

## CLIMATE CHANGE: A GUIDE FOR LAND MANAGERS

### REGIONAL SUMMARY

# Effects and impacts: Canterbury

#### KEY EFFECTS

- Warmer winters and a longer growing season.
- Drier winters and more frequent hot, dry, summer conditions.
- On the Canterbury plains, lower rainfall and increased evapotranspiration over the growing period, and possibly increased frequency and severity of drought.
- Increased rainfall in the Southern Alps and Canterbury foothills would lead to increased flows in the major rivers of the region, including the Waitaki, Rangitata, Rakaia and Waimakariri.

#### KEY CHANGES

- The greatest gains are likely to arise from increased opportunities to grow a more diverse range of crops in lowland areas.
- The greatest losses are likely to arise from the effects of likely increased demand for water and increases in drought frequency and severity.



Average annual temperatures in Canterbury are likely to increase by about 1.0°C by mid-century, and 2.0°C or more by late century, with the largest temperature increases likely to occur in winter.

On average, annual rainfall is likely to increase in inland Canterbury and the Southern Alps, with lower rainfalls than present in coastal Canterbury from Banks Peninsula north. Winters may become drier than normal on the Canterbury Plains but wetter inland and in the Alps.

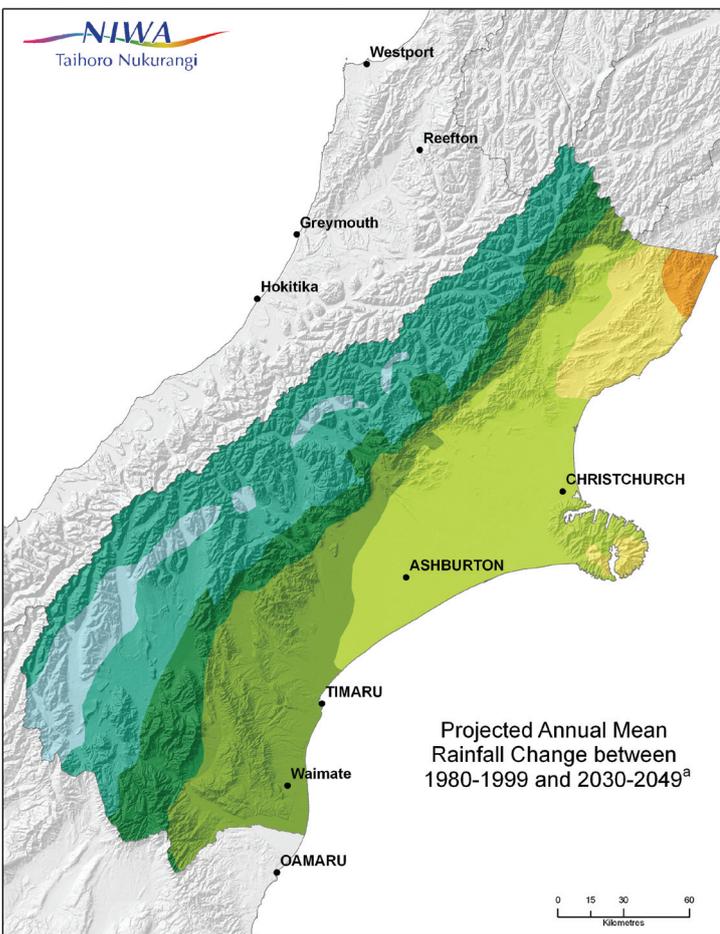
#### LIKELY IMPACTS AND OPPORTUNITIES

- Drier average conditions and increased drought risk in the Canterbury plains will contribute to increased demand for water.
- Security of water supply is likely to be the greatest issue for Canterbury in the future, even if the worst effects of climate change are not realised. Drier average conditions during the summer months, together with increased demand for water, is likely to place pressure on resources. This will require careful planning and increasingly efficient irrigation practices and infrastructure.
