

Climate change: impacts on New Zealand

Earth's climate is changing - it's getting warmer, faster. And that change, largely over the past 50 years, is a direct result of human activity.

Global warming means more than just a rise in the world's temperature. Any changes in the global system have a flow-on effect. A warmer surface means more water vapour enters the atmosphere. This affects the complex systems controlling Earth's climate and can significantly change climate patterns.

Because of human-induced global warming, New Zealand's climate is very likely to change during the 21st century, much more than it has done in the past due to natural variability. The overall effect of these changes is difficult to evaluate, but it is already clear that there will be short-term winners and losers. Over time, climate change would mean major changes to the country as we know it.

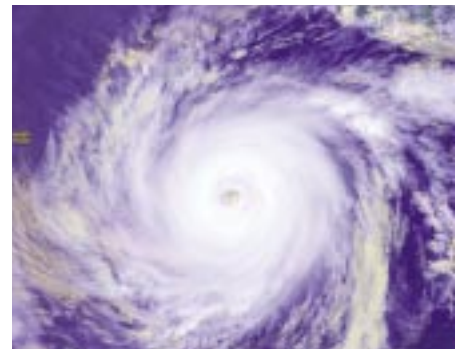


Photo courtesy of NOAA (National Oceanic and Atmospheric Administration)/US Department of Commerce

Projected climate changes in New Zealand - temperature, rainfall, and sea levels

Temperature rises in New Zealand are likely to be less than the global average - but will be higher in the North Island than the South. There are likely to be fewer frost days in winter and more hot days in summer.

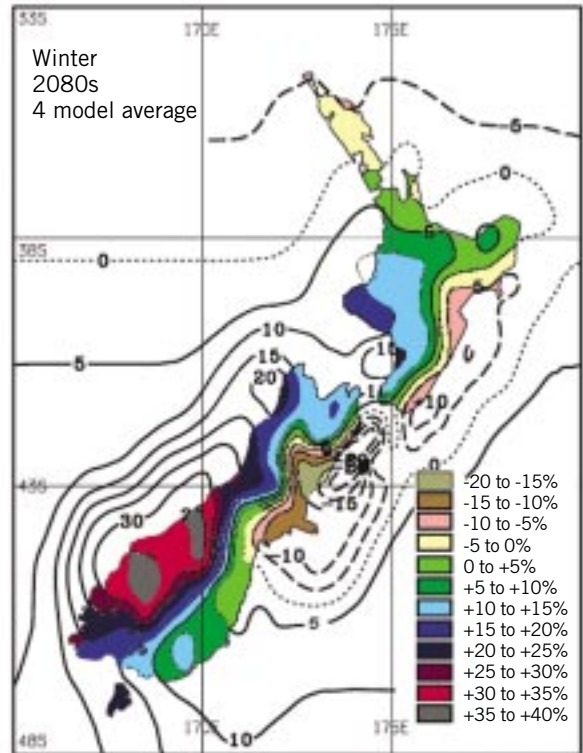
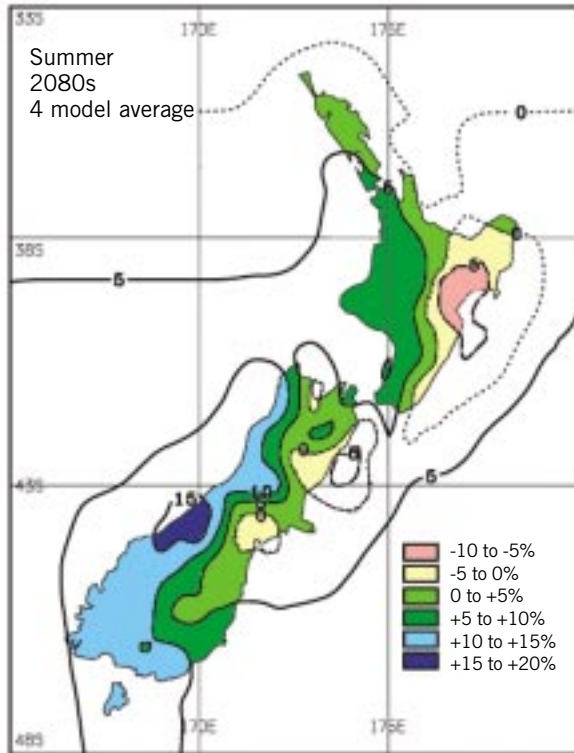
Apart from higher temperatures, the greatest effect of climate change is likely to be on water resources, with higher rainfall in the west and less in the east. Extreme climate events such as droughts could become more frequent in eastern areas, but floods after major downpours could also increase.

