



INTRODUCTION TO CLIMATE CHANGE: 13

Effects and impacts: Otago and Southland

KEY EFFECTS

- Warmer winters, reduced frequency of frost, and a longer growing season. The daily temperature range is already decreasing in Southland faster than anywhere else in New Zealand.
- More frequent hot, dry, summer conditions in coastal North Otago and possibly Central Otago.
- The possibility of a greater frequency of drought comparable to those experienced during the 1997/98 El Niño and the 1998/99 La Niña episodes.
- Increased rainfall in the main divide of the Southern Alps could increase river flows in the Clutha, Waitaki and Waiau rivers.
- The frequency and intensity of high rainfall events could increase.
- Runoff decreases could be experienced in coastal Otago if warmer and drier conditions are realised. Existing water-short areas, would anticipate significant problems with water supply for both rural water and community township supplies.

KEY CHANGES

- The greatest gains are likely to arise from possible productivity increases in existing crops and pasture, and the opportunity to grow a greater diversity of crops.
- Losses are likely to arise from the changes in extremes that might occur. Threats will arise from any increase in drought frequency and severity, and increased flood risk if more frequent and intense rainfall events are realised over time.

Otago and Southland are likely to become wetter with climate change, particularly in winter and spring. Average annual temperatures are likely to rise by about 1.0°C by mid-century and 2.0°C by 2100, with the possibility of winter temperatures increasing slightly more than in other seasons.

LIKELY IMPACTS AND OPPORTUNITIES

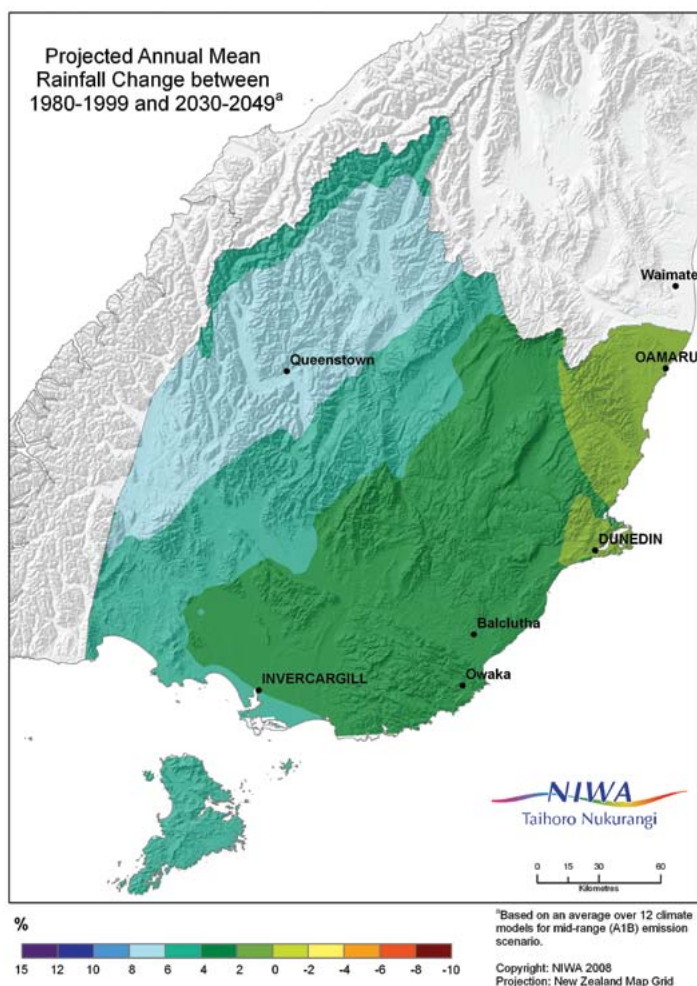
- Pasture productivity could increase in some areas and decrease in others. Potential increases are more likely to be realised in South Otago, Southland hill country and intensive farming systems. The Otago dry hill country could experience warmer winter conditions and higher average precipitation, which will improve conditions for sheep and beef farmers. However this benefit may not continue into the East Otago hill country if eastern regions of the South Island become more drought prone. Higher rainfall during winter in dairy farming areas will make the management of winter conditions more difficult.
- Higher average temperatures and reduced frost risk will benefit fruit production in Central Otago, the predominant fruit growing area in the region. The greatest benefits will arise from a longer frost-free season and warmer spring temperatures, which could increase fruit size and quality.
- With frost reduction and temperature increase, climate change could benefit cherries and apricots, both in yield and quality. There could be a change in the current “window of opportunity” with a reduction in the production of out-of-season produce and lower prices for export products.
- Similar comments apply to flower exports from the Southland and Otago area. There may be some loss of colour, increased disease and pest occurrence and a change to the out-of-season advantage that currently exists.
- Central Otago is the southern margin for cool-climate wine production in New Zealand. Wine grapes in this region will benefit greatly from warmer, drier conditions. It is unlikely that there would be any significant change in varieties over the next 50 years as a result of climate change, although this could occur further into the future if higher warming scenarios are realised.
- Pest and disease regimes for all fruit crops could change, particularly through warmer winters.
- A warmer average climate and higher precipitation in South Otago and Southland may have a mix of costs and benefits for arable cropping. More rain at harvest time would be detrimental. Higher temperatures and a longer growing season will be beneficial.
- Water security is most likely to be an issue in parts of Otago and Southland where drought is already a major constraint. Flood risk could also increase throughout the region over coming decades with projected average rainfall increases and the possibility of an increased frequency and intensity of rainfall events.

