

# Communicating Climate Change

Module 3

August 2008

An initiative of the National Agriculture and Climate Change Action Plan

## Glimpsing Queensland's future climate

Climate change projections indicate that Queensland's climate in the decades ahead will be different to that of the past. Farmers will need to modify their practices to manage the risks presented by the change in climate.

### Key facts

- Climate model projections are tools for understanding how the climate will respond to increased greenhouse gas concentrations.
- Unknown future greenhouse gas levels and climate model uncertainty mean there is a range of projected climates.
- Temperature projections for Queensland indicate continued warming over the coming decades.
- Rainfall projections for central and southern Queensland indicate a drying trend during winter and spring. Projections for the far north are mixed.
- Potential threats from climate change have been identified for agriculture in Queensland.
- Farmers need to prepare for unavoidable climate change, as well as help reduce greenhouse gas emissions.

### Climate model projections

Climate projections are computer model simulations of the climate. We use them to understand how the world's climate will respond to the rapid increase in atmospheric greenhouse gases associated with human activities.

The projections indicate a wide range of possible future climates. There are two main reasons for this:

- We do not know precisely how greenhouse gas concentrations will vary in future. Due to demographic, economic and technological factors, a range of greenhouse gas emission scenarios are possible for the 21st century.
- The climate system is so complex that it is not possible for models to predict the exact state of the Earth's climate several decades into the future.

Scientists use a range of different independent climate models and emission scenarios to estimate future climate. From the spread of these model projections, they can identify the changes that are likely to occur, and those that are less certain.

Climate models are constantly being improved with higher resolution and inclusion of more climate system processes, leading to greater confidence in climate projections.

A cooperative venture between



**Australian Government**  
**Department of Agriculture,  
Fisheries and Forestry**  
**Bureau of Meteorology**



## Using climate projections

The uncertainty of climate projections makes it difficult for farmers and policymakers to incorporate model output directly into the decisions they make. Nevertheless, climate projections can help them identify potential long-term threats and opportunities associated with climate change.

The climate projections we present here are based on the average projections provided by different climate model simulations using low-, medium- and high-emission scenarios. Further information about these projections can be found at:

<http://www.climatechangeinaustralia.gov.au>

## Changes in mean rainfall

By 2030, annual rainfall across the southern half of Queensland is projected to decline by up to 5% relative to the climate around 1990 (Figure 1).

By 2070, the projected decline is up to 10% under a low emission scenario, and up to 20% under a high emission scenario.

Projected rainfall changes for northern Queensland are mixed, resulting in a best estimate of little change for this region. Winter and spring rainfall is likely to decrease in central and southern Queensland, but changes in summer and autumn rainfall are less certain.

We expect natural climate drivers to strongly influence rainfall variability for many decades to come, counteracting and adding to the projected human-induced changes.

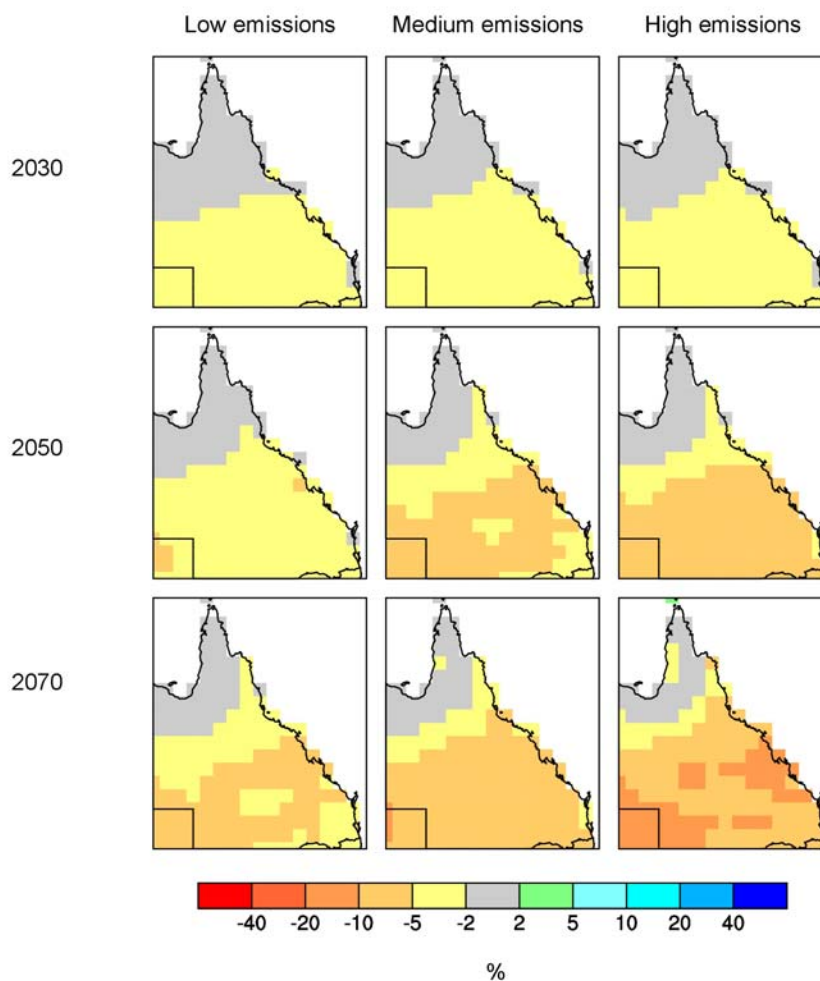


Figure 1: Best estimate (50<sup>th</sup> percentile of model projections) for Queensland annual rainfall change (per cent) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios

## Changes in drought and extreme rainfall

Potential evapotranspiration is projected to increase over Queensland. Evapotranspiration is the combination of evaporation from soil and water surfaces, and transpiration from vegetation. When these changes are combined with the projected declines in rainfall, an increase in aridity and drought occurrence is likely.

