MANAGING CLIMATE VARIABILITY
R & D PROGRAM

Improved seasonal climate forecasts:

the benefits for Australian agriculture

The aim of the national Managing Climate Variability program is to help farmers and natural resource managers manage the risks and exploit the opportunities presented by Australia's increasingly variable climate. For more than 20 years, we have invested in research and development that aims to improve climate forecasts for the season ahead, particularly for the period of 2–8 weeks and 3–6 months out.

In 2014, we engaged The Centre for International Economics to estimate the value of improved seasonal forecasts for Australia's industry sectors. The information below is based on their analysis for the agriculture sector. A separate companion fact sheet is available for other sectors of the Australian economy (see the end of this fact sheet for details on where to access it).

The importance of climate to agriculture

Agriculture is highly sensitive to climatic conditions, especially in Australia where we have the most variable climate on Earth. Farmers are constantly making decisions in which the weather and climate are a factor. These decisions include:

- if and when to plant crops
- what area and crop variety to plant
- if and when to irrigate
- if and when to apply fertiliser, and how much to apply
- when to harvest
- whether to buy or sell livestock.

No studies have estimated the impact of climate on agricultural production in Australia. In the US in 2011 agricultural production was estimated to be down 12 per cent due to climatic factors, and recent droughts are estimated to have reduced agricultural production by up to 30 per cent, and 60 per cent in the case of wheat. Given the greater variability of Australia's climate, the degree to which agricultural production is impacted by climate—its 'climate sensitivity'—is likely to be higher here.

The value of climate forecasts for agriculture

While many factors influence their decisions, such as world commodity prices or currency fluctuations, farmers can use weather and climate forecasts to refine their decisions.

The Centre for International Economics estimates that the potential value of improved seasonal climate forecasts for Australia's agricultural sector is significant, and much greater than for other sectors in the economy (Table 1). And with even more climate variability expected under climate change, they expect that value to increase.

Forecasts are likely to be of greatest value in areas of high climate variability.

Table 1. The potential value of improved seasonal climate forecasts for Australia's agricultural sector is significant, and much greater than for other sectors in the economy.

Industry	Potential annual value of forecast A$m	Industry value added A$m	Potential value of forecast as share of industry value added (%)
Agriculture	1 567	21 429	7.31
Construction	192	79 851	0.20
Oil and gas	93	20 363	0.46
Coal mining	68	20 852	0.33
Water supply	28	10 550	0.27
Transport	5	22 824	0.02
Electricity	2.3	16 556	0.01

Note: All values are in Australian dollars at 2012 prices. *Source:* The Centre for International Economics, 2014

The value of improved seasonal forecasts for the agriculture sector depends on a wide range of complex and interrelated factors:

- forecast accuracy – including accuracy at relevant spatial resolution and lead times
- forecast adoption rates
- farmers' attitudes to risk
- the seasonal conditions experienced.

Some climate-related loss in production is inevitable. No matter how skilful a climate forecast is, farmers can not eliminate all impacts of weather on production, and any actions they take to mitigate the risk will cost money, as will any decisions they make based on incorrect forecasts.

Benefits to rural communities

The value that improved seasonal climate forecasts bring to the agriculture sector is likely to have flow-on benefits and multiplier effects for rural communities. An increase in farmer incomes and a decrease in income variability are generally beneficial for local communities.

The distribution of benefits through the community could be affected if:

- as a result of improved forecasts farmers spend less on locally sourced inputs, including hired labour, with possible negative impacts on the non-farming community
- increased profits flow to corporate farm headquarters rather than local communities.

The challenge of quantifying the benefits

While it is clear that the benefits of improved seasonal climate forecasts are significant for the agriculture sector, further work is needed to be able to fully quantify these benefits. Future work should endeavour to quantify the value of seasonal forecasts to livestock operations and to a wider range of management practices.

More information

Download the following documents at: http://www.managingclimate.gov.au/publications/benefits-of-improved-forecasts

- **Fact sheet:** 'Improved seasonal climate forecasts: the benefits for Australian industry (excluding agriculture)'
- **Full report:** 'Analysis of the benefits of improved seasonal climate forecasting for sectors outside agriculture'
- **Full report:** 'Analysis of the benefits of improved seasonal climate forecasting for agriculture'