



# Our atmosphere and climate 2020 Summary

New Zealand's Environmental Reporting Series



Ministry for the  
**Environment**  
*Manatū Mō Te Taiao*

**Stats**<sup>NZ</sup>  
Tatauranga Aotearoa

Our atmosphere and climate 2020 is the latest in a series of environmental reports produced by the Ministry for the Environment and Stats NZ.

## OUR CLIMATE AND WHY IT IS CHANGING

Patterns of temperature, rain, wind, and sunshine make up the climate of Aotearoa New Zealand. We have learned to live and thrive with our climate, and tend to take it for granted because we generally know what to expect – even the unexpected.

But the accumulation of greenhouse gases in the atmosphere (mainly from burning fossil fuels for the past 200 years) is changing the climate around the world and in our own country.

## CLIMATE SHAPES US AND WE SHAPE THE CLIMATE

The changing climate is affecting us, but it is a two-way street – our actions and activities are also affecting the climate. Many of the things we do every day contribute to greenhouse gas emissions.

Our future is interconnected with the climate because climate shapes social, cultural, and economic aspects of our lives.

## OUR UNIQUE WAY OF LIFE IS THREATENED

The native biodiversity of New Zealand and the places where we live, enjoy recreation, and make a living are already being affected by climate change. The impacts are being felt by vulnerable whānau throughout Aotearoa, and are causing pain and mamae (hurt).

Our unique way of life, identity, and the values and traditions that make us who we are, are at risk of being altered or lost forever. Some of the things we care about most – our ability to direct our own future, a secure life for our grandchildren, and our deep connections to the natural beauty of these islands – are all threatened by climate change.

## NAVIGATING THE CHALLENGES AHEAD

The ways we choose to reduce emissions and adapt to the impacts we cannot avoid require careful planning and evaluation well before they are needed. Flexible, innovative plans need to be adjustable as the future plays out – making the right decision today will give the next generation an opportunity to make the right decisions tomorrow.

An improved understanding of how our climate is likely to change and the effects of those changes (particularly at local and regional scales) can help us be more resilient.

Mātauranga Māori is a vast repository of knowledge. Together with science it can provide different ways of thinking and alternate pathways to explore as we find ways through the complex challenge of climate change.

This is a summary of the [full report](#).

### How climate change works

Greenhouse gases in the atmosphere act like a blanket by holding in energy from the sun. Burning fossil fuels (like coal, oil, and gas) globally is the main reason for increasing greenhouse gases in the atmosphere. This has caused more energy to be trapped by Earth's blanket which has warmed the climate.

Not all greenhouse gases have the same effect. Some, like carbon dioxide, can stay in the atmosphere for thousands of years and build up (making the blanket thicker and thicker). Other gases, including methane, are gone within decades but hold in much more heat (more like a duvet than a blanket). Carbon dioxide has the biggest effect on future warming globally because it is emitted in large quantities by many different processes.

## ► Our activities are driving emissions

The products we buy, the food we eat, the way we travel, and the goods we produce can all cause emissions of greenhouse gases.

Globally, carbon dioxide emissions have continued to increase – the concentration in the atmosphere is now the highest for at least the past 3 million years.

New Zealand's gross carbon dioxide emissions were 7.7 tonnes per person in 2017 – 17th out of 32 OECD countries. We also 'import' carbon dioxide emissions when we use goods and services from overseas.

Road transport was the largest source of carbon dioxide emissions in 2018 (43 percent). Emissions from road transport also increased by 22 percent from 2009 to 2018. The popularity of vehicles that use more fuel – especially utes and SUVs – means our transport emissions are continuing to increase despite improvements in engine technology.

Methane made up 43 percent of New Zealand's gross greenhouse emissions in 2018, with 86 percent of this coming from livestock. Nitrous oxide made up 10 percent. Agriculture contributed 48 percent of our gross greenhouse gas emissions.

Economic activity and population growth have contributed to New Zealand's carbon dioxide emissions. Improvements in energy efficiency and a greener energy supply have offset some of the increases.

## ► Changes in our climate and environment

Climate change has well and truly arrived in New Zealand and is affecting the climate where we live.

The national average temperature has risen by 1.13 ( $\pm 0.27$ ) degrees Celsius from 1909 to 2019, at an average rate of 0.10 degrees per decade. That rate was 0.31 degrees Celsius per decade in the past 30 years.