- Changes in rainfall, with the possibility of increased rainfall in the ranges and drier average conditions on the plains, will have consequences for local and regional infrastructure including: flood protection; community water schemes; culverts and bridges; erosion control; farm dams; water reticulation, and irrigation.
- A warmer average climate in Canterbury will increase opportunities for arable cropping and process vegetable production, with crops such as sweetcorn and maize becoming increasingly viable.
- The extent to which improved potential in crop production is realised will depend on the future extent of irrigation and the capacity of surface and ground water resources to meet increased demand, particularly from dairy conversions.
- Productivity of temperate grains such as wheat could increase, although such increases would require increased fertiliser inputs and be dependent on water availability.
- Pest and disease regimes for all arable and fruit crops could change, particularly with warmer winters.
- Productivity of pastoral farming is likely to increase providing water is available.
- The biggest issues for dryland farming in Canterbury will be increased periods of pasture deficit, changes in species composition in dryland farming systems, and impacts on water resources in drier conditions.
- There is no clear evidence of sub-tropical grass species becoming a problem, although there would be increased risk of invasive species establishing over time, particularly on dry, northern slopes in North Canterbury.

- Higher temperatures over time may increase the biosecurity risk for the Canterbury region. Two examples of pests that may show an increased presence are banana passionfruit, a frost tender plant which appears to be spreading and argentine ants which have managed to survive through two winters when previously not thought possible.
- Risk of fires in rural coastal areas may also increase, with potentially severe effects.

### ANNUAL AVERAGE RAINFALL

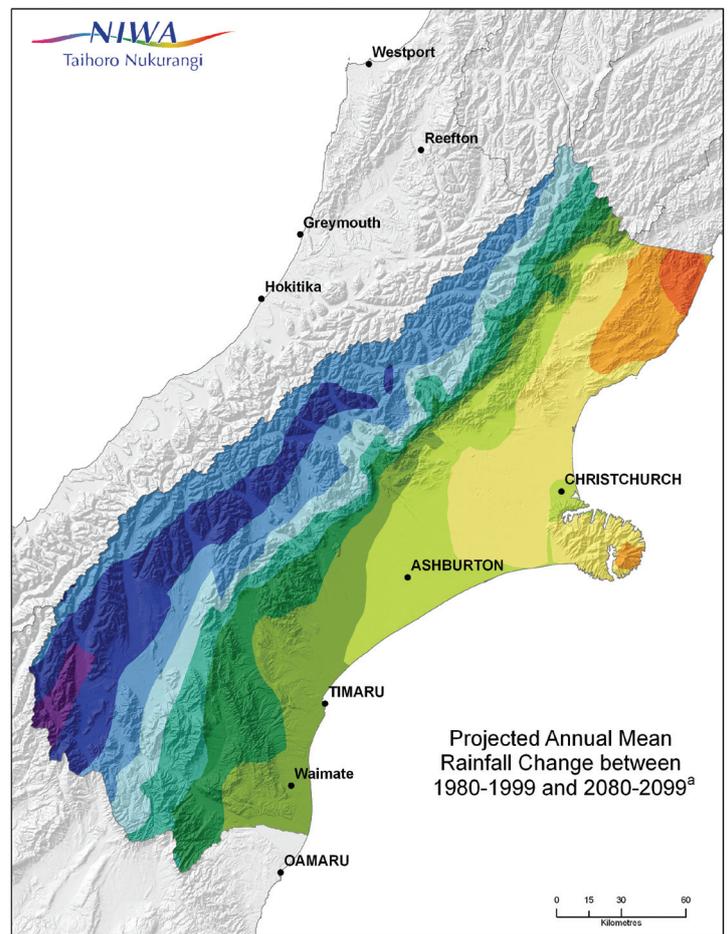
The maps below show the projected trend in annual-average rainfall that could be expected by 2050 and 2100, compared to the average for 1980–1999.



