



INTRODUCTION TO CLIMATE CHANGE: 8

Effects and impacts: Gisborne to Wairarapa

KEY EFFECTS

- A longer growing season and reduced frequency of frost.
- More frequent hot, dry, summer conditions and potential for more frequent heat waves.
- Lower rainfall and increased evaporation over the growing period, and likely increased frequency and severity of drought.
- Decreased runoff into rivers and thus reduced average river flows. Decreases of 10-40 percent could be experienced in eastern parts of Hawke's Bay.
- Uncertainty over rainfall changes in the western ranges means uncertainty about changes in runoff and river flows.
- The possibility of an increase in frequency and intensity of high rainfall events. Together with drier conditions on average, this could lead to increased problems with erosion and flooding.
- The area at greatest risk of erosion is the hill country between Hawke's Bay and Poverty Bay.
- Westerly winds are likely to become more persistent in spring and summer.

KEY CHANGES

- The greatest gains are likely to arise from increased opportunities to grow a greater diversity of crops in lowland areas although this would need to be balanced against the possibility that some crops may be lost over time.
- The greatest losses are likely to arise from the effects of possible decreases in water availability, increases in drought frequency and severity, and the potential for invasive pest species to spread more widely throughout the region.

The East Coast of the North Island is expected to warm by about 1.0°C by mid-century, and more than 2.0°C by late century. Scenarios suggest that temperature increases will be highest in summer and autumn. Annual rainfall is likely to decrease overall, dominated by 10–15 percent less rain in winter and spring. In contrast, summer could become up to 10 percent wetter, although this is less certain.

LIKELY IMPACTS AND OPPORTUNITIES

- With drier conditions on average, increased drought frequency and potentially more wind in spring, comes a reduction in pasture productivity. These impacts will be greatest in drier parts of the east coast.
- The expected drier average conditions, combined with possibly more intense rainfall at times, will increase the erosion and flood risk of most hill country in the eastern region. Windier springs could also increase the potential for wind erosion.
- Changes in pasture composition are likely, with the possibility of a decreased legume component depending on grazing management. An increased incidence of subtropical grasses such as paspalum and kikuyu is likely. The spread of these species is already evident in parts of Gisborne and northern Hawke's Bay.
- Conditions for some existing weedy species, such as woolly nightshade, may improve in some areas and other plant pests could emerge with warmer, drier, conditions. There is already evidence of new plant pest species in eastern regions. Whether this is presently because of gradual acclimatisation, greater awareness or a definite southward spread because of climate change, it is indicative of the sort of changes that could become more common.
- There could be greater problems with animal health, and pests and diseases. Examples of what could be experienced with greater frequency include an increased incidence of facial eczema and viral pneumonia, the rapid spread of Tasmanian grass grub in the last 5–6 years and the outbreak of crickets in Hawke's Bay. Increased heat stress in animals could also be a factor over time.
- The risk of fire in rural areas may also increase.
- The greatest issue for arable and vegetable cropping in eastern North Island will be the availability of water. This will be strongly influenced by continued increases in demand, coupled with possible decreases in supply from warmer, drier conditions.
- Higher temperatures will generally increase opportunities for some grain, legume and vegetable crops through reduced frost risk, the opportunity for earlier sowing and more rapid maturation. The availability of water will be the greatest limitation.
- Subtropical crops, such as citrus and avocados, will benefit from higher temperatures and reduced frost risk. As a result they could be more widely grown in Hawke's Bay.
- Wine grapes will tend to benefit from warmer, drier conditions, particular red wine varieties. However, there will likely be changes to phenology, regional spread of

varieties and wine quality. Higher temperatures will generally be beneficial for kiwifruit in Hawke's Bay, although water demand will be a key issue.

