



## INTRODUCTION TO CLIMATE CHANGE: 7

# Effects and impacts: Waikato and Bay of Plenty

### KEY EFFECTS

- Wetter average conditions, particularly in the west, could manifest as more frequent and intense rainfall events.
- Also possible are more frequent and intense rainfall events in the Coromandel and inland Bay of Plenty, which have historically experienced the most intense 24-hour, five-year rainfalls in the region.
- Increased risk of flooding in the west and also in river catchments in the Coromandel and inland Bay of Plenty.
- Increased drought risk for the Hauraki Plains, and coastal and eastern Bay of Plenty.
- Fewer frosts, particularly inland, and more hot days in summer are likely.
- Annual temperature increases of about 1°C by mid-century and more than 2°C by 2100 are projected.

### KEY CHANGES

- The greatest gains are likely to arise from the potential for increased pasture production, depending on species, and increased opportunities to grow a greater diversity of sub-tropical fruit crops in the Bay of Plenty.
- Greatest losses could result from an increased incidence of lower quality pasture species on Waikato and Bay of Plenty dairy farms, a decline in suitability of Hayward kiwifruit in warmer locations and increased risk from invasive pests.



With climate change, temperature increases are likely to be highest in summer and autumn, with less warming in spring. Winters will be warmer with a reduced frequency of frost inland and at higher elevations, and a longer growing season. Higher annual rainfall is likely in the south and west of Waikato, and less rainfall expected annually in Coromandel and western Bay of Plenty.

### LIKELY IMPACTS AND OPPORTUNITIES

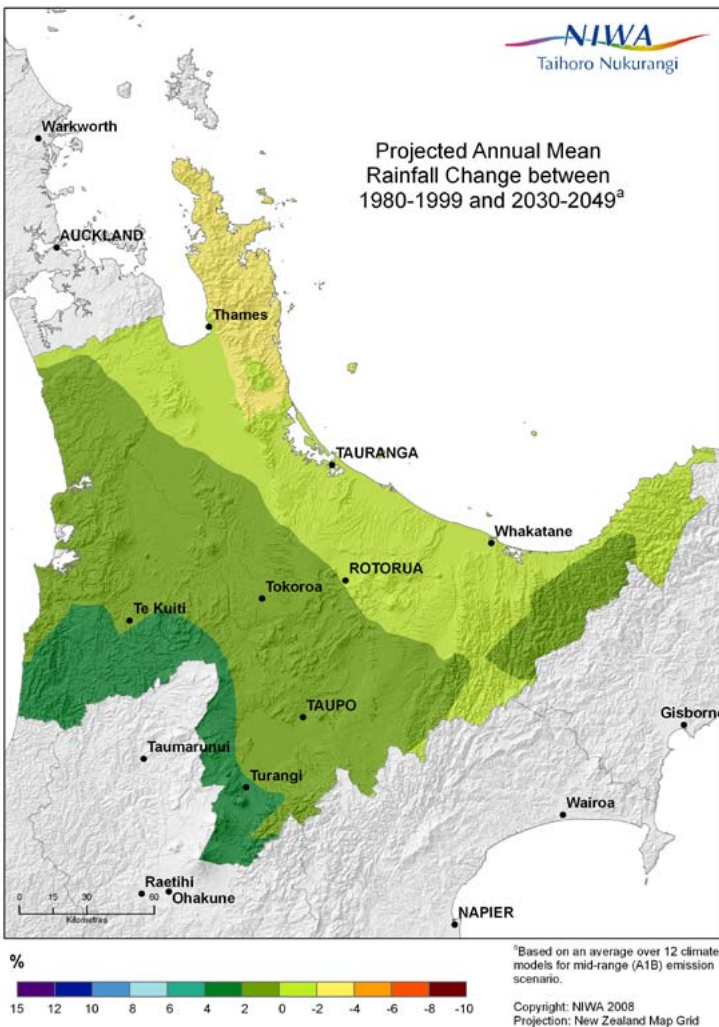
- A useful indicator of potential future changes in the Waikato and Bay of Plenty are current changes in Northland and Auckland, for example, the spread of sub-tropical grasses in pasture, greater infestation of pests and reduced winter chill for crops like kiwifruit.
- Waikato and Bay of Plenty could experience increases in temperate pasture yield although high summer temperatures could become increasingly limiting over time in warmer areas. The extent to which any production gains are realised will depend strongly on changes in pasture composition.
- Sub-tropical grasses such as kikuyu and paspalum are already spreading and are likely to become more widespread over time.
- The possibility of increased drought risk on the Hauraki Plains, and coastal and eastern Bay of Plenty resulting from increased evapotranspiration and lower average rainfall, could contribute to reduced clover content in pastures and a higher incidence of sub-tropical species.
- A warmer, wetter climate, (particularly in the south and west of Waikato) is likely to see diseases such as facial eczema increase and greater problems with internal parasites. Heat stress will become more of a problem for cattle over time.
- Warmer, wetter conditions could lead to increased problems with pests, weeds and diseases in arable crops, pasture and horticultural crops.
- Conditions for some existing weedy species, such as woolly nightshade, may improve in some areas and new plant pests could emerge with warmer, drier conditions. There is already evidence of new plant pest species. Whether this is presently because of gradual acclimatisation, greater awareness or a definite southward spread because of climate change is unknown but it is indicative of the sort of changes that could become more common.
- Warmer, wetter conditions would generally be of benefit to maize production although increased summer rainfall may not always be beneficial, depending on timing and intensity. In areas where conditions could be drier on average, the greatest constraint on production would be from any increase in frequency and intensity of summer drought.
- Without significant use of dormancy-breaking agents and other management practices, Hayward kiwifruit could become uneconomic in warmer parts of the Bay of Plenty.