Temperatures are likely to rise and rainfall distribution is likely to change. The maps show the changes estimated from an average of four different climate models for the years 2070 to 2099 for continued greenhouse gas emissions. Source: National Institute of Water and Atmospheric Research (NIWA).

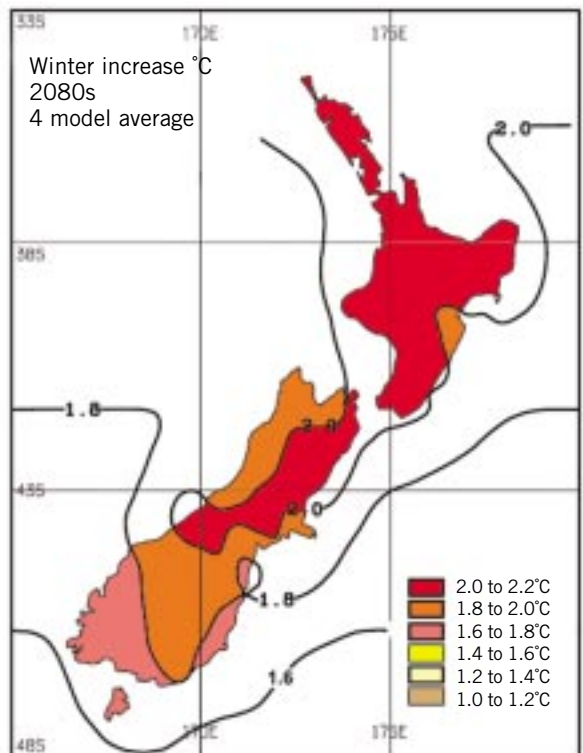
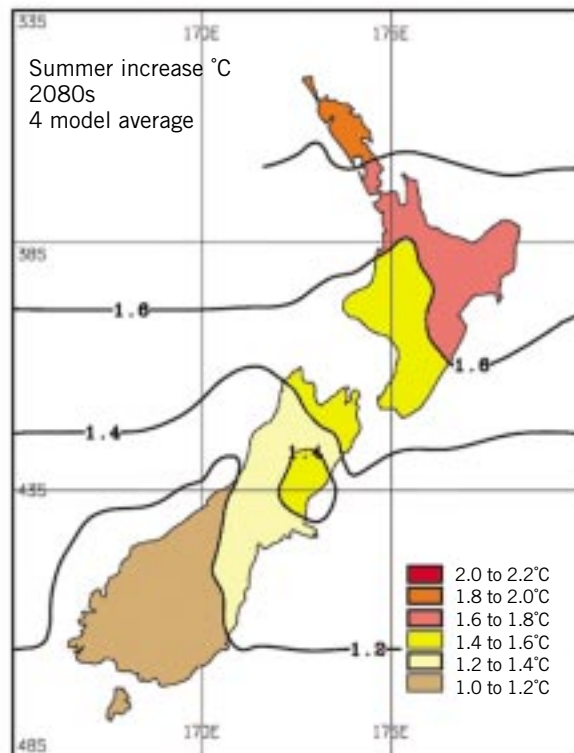
Major risks of the projected climate changes for New Zealand include:

- More droughts, high winds and localised flooding
- Increasing water shortages in eastern areas
- Growing pest and disease problems
- Costs of changing land-use activities to suit the new climate.

Precipitation change



Mean temperature change





Sea-level rise and coasts

Sea levels globally are expected to rise between 9 and 88cm by 2100, compared with average rises of 10 to 20cm last century. Rising sea levels will increase erosion of vulnerable beaches and may increase the need for coastal protection measures.



Agriculture

Potential benefits of climate change include:

- Crops such as *Pinus radiata* growing faster and being able to move into new areas
- Improved plant growth because of rising temperatures and CO₂ levels
- The introduction of new crops and related industries.