Changes in rainfall – particularly extremes – are beginning to emerge. In early 2020, Auckland experienced its longest dry spell of 47 days, well above the average length of 10 days for 1960–2019.

Climate changes are translating to effects on the physical environment. New Zealand's mean relative sea level has risen by 1.81 ( $\pm 0.05$ ) millimetres per year on average since records began more than 100 years ago, and the average rate for 1961–2018 was twice the average rate for the time period since records began to 1960.

Trends from 30 sites across New Zealand showed:

- the annual average temperature increased at 28 sites for 1972–2019
- the average and the maximum winter temperature increased at all sites, and frost days very likely decreased at 40 percent of sites for 1972–2019
- warm days (with a high over 25 degrees Celsius) very likely increased at nearly two thirds of the sites for 1972–2019
- almost half of the sites had increasing trends for annual rainfall, and most of these also had more intense rainfall for 1960–2019
- the intensity of short-term drought increased at 14 sites, with 11 in the North Island for 1972–2019
- a very likely increasing trend in days with very high or extreme fire danger was recorded at 6 sites – Napier, Lake Tekapo, Queenstown, Gisborne, Masterton, and Gore for 1997–2019.

Note: all trends were assessed as statistically likely or very likely (see the [full report](#)).

## ► Climate change and our wellbeing

**Our wellbeing and the things that matter most to us will be affected more and more by changes in the climate.**

We are just beginning to understand the impacts of climate change on our wellbeing. Some effects are already being observed, like shifts in the range of some taonga (treasured) species. For many others, we only have indications of what to watch for as the climate changes.

The contribution of climate change to floods and droughts is estimated to have cost New Zealanders \$840 million in insured damages and economic losses alone from 2007 to 2017. Besides economic losses, experiencing severe weather events can be traumatic and can lead to anxiety and depression.

Climate change is likely to affect marae and customary harvesting grounds and cause major local shifts in how whānau (families) practice manaakitanga (hospitality). A loss of taonga species would mean whānau were no longer able to provide local delicacies to manuhiri (visitors).

A study of hoiho (yellow-eyed penguins) on Otago Peninsula found that warming seas contributed to a reduction in their survival rates, probably by reducing the number and size of the fish they feed on.

The New Zealand Defence Force has already begun planning for more humanitarian, disaster relief, and stability operations in the Pacific. Our Pacific island neighbours will be increasingly affected by rising sea levels, drought, and stronger tropical cyclones.

## ► Looking ahead: emissions and climate

**Globally, emissions of greenhouse gases are expected to continue rising. At the current rate, global average temperature is likely to be 1.5 degrees Celsius above the pre-industrial level in the next 10–30 years.**

A rise of 3 degrees above the pre-industrial level by the end of this century is projected, even if all the current emissions reduction commitments and goals are met by the international community. Deep cuts to global net carbon dioxide emissions would be needed to hold warming to 1.5 degrees Celsius (about 45 percent below 2010 levels by 2030, and net zero by about 2050).

