

# Communicating Climate Change

Module 3

August 2008

An initiative of the National Agriculture and Climate Change Action Plan

## Glimpsing Victoria's future climate

Climate change projections indicate that Victoria'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 a range of projected climates.
- Temperature projections for Victoria are for continued warming over the coming decades.
- Rainfall projections for Victoria are more mixed than for temperature but most of them indicate a drying trend, particularly during winter and spring.
- The combination of projected warming and less rainfall has serious implications for streamflow in Victoria.
- Potential threats from climate change exist for agriculture in Victoria.
- 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 scenarios. 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 in Victoria is projected to decrease by up to 5% relative to the climate around 1990 (Figure 1).

By 2070, a decrease of 5–10% is most likely under a low greenhouse gas emission scenario, or a 10–20% decrease under a high emission scenario. Winter and spring rainfall is likely to decrease, whereas 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.

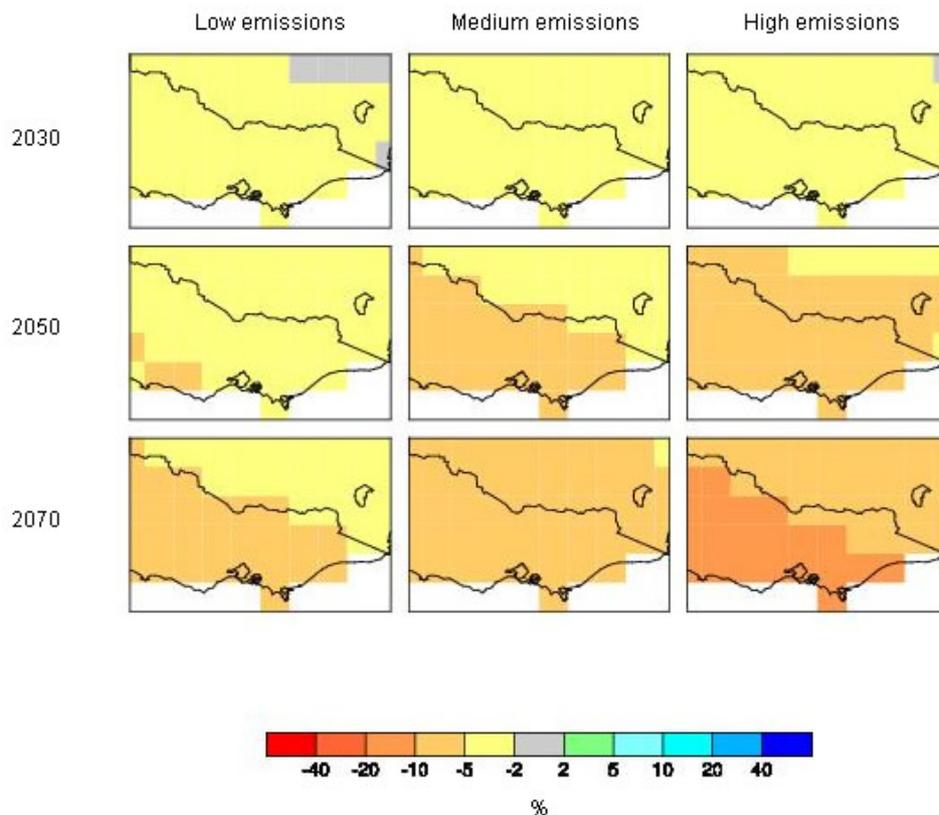


Figure 1: Best estimate (50<sup>th</sup> percentile of model projections) for Victorian annual rainfall change (per cent) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios

## Changes in drought and extreme rainfall

Potential evapotranspiration is projected to increase over Victoria. 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.

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

## Changes in mean temperature

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

By 2030, annual average temperatures over Victoria are projected to increase by at least 0.6°C, relative to the climate around 1990 (Figure 2).