- Avocados would benefit from higher average temperatures although there will be ongoing problems with diseases such as phytophthora. The citrus industry could also benefit from higher temperatures and other sub-tropical crops could become increasingly viable.
- Increased demand for water is already placing pressure on water resources. If parts of the region, such as the Hauraki Plains and coastal and eastern Bay of Plenty, become drier on average then there will be increased pressure to irrigate.
- A possible increased drought risk in the Hauraki Plains would increase costs of farming on the area's peat soils when combined with projected sea-level rise.

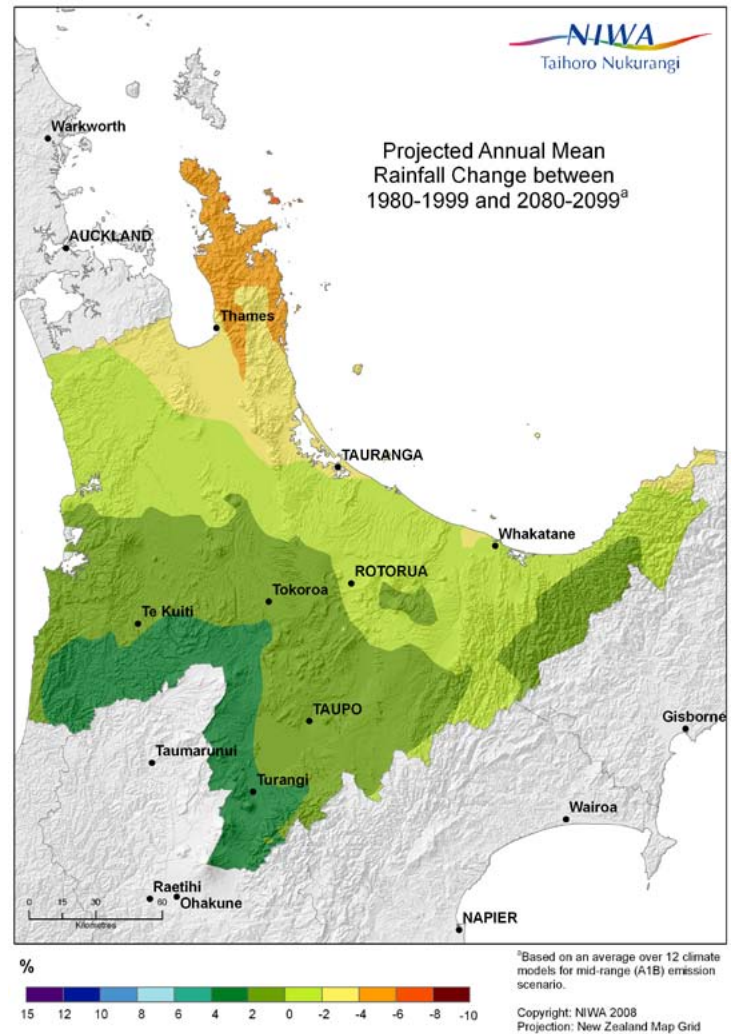
- Currently, there are approximately 20 000 hectares below high tide level in the Thames Valley. The Waihou River is tidal to Tirohia, and the Piako to the Paeroa-Tahuna road. It is likely that rising sea levels will have significant effects on these areas, for example, in drainage engineering and costs, and salt water intrusion near the coast.
- 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:** Waikato is likely to be up to 4 percent wetter in the west and south, with little change in annual rainfall in Bay of Plenty.