%  
15 12 10 8 6 4 2 0 -2 -4 -6 -8 -10

<sup>a</sup>Based on an average over 12 climate models for mid-range (A1B) emission scenario.  
Copyright: NIWA 2008  
Projection: New Zealand Map Grid

**2050:** Annual rainfall in the Southern Alps increases by more than 6 percent, while it becomes a little drier in lowland mid and North Canterbury.



%  
15 12 10 8 6 4 2 0 -2 -4 -6 -8 -10

<sup>a</sup>Based on an average over 12 climate models for mid-range (A1B) emission scenario.  
Copyright: NIWA 2008  
Projection: New Zealand Map Grid

**2100:** Annual rainfall could increase by 15 percent in the Alps of South Canterbury, while coastal North Canterbury rainfall could decrease by 6–8 percent.

## RANGES OF UNCERTAINTY IN TEMPERATURE AND RAINFALL PROJECTIONS

In the table below the first number in each case is a mid-range estimate of what the change will be, and the figures in brackets give the modelled range within which the change could lie. Mean [lower, upper].

For example, the average summer temperature in Canterbury is likely to increase by 2.1°C by 2090, but estimates of the expected temperature increase range between 0.8 and 5.2°C.

CHANGE IN TEMPERATURE °C	SUMMER	AUTUMN	WINTER	SPRING	ANNUAL
<b>CANTERBURY</b>					
2040	0.9 [0.1, 2.2]	0.9 [0.2, 2.2]	1.0 [0.4, 2.0]	0.8 [0.2, 1.8]	0.9 [0.2, 1.9]
2090	2.1 [0.8, 5.2]	2.1 [0.7, 4.9]	2.2 [0.8, 5.1]	1.8 [0.4, 4.7]	2.0 [0.7, 5.0]
<b>CHANGE IN RAINFALL %</b>					
<b>HAMNER</b>					
2040	2 [-16, 25]	4 [-5, 19]	-7 [-26, 6]	0 [-6, 12]	-1 [-8, 7]
2090	4 [-25, 32]	3 [-7, 15]	-10 [-34, 6]	-1 [-13, 29]	-2 [-14, 15]
<b>CHRISTCHURCH</b>					
2040	2 [-15, 22]	5 [-10, 30]	-8 [-30, 7]	-1 [-8, 9]	-1 [-10, 9]
2090	3 [-17, 25]	6 [-6, 20]	-11 [-41, 10]	-2 [-15, 25]	-2 [-14, 16]
<b>TEKAPO</b>					
2040	1 [-16, 16]	2 [-12, 10]	8 [-1, 19]	6 [-3, 17]	4 [0, 13]
2090	2 [-30, 31]	0 [-16, 17]	18 [5, 41]	10 [-6, 47]	8 [0, 29]

### SOURCE

Ministry for the Environment (2008). *Preparing for climate change: A guide for local government in New Zealand*.

**THIS REGIONAL SUMMARY IS ONE OF EIGHT FROM THE RESOURCE PACK:**

**CLIMATE CHANGE: A GUIDE FOR LAND MANAGERS.**

**TO VIEW OTHER MATERIAL IN THIS RESOURCE PACK VISIT**

**[WWW.MAF.GOVT.NZ/CLIMATECHANGE](http://WWW.MAF.GOVT.NZ/CLIMATECHANGE) OR PHONE 0800 CLIMATE**

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## SOURCES

### MINISTRY OF AGRICULTURE AND FORESTRY

#### WWW.MAF.GOV.TZ

- *The EcoClimate report: Climate change and agricultural productions* (2008). Available on the Ministry of Agriculture and Forestry website [www.maf.govt.nz/climatechange](http://www.maf.govt.nz/climatechange)
- Kenny, G (2008) *Adapting to climate change in the kiwifruit industry*. Available from [www.maf.govt.nz/climatechange](http://www.maf.govt.nz/climatechange)

### MINISTRY FOR THE ENVIRONMENT

#### WWW.MFE.GOV.TZ

- *Preparing for Climate Change: A guide for local government* (2008). Available from [www.mfe.govt.nz](http://www.mfe.govt.nz); Ref: ME534
- *Climate Change: Impacts on New Zealand* (2001). Available from [www.mfe.govt.nz](http://www.mfe.govt.nz); Ref: ME396