By 2070, this increase is at least 1.0°C under a low emission scenario, and at least 2.5°C under a high emission scenario. Less warming is expected in coastal regions.

Projected warming during spring and autumn is similar to the annual increase, but slightly greater for summer and slightly less for winter.

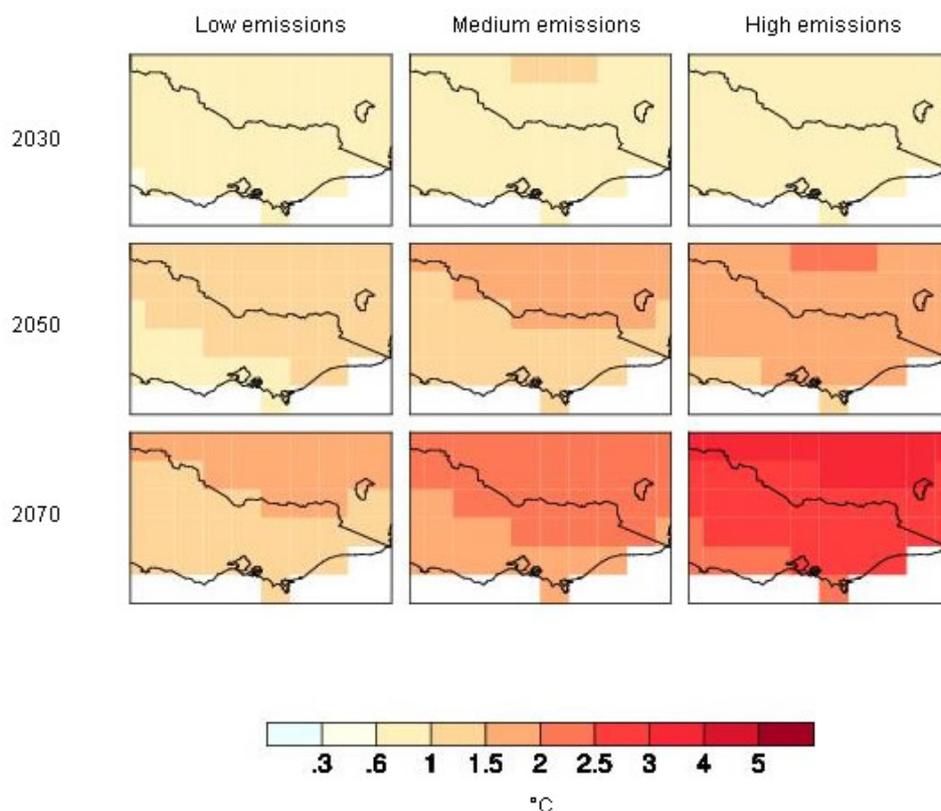


Figure 2: Best estimate (50<sup>th</sup> percentile of model projections) for Victorian annual mean temperature change (°C) for 2030, 2050 and 2070 using low, medium and high greenhouse gas emission scenarios.

## Changes in extreme temperatures

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

## Changes in other climate variables

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

- increases in solar radiation (**sunshine**) in winter and spring
- small decreases in relative **humidity**
- small increases in **wind speed** in winter and decreases in autumn

## Changes in severe weather

Vulnerability to changes in severe weather varies regionally. Potential changes that may impact agriculture in Victoria include:

- higher bushfire risk
- fewer cool season tornadoes
- increased hail risk in the far east of Victoria

## Changes in runoff and streamflow

The combination of projected warming and less rainfall has serious implications for runoff and water storage.

By 2030, streamflow into Victorian dams is projected to decline by 7–35% relative to historical average flows.

## General threats to agriculture

More general threats to agriculture across southern Australia include:

- decline in productivity due to increased drought and bushfires
- 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
- earlier ripening and reduced grape quality
- 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 Victoria 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.com.au>
- the Intergovernmental Panel on Climate Change: <http://www.ipcc.ch>