social and policy considerations as well as specific climate, farming system and agribusiness issues.
For more information about any of these key learnings and how they can be tailored to meet different industry needs, visit the website www.managingclimate.gov.au, or contact Land & Water Australia on 02 6263 6000.

Helping Australia's primary industries to manage natural resources sustainably.

Land & Water Australia manages several research programs in partnership with rural industries, often through its fellow Rural Research and Development Corporations. These programs, targeting environmental and production outcomes, also serve as a gateway between primary industries and other environment and social research within Land & Water Australia.

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