But there are risks too. The most significant risks are to do with any increase in floods, droughts and general water limitations. Recent droughts have shown how vulnerable some parts of the country can be to climate extremes.

Higher temperatures could also cause problems for fruit growers in northern areas because plants such as kiwifruit require cold winters. Shifting land-use activities to adapt to the changed climate will incur costs, with some regions winning and others losing.

Pests and diseases could spread more easily under warmer conditions. Pasture composition could change with subtropical grasses spreading, but the overall effect of this on animal health and productivity is still poorly understood.

Being able to supply export markets worse affected than New Zealand will be an opportunity for farmers. But some markets may become more important competitors while global commodity prices for food and wood products could change significantly.

Many of these changes are difficult to predict with certainty, but they show that climate change in other countries could have a strong influence on the economic prosperity of New Zealand.

Urban life, transport and energy

Heavy rainfall will put pressure on drainage and stormwater systems and increase flooding risks in some areas. This makes planning new infrastructure difficult, as it must take expected future changes into account.

Erosion from more frequent flooding will increase road maintenance costs, but fewer snowfalls during winter would save costs in some areas.

Warmer winters, however, are likely to cut heating costs – reducing electricity demand in winter, but possibly increasing it in summer with more need for air conditioning.

Reduced winter electricity demand, more rainfall in the mountains and reduced snow cover will mean levels in hydroelectric storage lakes should stay higher and reduce electricity supply problems during winter.



Natural ecosystems

Overall, climate change is unlikely to be the main risk factor for native ecosystems. But it may make things worse for ecosystems already under pressure from human settlement.

Indigenous plants are generally well adapted to the climate they live in. Fragmentation of our remaining native ecosystems through settlement, roads and farmland makes it difficult for plants to adapt by migrating

to cooler areas, and dry lowland forest areas, in particular, could significantly change in composition. Such changes are likely to affect animals that rely on specific plants for food.

Increased flooding from heavy rainfall and rising temperatures would also change the habitat in freshwater ecosystems, as many fish species require cool conditions. Rising sea levels and changes in rainfall could also change the wetland habitats.

Invasive exotic plant species could find a warmer climate more suitable and increase pressure on native plant communities.

Health

Higher temperatures will reduce winter illnesses and discomfort on cold days, but are likely to increase problems such as heat stress in summer.

Disease-transmitting insects – like the mosquitoes carrying Ross River virus and dengue fever – could become established more easily as the climate warms.

Continued greenhouse gas emissions are also likely to slow the recovery of the ozone layer by 15 to 20 years. This would increase the period New Zealanders would be exposed to high levels of ultraviolet radiation, linked to skin cancers.

Māori

Māori-owned land tends to be concentrated in areas with less productive land types which may be more prone to erosion and invasion by subtropical grasses. Land ownership structures and spiritual and cultural links to the land are likely to make it harder for Māori to consider relocating or making major changes to land use.

Māori see the world as a unified whole, where all elements including tāngata whenua are genealogically connected. Climate change affects the balance between living things (utu), and is seen as a depletion of Earth's life force (mauri).

Restoring the natural balance from a Māori perspective is not only a question of physical and economic benefit, but also of spiritual value.

Reports by the Intergovernmental Panel on Climate Change have concluded that communities with limited resources will have limited ability to make the necessary adaptations to the impacts from climate change. Low income communities in New Zealand, which currently are disproportionately Māori, may therefore suffer disproportionate impacts.

Neighbouring Pacific Island nations

Many of the Pacific nations closely linked to New Zealand will be affected by climate change, with:

- rising sea levels
- changes in rainfall patterns
- destruction of coral reefs
- effects on human health with more heat and risk of diseases.

Increasing demands on New Zealand for development aid and disaster relief are likely if the impacts of climate change hinder or delay the further economic development of these countries.

With significant disruption predicted for Pacific Island and other communities vulnerable to sea-level rise and climate change, some communities could be forced to leave their homeland. As a nearby country with better ability to cope with the impacts of climate change, New Zealand may be required to offer assistance.



New Zealand Climate Change Office
Te Hōtaka Rerekētanga Āhuarangi ō Aotearoa

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