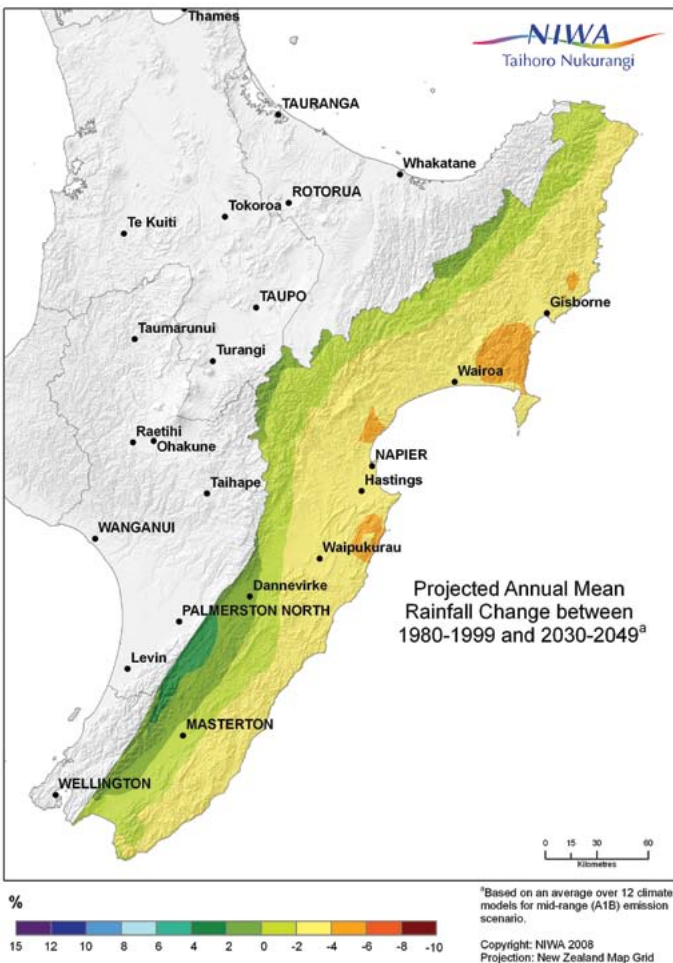
- For apples, higher average temperatures are expected to lead to small changes to dates of bloom, maturity, and fruit size over the next 50 years. Although not certain, current knowledge suggests that an increased incidence of warmer winters will not have a major impact on flowering and fruit set. A trend towards more frequent hot, dry summers could result in greater problems with watercore and sunburn.
- Availability of water for irrigation will be a limiting factor for fruit production. Ground water is vital to fruit production in Gisborne, the Heretaunga Plains and the Wairarapa. At present there is sufficient recharge of ground water during winter to meet the growing season demand. Any depletion in recharge, coupled with

increased demand for water, could change this situation and limit the potential gains outlined here.

