Communicating Climate Change
Module 3
An initiative of the National Agriculture and Climate Change Action Plan
October 2008

Observed climate change: Western Australia

Western Australia's climate is changing. Farmers have long been aware of natural cycles in the climate, but now human-induced climate changes are also becoming apparent. These changes will have significant impacts on the way Western Australia is farmed.

Key facts

- Rainfall and streamflow in south-west Western Australia dropped sharply in the mid-1970s.
- Temperatures in Western Australia have increased by approximately 0.8ºC since 1910.
- Cold fronts are weaker and bring less rainfall as part of the changes in weather patterns observed since the 1970s.
- Some of the changes observed are very likely due to global warming.

Observed changes in rainfall

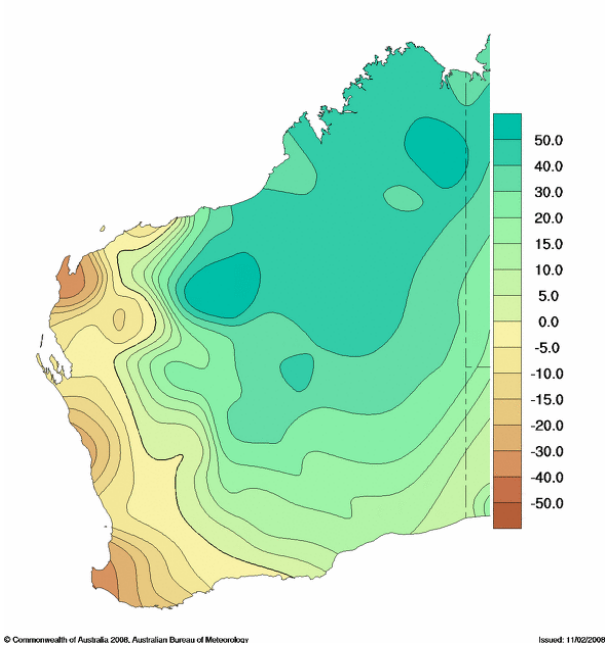

Figure 1: Trend in Western Australia's annual rainfall (mm/decade), 1960–2007

A cooperative venture between
MANAGING CLIMATE VARIABILITY R&D PROGRAM
mla MEAT & LIVESTOCK AUSTRALIA
BCG shared solutions
Australian Government
Department of Agriculture, Fisheries and Forestry
Bureau of Meteorology

Rainfall across much of inland Western Australia has increased since 1900 (Figure 1 shows the trend since 1960). However, near the west coast, rainfall has declined. This decline has been particularly evident since the mid-1970s when there was a distinct decrease in annual rainfall in south-west Western Australia. Seasonally, this abrupt decrease is most apparent in late autumn and early winter (Figure 2 and Figure 3), with little change in late winter and spring, and a slight increase in summer rainfall. There have been fewer winter storms, and less rain per storm.

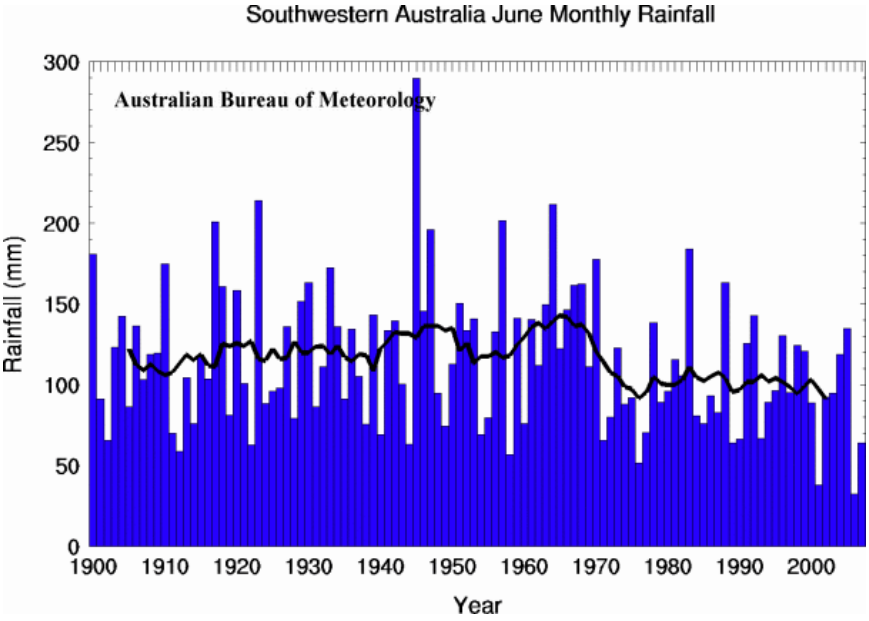

Figure 2: June monthly rainfall (mm), south-western Australia

Observed changes in extreme rainfall and drought

Despite a decline in moderate (10–40 mm) rainfall events in south-west Western Australia in winter, there is no evidence of a change in the frequency of extreme (more than 40 mm) rainfall events.