Climate projections show an increase in daily precipitation intensity and an increase in the number of dry days, suggesting that Queensland's rainfall patterns will have longer dry spells interrupted by heavier rainfall events.

## Changes in mean temperature

We are more confident in our projections of mean temperature than those of rainfall.

By 2030, annual average temperatures over Queensland are projected to increase by up to 1°C in coastal areas and up to 1.5°C inland, relative to the climate of recent decades (Figure 2).

By 2070, this increase is up to 2°C across most of the state under a low emission scenario, and up to 4°C under a high emission scenario. Slightly less warming is expected in coastal regions.

The amount of warming projected for summer and autumn is similar to the annual increase, but slightly less for winter and slightly more for spring.

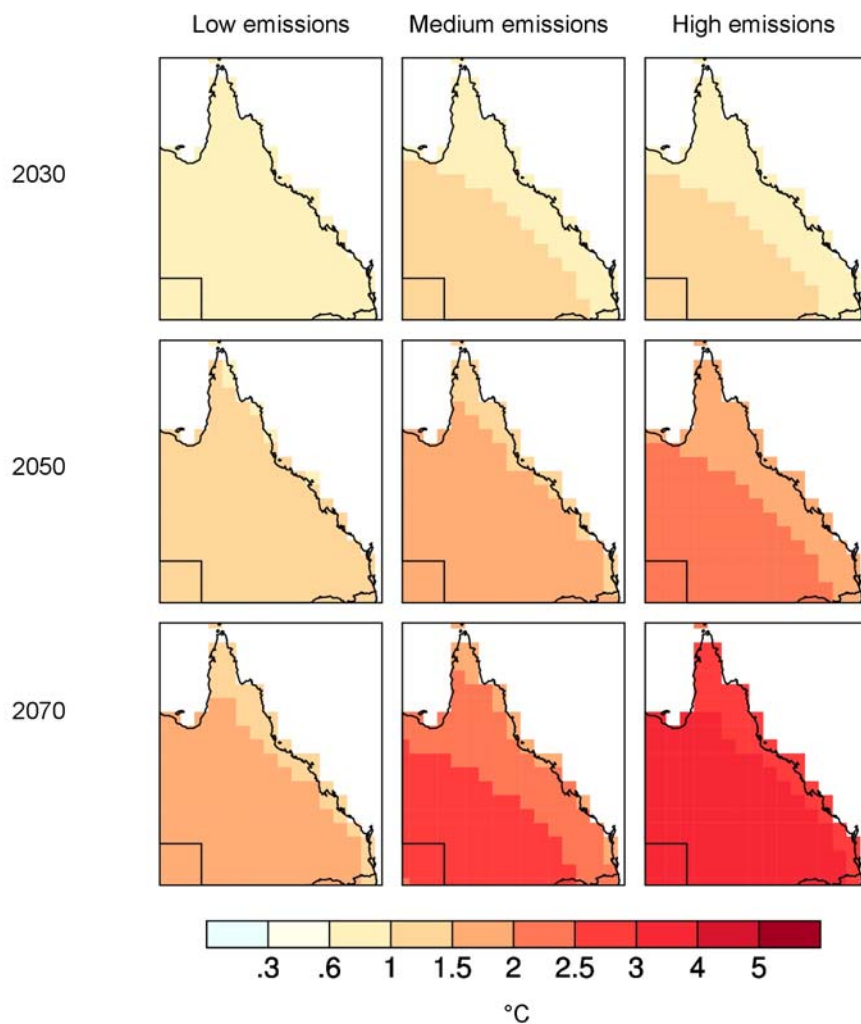


Figure 2: Best estimate (50<sup>th</sup> percentile of model projections) for Queensland annual mean temperature change (°C) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios

## Changes in extreme temperatures

Along with the increase in mean temperatures, an increase in the frequency of hot days and nights is likely. Projections indicate that by 2030 Queensland towns will experience many more days per year above 35°C than they do now, with very large increases in frequency by 2070 under a high emission scenario. Conversely, the frequency of frosts and cold days is likely to decline across the state.

## Changes in other climate variables

Other projected climate changes with potential to impact agriculture in Queensland include:

- small decreases in relative **humidity** inland, with little change along the coast
- small increases in average **wind speed** in southeast Queensland
- increased **intensity of tropical cyclones**

## Potential impacts

The vulnerability to climate change varies across Queensland and across agricultural sectors. General threats for agriculture include:

- decline in productivity due to increased drought
- crop yields benefiting from warmer conditions and higher carbon dioxide levels, but vulnerable to reduced rainfall
- greater exposure of stock and crops to heat-related stress and disease
- less winter chilling for fruit and nuts
- southern migration of some pests
- potential increase in the distribution and abundance of some exotic weeds

## Planning for change

Farmers in Queensland need to prepare for climate change, as well as help mitigate global warming by reducing greenhouse gas emissions. While further human-induced warming is inevitable, the great range in projected climates by 2070 indicates that we still have a choice about the type of climate we will have by the end of this century.

### Further information

The information presented here is sourced from:

- the *Climate Change in Australia* report: <http://www.climatechangeinaustralia.gov.au>
- the Intergovernmental Panel on Climate Change: <http://www.ipcc.ch>