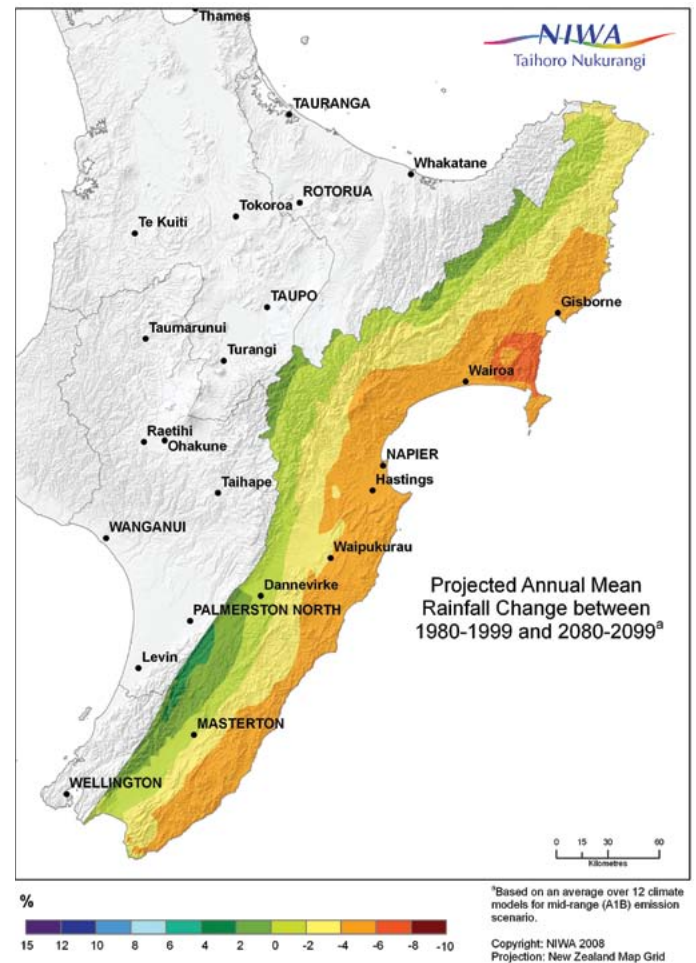
- Changes in pests and diseases will occur with the likelihood of more weed species, and subtropical pests and diseases invading over time, possibly requiring new pest management approaches.
- Security of water supply is likely to be the greatest issue for eastern North Island. Drier average conditions together with increased growth in demand for water is likely to place increasing pressure on available water resources.
- Changes in rainfall, with the possibility of more extremes of wet and dry, 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: Eastern regions of the North Island are likely to receive less total annual rainfall on average by mid century, but with considerable seasonal variations.



2100: Annual rainfall is likely to decrease by about 5 percent by late century along the coast, with less decrease inland. Seasonal variation will be high.

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 Gisborne is likely to increase by 2.2 °C by 2090 but estimates of the expected temperature increase range between 0.8 and 6.2 °C.

CHANGE IN TEMPERATURE °C	SUMMER	AUTUMN	WINTER	SPRING	ANNUAL
GISBORNE					
2040	1.0 [0.2, 2.6]	1.0 [0.3, 2.7]	0.9 [0.1, 2.2]	0.8 [0.0, 2.1]	0.9 [0.2, 2.4]
2090	2.2 [0.8, 6.2]	2.2 [0.6, 5.6]	2.0 [0.5, 5.2]	1.9 [0.3, 5.2]	2.1 [0.6, 5.5]
HAWKE'S BAY					
2040	1.0 [0.2, 2.5]	1.0 [0.3, 2.6]	0.9 [0.1, 2.2]	0.8 [0.0, 2.0]	0.9 [0.2, 2.3]
2090	2.1 [0.8, 6.0]	2.1 [0.6, 5.3]	2.1 [0.5, 5.1]	1.9 [0.3, 5.1]	2.1 [0.6, 5.4]
CHANGE IN RAINFALL %					
GISBORNE					
2040	3 [-26, 33]	4 [-18, 46]	-11 [-30, -2]	-9 [-21, 3]	-4 [-15, 14]
2090	5 [-38, 41]	4 [-25, 27]	-13 [-41, 1]	-16 [-42, 7]	-5 [-22, 8]
NAPIER					
2040	4 [-33, 38]	5 [-14, 42]	-13 [-34, -1]	-7 [-17, 3]	-3 [-14, 14]
2090	9 [-46, 52]	5 [-14, 25]	-16 [-45, -1]	-13 [-38, 9]	-4 [-20, 11]
MASTERTON					
2040	2 [-17, 25]	4 [-8, 32]	-6 [-20, 4]	-1 [-8, 10]	-1 [-7, 9]
2090	4 [-28, 32]	3 [-7, 13]	-7 [-28, 2]	-4 [-20, 16]	-2 [-15, 7]

Source

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

“I work on the assumption that our weather events are going to get more dramatic, we’re going to have more droughts, we’re going to have more weather bombs.”
Hawke’s Bay farmer

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

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SOURCES

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- Kenny, G (2008) *Adapting to climate change in the kiwifruit industry*.

MINISTRY FOR THE ENVIRONMENT

WWW.MFE.GOV.TZ

- *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