The region has had some of its driest years on record since 1975 (Figure 3), with few wet years. Consequently there have been few opportunities for replenishing water storages.

Rising temperatures (Figure 4) have exacerbated the effects of the dry years.

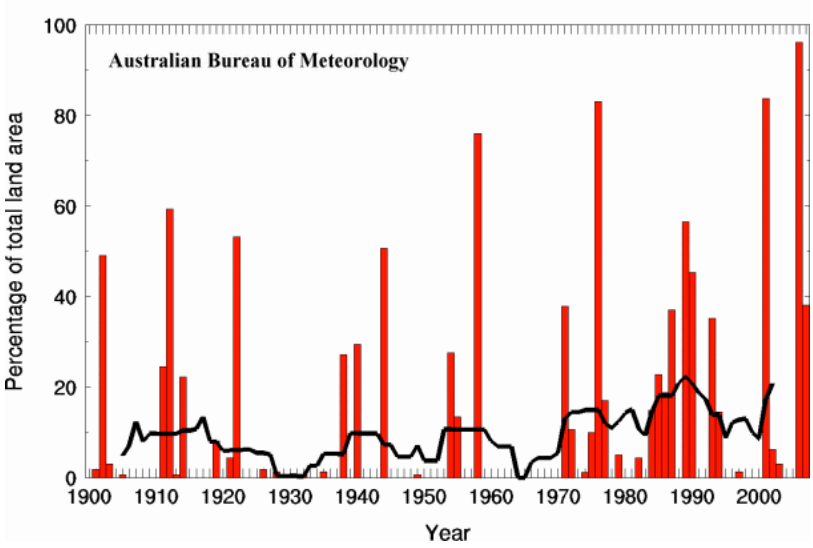

Figure 3: Percentage area of south-western Australia with very dry conditions (decile 1 rainfall) in early winter

Observed changes in temperature

Rising global temperatures are reflected in Western Australia's mean temperatures, which have increased by approximately 0.8ºC since 1910, with most of this warming occurring since 1950 (Figure 4).

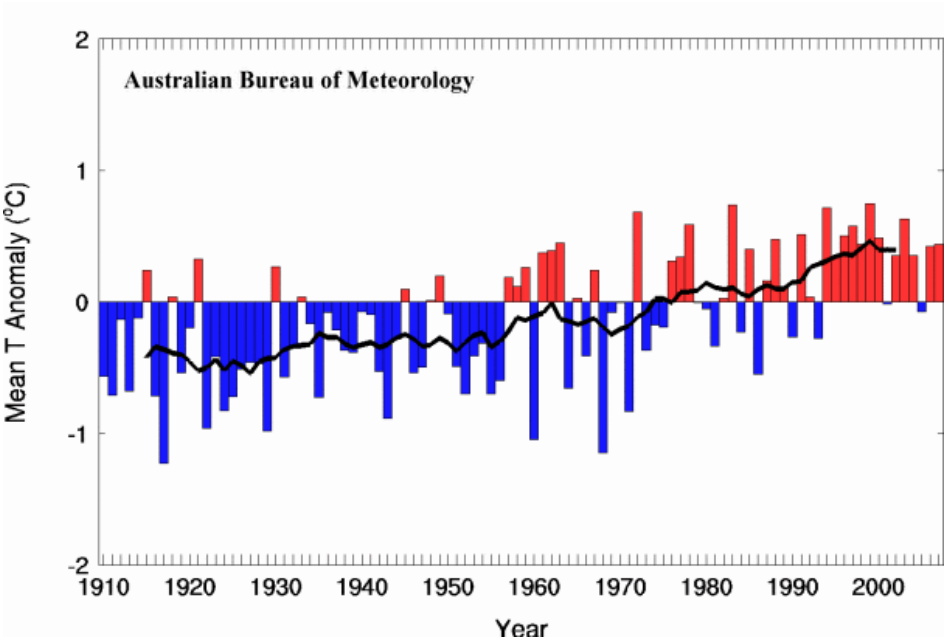

Figure 4: Annual mean temperature relative to the long-term average (ºC), Western Australia (red = above average temperature, blue = below average temperature)

The greatest warming has occurred in southern inland regions of the state (Figure 5). Daily minimum temperatures have increased more than maximums, and the most apparent warming has been during winter and spring.