- *Likely impacts on New Zealand agriculture* (2001). Available from [www.mfe.govt.nz](http://www.mfe.govt.nz); Ref: ME412
- *Regional summaries of climate change*; Available from [www.mfe.govt.nz/issues/climate/](http://www.mfe.govt.nz/issues/climate/)
- *Climate change effects and impacts assessment: A guidance manual for local government in New Zealand* (2008). Available from [www.mfe.govt.nz](http://www.mfe.govt.nz); Ref: ME870

### OTHER

- *The International Global Change Institute's CLIMPACTS programme: Examining the sensitivity of the New Zealand Environment to Climate Variability and Change*. Available on the University of Waikato website [www.waikato.ac.nz](http://www.waikato.ac.nz)
- *Adapting to climate change in eastern New Zealand* (2005). Published by Earth Limited.org on their website [www.earthlimited.org](http://www.earthlimited.org)

## FOR MORE INFORMATION

- For general information on climate change for land-based sectors visit the Ministry of Agriculture and Forestry website [www.maf.govt.nz/climatechange](http://www.maf.govt.nz/climatechange)
- For more information on climate change in New Zealand visit [www.climatechange.govt.nz](http://www.climatechange.govt.nz) or the Ministry for the Environment's website [www.mfe.govt.nz/issues/climate](http://www.mfe.govt.nz/issues/climate)
- For more information on animal health visit [www.biosecurity.govt.nz/regs/animal-welfare](http://www.biosecurity.govt.nz/regs/animal-welfare)
- For more information on insect and plant pests and diseases visit [www.biosecurity.govt.nz/pests/surv-mgmt](http://www.biosecurity.govt.nz/pests/surv-mgmt)
- For a popular guide to the IPCC reports, visit the website of the United Nations Environment Programme [www.grida.no/publications/climate-in-peril](http://www.grida.no/publications/climate-in-peril)
- Information on droughts, floods and emergencies, land and water resources, irrigation practices and adverse events can be found in the Rural New Zealand section of the MAF website [www.maf.govt.nz](http://www.maf.govt.nz)
- Information on projects under MAF's Sustainable Farming fund targeting climate related issues can be found in the Sustainable Farming section of the MAF website [www.maf.govt.nz](http://www.maf.govt.nz)
- Your local council may also have information on climate change. Visit [www.localcouncils.govt.nz](http://www.localcouncils.govt.nz) for a list of council websites.

The following websites provide a range of resources and publications related to climate change adaptation.

### INDUSTRY

- Dairy NZ [www.dairynz.co.nz](http://www.dairynz.co.nz)
- Fert Research [www.fertresearch.org.nz](http://www.fertresearch.org.nz)
- Foundation for Arable Research [www.far.org.nz](http://www.far.org.nz)
- Horticulture NZ [www.hortnz.co.nz](http://www.hortnz.co.nz)
- Meat and Wool New Zealand [www.meatnz.co.nz](http://www.meatnz.co.nz)
- NZ Kiwifruitgrowers Inc. [www.nzkgi.org.nz](http://www.nzkgi.org.nz)
- NZ Forest Owners Association [www.nzfoa.org.nz](http://www.nzfoa.org.nz)
- Organics Aotearoa NZ [www.oanz.org.nz](http://www.oanz.org.nz)
- Sustainable Winegrowing New Zealand [www.nzwine.com](http://www.nzwine.com)

### CROWN RESEARCH INSTITUTES

- AgResearch [www.agresearch.co.nz](http://www.agresearch.co.nz)
- GNS [www.gns.cri.nz](http://www.gns.cri.nz)
- Landcare Research [www.landcareresearch.co.nz](http://www.landcareresearch.co.nz)
- NIWA [www.niwa.co.nz](http://www.niwa.co.nz)