

# INTRODUCTION

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## KEY MESSAGES:

- The climate is changing and further change seems unavoidable, even if efforts are taken to reduce greenhouse gas emissions. For primary industries to continue to thrive in the future we need to anticipate these changes, be prepared for uncertainty, and develop adaptation strategies now.
- Some broad generalisations can be made about how plant growth, which underpins all the primary industries addressed in this book, will be affected by climate change. Warmer temperatures may benefit perennial plants in cool climates, but annuals and plants growing in hot climates may be negatively affected. Plant productivity would be expected to increase or decrease in accordance with any changes in rainfall, while the direct effects of CO<sub>2</sub> in stimulating plant growth and increasing water use efficiency could help by partly offsetting increases in evaporation or decreases in rainfall.
- While there are some general principles about how impacts of climate change will vary geographically, regional climate change projections are currently more useful for describing the wide range of uncertainty and for probability-based risk assessment than serving as precise estimates for predictive planning and decision making.
- Adaptation will need to take a flexible, risk-based approach that incorporates future uncertainty and provides strategies that will be able to cope with a range of possible changes in local climate. Initial efforts in preparing adaptation strategies should focus on equipping primary producers with alternative adaptation options suitable for the range of uncertain future climate changes and the capacity to evaluate and implement these as needed, rather than focussing too strongly yet on exactly where and when these impacts and adaptations will occur.
- In the short term, a common adaptation option will be to enhance and promote existing management strategies for dealing with climate variability. This will automatically track early stages of climate change until longer term trends become clearer.

## A changing climate for agriculture

Australia's climate has many influences: seasonal synoptic circulations and frontal systems, the El Niño-Southern Oscillation (e.g. Pittock 1975), the Indian Ocean Dipole (Saji *et al.* 1999), the Southern Annular Mode (Marshall 2003), the Madden-Julian Oscillation (Donald *et al.* 2006), and the Inter-decadal Pacific Oscillation (Power *et al.* 1999) among others (see Table 1.1). Jointly, these

have provided Australia with the world's most variable climate. Managing the impacts of climate variability on agricultural systems has thus been a major challenge since European settlement but has been improving gradually. Now, in addition to this highly variable and challenging climate, there is increasing evidence that the climate is changing and that humans are likely to be the cause of this change (Solomon *et al.* 2007). Climate change will likely cause a range of impacts on