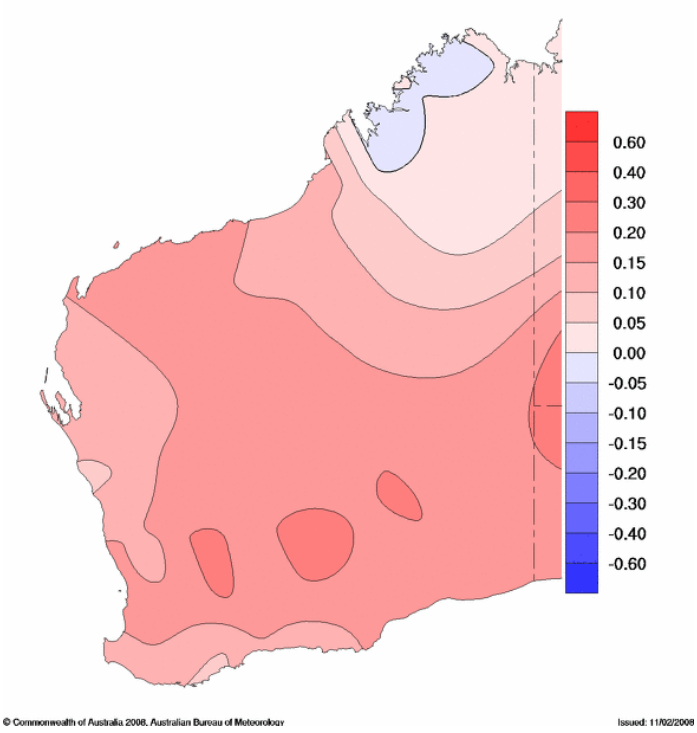

Figure 5: Trend in mean temperature (ºC) across Western Australia since 1950

Observed changes in extreme temperatures

Western Australia has seen an increasing trend in the number of hot days and nights, and a decreasing trend in the number of cold days and nights.

Observed changes in severe weather

Severe weather trends are difficult to determine due to the short period of high-quality data available.

At present, there is no evidence to suggest significant trends in severe thunderstorms, tornadoes or hail.

Increasing summer rainfall in the state (Figure 6) suggests a possible increase in the number of thunderstorms. However, studies to date have not confirmed this.

There is a lot of uncertainty about changes in tropical cyclone frequency and intensity in the Australian region. One study suggests that there has been a recent increase in the proportion of tropical cyclones in Western Australia that are severe, but further observations are required in order to show definitive trends.

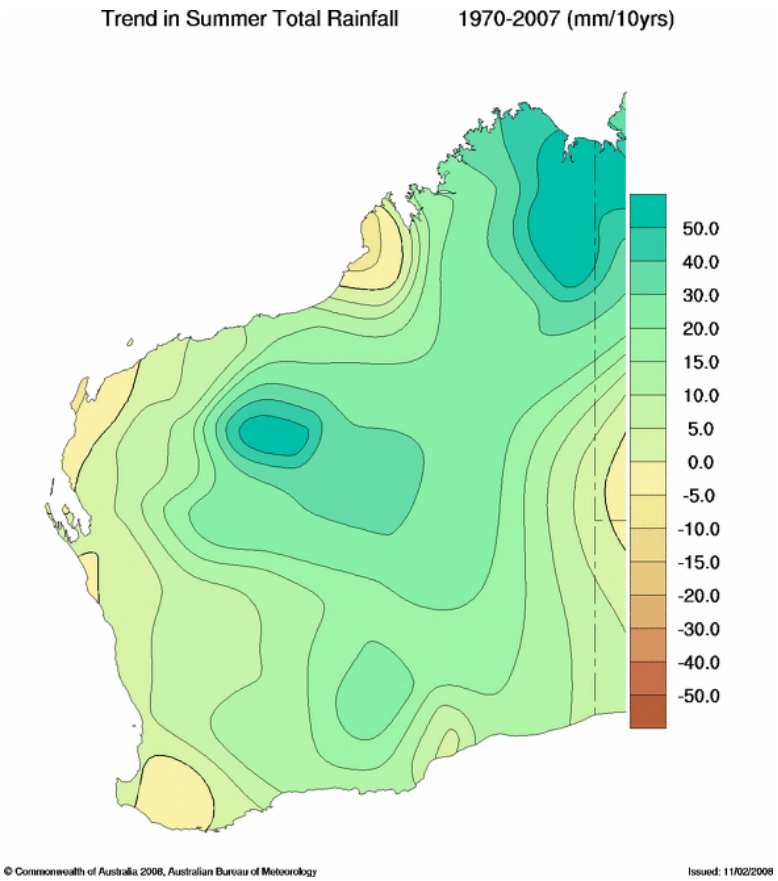

Figure 6: Trend in summer rainfall (mm/decade) in Western Australia since 1970

Observed changes in Western Australia's climate drivers

Large-scale changes in weather patterns have been observed since the 1970s. Figure 6 shows changes in features that affect the climate of south-west Western Australia.