- Higher intensity rainfalls will increase the risk of problems with soil management such as erosion, compaction and nutrient run-off.
- Changes in rainfall will have consequences for local and regional infrastructure including land drainage; flood protection; community water schemes; culverts and bridges; erosion control; farm dams; water reticulation and irrigation.

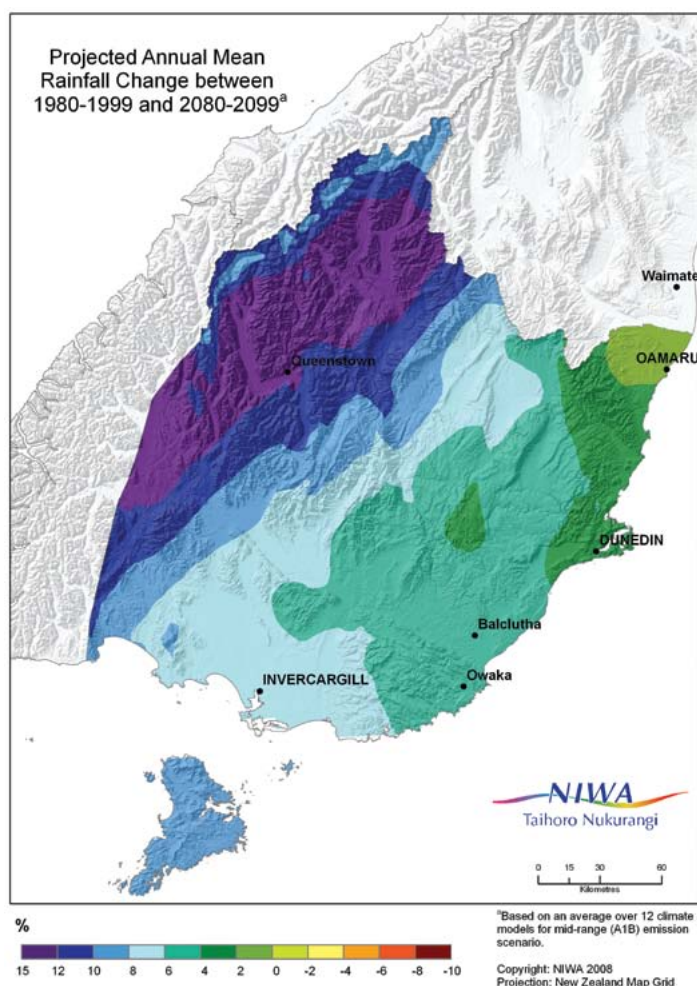


ANNUAL AVERAGE RAINFALL

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.



2050: Annual average rainfall in Southland and Otago is likely to increase, with the largest increases inland.