**2100:** Hauraki and Western Bay of Plenty will be drier, with up to 6 percent less rain in Coromandel.

## 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 Waikato is likely to increase by 2.3 °C by 2090 but estimates of the expected temperature increase range between 0.9 and 6.3 °C.

CHANGE IN TEMPERATURE °C	SUMMER	AUTUMN	WINTER	SPRING	ANNUAL
<b>WAIKATO</b>					
2040	1.1 [ 0.2, 2.5]	1.0 [ 0.3, 2.7]	0.9 [ 0.2, 2.2]	0.8 [ 0.0, 2.0]	0.9 [ 0.2, 2.4]
2090	2.3 [ 0.9, 6.3]	2.2 [ 0.6, 5.6]	2.1 [ 0.5, 5.2]	1.8 [ 0.3, 5.1]	2.1 [ 0.6, 5.6]
<b>BAY OF PLENTY</b>					
2040	1.0 [ 0.3, 2.5]	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]	1.8 [ 0.3, 5.1]	2.1 [ 0.6, 5.5]
<b>CHANGE IN RAINFALL %</b>					
<b>RUAKURA</b>					
2040	1 [-18, 19]	2 [-13, 10]	1 [-4, 8]	-2 [-10, 13]	0 [-6, 6]
2090	-1 [-34, 18]	-1 [-24, 10]	3 [-7, 15]	-4 [-23, 16]	-1 [-11, 11]
<b>TAURANGA</b>					
2040	2 [-16, 25]	3 [-12, 25]	-4 [-16, 2]	-5 [-18, 7]	-1 [-10, 8]
2090	2 [-20, 23]	2 [-15, 16]	-3 [-16, 8]	-9 [-32, 12]	-2 [-12, 5]

Source

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

*“We used to look out the window in the winter and say ‘it’s fairly frost free over there, that’s good.’ You wouldn’t do that today. You’d say ‘I hope I’ve got enough frost to get winter chill’. There is no winter now. The grass now grows all winter whereas in the past it used to stop growing for about a month, in any one of the winter months.” Bay of Plenty kiwifruit grower*

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

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Photo: Bob Zuur.



## SOURCES

### MINISTRY OF AGRICULTURE AND FORESTRY

[WWW.MAF.GOV.TZ](http://www.maf.govt.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.TZ](http://www.mfe.govt.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](http://www.waikato.ac.nz)
- *Adapting to climate change in eastern New Zealand* (2005). Published by Earth Limited on their website [www.earthlimited.org](http://www.earthlimited.org)
- Kenny, G (2006) *Biotic effects of climate change in the Bay of Plenty*. Report prepared for Bay of Plenty Regional Council and available at [www.ebop.govt.nz](http://www.ebop.govt.nz)

## 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](http://www.maf.govt.nz)
- 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](http://www.mfe.govt.nz)
- For information on animal health and insect and plant pests and diseases visit [www.biosecurity.govt.nz](http://www.biosecurity.govt.nz)
- For a popular guide to the IPCC reports, visit the website of the United Nations Environment Programme [www.grida.no](http://www.grida.no)
- 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)
- Beef + Lamb 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)