In south-west Western Australia, in particular, average surface pressure has increased such that cold fronts are weaker and bring less rainfall.

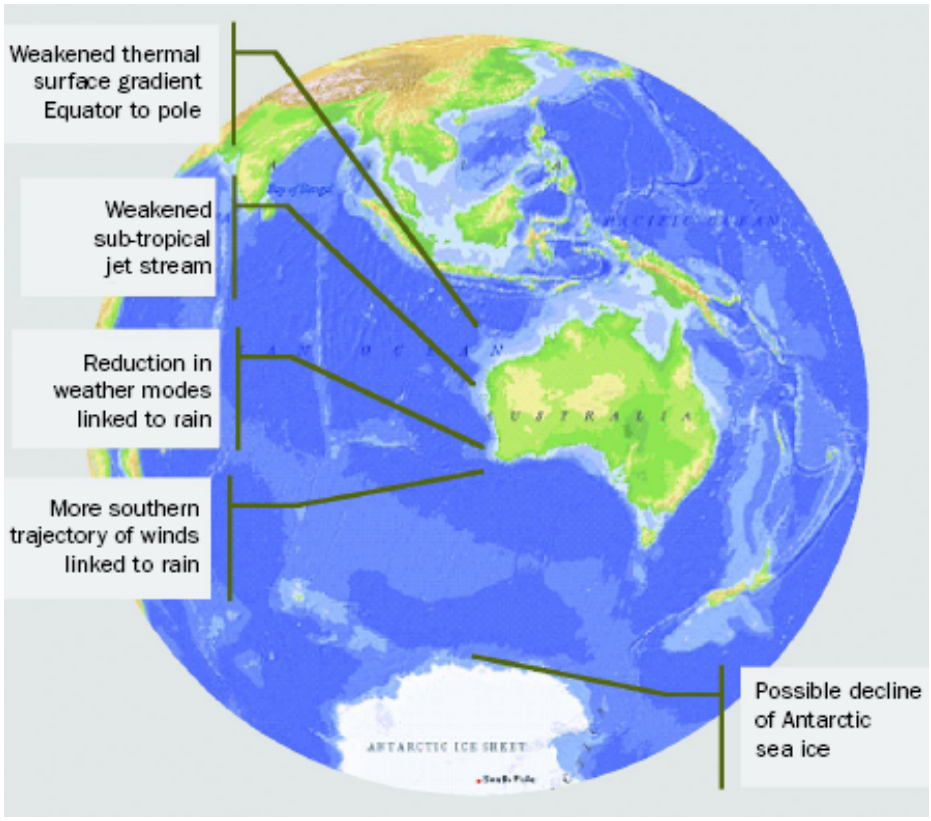

Figure 6: Large-scale changes related to south-west Western Australia climate

What is causing the changes we have observed?

Scientists are confident that warming over Australia in recent decades is linked to global increases in greenhouse gas concentrations caused by human activities.

The decrease in south-west Western Australia's rainfall during the mid-1970s is likely to be due partly to the enhanced greenhouse effect, and partly to natural variability. Smaller contributions to the rainfall decrease are possibly from local changes in land use and other human activities.

It is unclear what is driving the rainfall increase through much of inland Western Australia, but a human influence has been suggested. Further research aims to answer this question (see the Indian Ocean Climate Initiative under 'further information' at the end).

What the changes mean for farmers

South-west Western Australia was once considered to have reliable winter rainfall. However, the abrupt drop in rainfall during the 1970s has brought much less reliable early-season rain and fewer wet years. The result is less surface water storage, and potentially less sub-surface water. However, dryland salinisation has slowed due to the absence of wet winters.

A warming climate suggests shorter growing seasons in warmer regions, such as the northern wheatbelt, while warmer temperatures have exacerbated the effects of the dry spells experienced.

Further information

- Bureau of Meteorology's climate change tracker: http://www.bom.gov.au/climate/change
- the *Climate Change in Australia* report: http://www.climatechangeinaustralia.com.au
- the Intergovernmental Panel on Climate Change – Fourth Assessment Report: http://www.ipcc.ch
- Indian Ocean Climate Initiative: http://www.ioci.org.au/