2100: Annual average rainfall in western Southland and Otago is likely to increase by 10–15 percent with smaller increases (2–4 percent) in the east of the region.

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 Otago is likely to increase by 2.0 °C by 2090, but estimates of the expected temperature increase range between 0.7 and 4.7 °C.

CHANGE IN TEMPERATURE °C	SUMMER	AUTUMN	WINTER	SPRING	ANNUAL
OTAGO					
2040	0.9 [0.0, 2.4]	0.9 [0.1, 1.9]	1.0 [0.3, 2.1]	0.7 [0.0, 1.8]	0.9 [0.1, 1.9]
2090	2.0 [0.7, 4.8]	2.0 [0.8, 4.6]	2.2 [0.8, 4.8]	1.7 [0.5, 4.3]	2.0 [0.8, 4.6]
SOUTHLAND					
2040	0.9 [0.0, 2.4]	0.9 [0.1, 1.9]	0.9 [0.2, 2.0]	0.7 [-0.1, 1.7]	0.8 [0.1, 1.9]
2090	2.0 [0.7, 4.7]	2.0 [0.8, 4.6]	2.1 [0.8, 4.7]	1.6 [0.5, 4.1]	1.9 [0.8, 4.5]
CHANGE IN RAINFALL %					
DUNEDIN					
2040	1 [-11, 13]	2 [-9, 10]	3 [-10, 13]	2 [-5, 11]	2 [-4, 9]
2090	0 [-29, 19]	2 [-11, 16]	7 [-16, 24]	6 [-1, 32]	4 [-9, 23]
QUEENSTOWN					
2040	1 [-16, 20]	2 [-15, 23]	16 [2, 38]	8 [-3, 21]	7 [1, 22]
2090	1 [-38, 37]	2 [-32, 20]	29 [7, 76]	15 [-5, 50]	12 [-2, 34]
INVERCARGILL					
2040	-1 [-15, 22]	2 [-17, 22]	10 [2, 30]	7 [-3, 22]	4 [-2, 19]
2090	-2 [-44, 27]	2 [-31, 19]	18 [1, 51]	13 [0, 47]	7 [-12, 29]

Source

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

THIS FACT SHEET IS ONE IN A SERIES CALLED INTRODUCTION TO CLIMATE CHANGE

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SOURCES

MINISTRY OF AGRICULTURE AND FORESTRY

WWW.MAF.GOV.T.NZ

- *The EcoClimate report: Climate change and agricultural productions* (2008).
- Kenny, G (2008) *Adapting to climate change in the kiwifruit industry*.

MINISTRY FOR THE ENVIRONMENT

WWW.MFE.GOV.T.NZ

- *Preparing for Climate Change: A guide for local government* (2008). Ref: ME534
- *Climate Change: Impacts on New Zealand* (2001). Ref: ME396
- *Likely impacts on New Zealand agriculture* (2001). Ref: ME412

- *Regional summaries of climate change*.
- *Climate change effects and impacts assessment: A guidance manual for local government in New Zealand* (2008). 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
- *Adapting to climate change in eastern New Zealand* (2005). Published by Earth Limited on their website 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
- For more information on climate change in New Zealand visit www.climatechange.govt.nz or the Ministry for the Environment's website www.mfe.govt.nz
- For information on animal health and insect and plant pests and diseases visit www.biosecurity.govt.nz
- For a popular guide to the IPCC reports, visit the website of the United Nations Environment Programme www.grida.no
- Your local council may also have information on climate change. Visit 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
- Fert Research www.fertresearch.org.nz
- Foundation for Arable Research www.far.org.nz
- Horticulture NZ www.hortnz.co.nz
- Beef + Lamb New Zealand www.meatnz.co.nz
- NZ Kiwifruitgrowers Inc. www.nzkgi.org.nz
- NZ Forest Owners Association www.nzfoa.org.nz
- Organics Aotearoa NZ www.oanz.org.nz
- Sustainable Winegrowing New Zealand www.nzwine.com

CROWN RESEARCH INSTITUTES

- AgResearch www.agresearch.co.nz
- GNS www.gns.cri.nz
- Landcare Research www.landcareresearch.co.nz
- NIWA www.niwa.co.nz