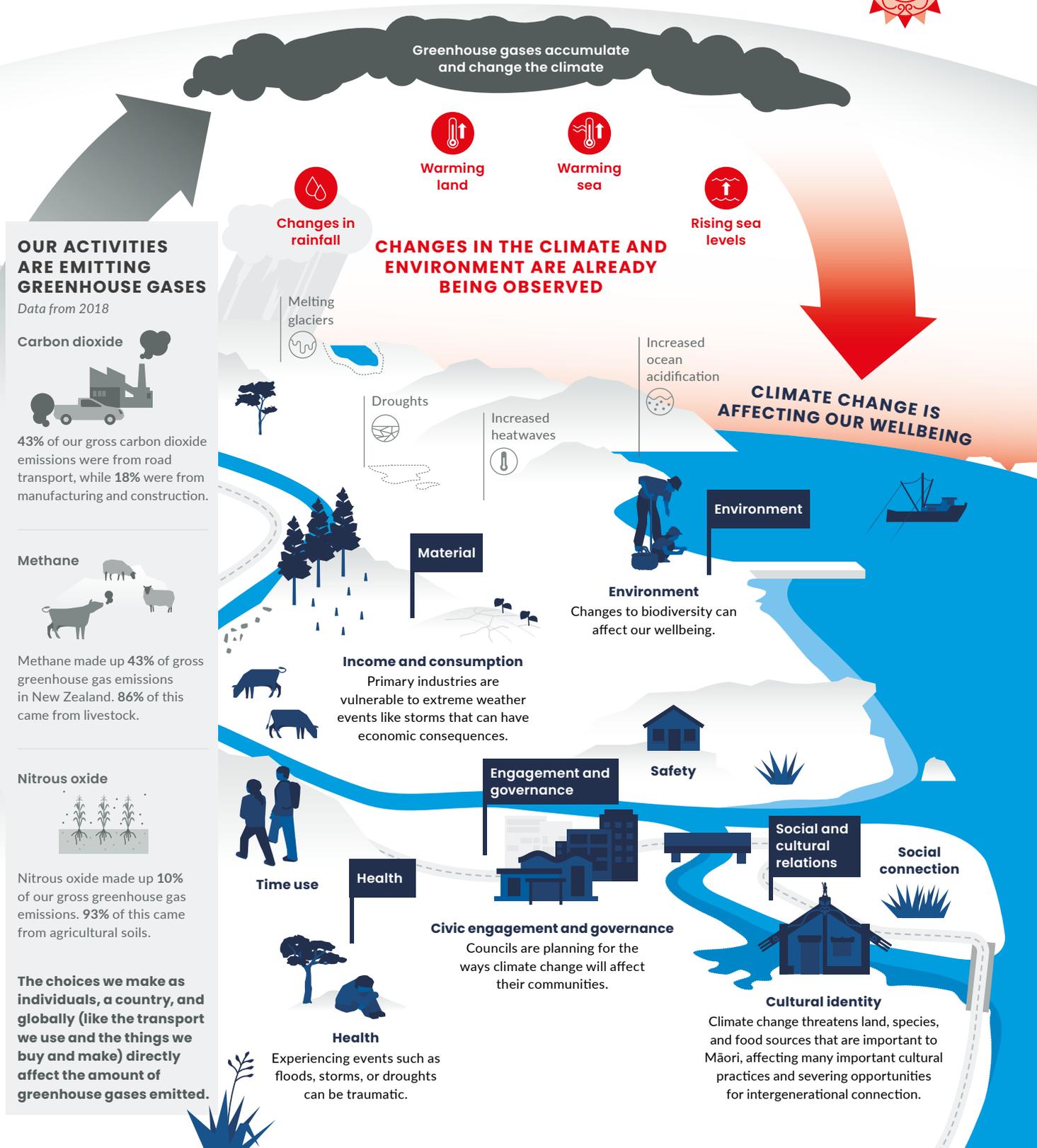
In New Zealand, greenhouse gas emissions are projected to decrease in the coming decades under existing policies, but not at a fast enough rate to meet our 2030 goals under the Paris Agreement.

Profound changes to our climate are expected. Higher temperatures are expected across New Zealand, with drought and wildfire risk projected to increase in many places. Extreme rainfall is expected to become more common. What were rare, extreme events for us may become common for our children and grandchildren.

The disturbance of climate change is not like the economic shocks or changes to our way of life that we may have experienced in the past. Even with no more carbon dioxide emissions, we will not go back to an undisturbed climate or even the climate we grew up with.

## ► Our changing climate

The greenhouse gases we emit are changing the climate and our environment. These changes can affect our wellbeing.



# ► Māori identity and wellbeing is threatened by climate change

Te whenua, te wai, and taonga species are being affected by climate change, which threatens traditional practices connected to Māori identity and wellbeing.

## The timing of tohu are changing

Traditional tohu are used to help forecast changes in the natural environment. They are becoming less reliable, and this is affecting planting, daily decision-making, and activities like resource gathering and hunting.

## The loss of taonga species

Taonga species are central to Māori identity and wellbeing. A warming climate is affecting where some species can live, their numbers, and size.

## Culturally significant places are at risk of being damaged

Many marae and urupā are threatened by flooding and erosion from sea-level rise and extreme weather events.

## Ability to manaaki is threatened

Manaakitanga is a way of life and is especially important on marae where local delicacies are offered generously to manuhiri. Climate change threatens the reliability of tohu, abundance of kai, and sometimes the marae itself.

### How Māori wellbeing is connected to te taiao



**Taha tinana:**  
physical wellbeing  
► rongoā  
► mahinga kai



**Taha wairua:**  
spiritual wellbeing  
► karakia  
► waiata



**Taha hinengaro:**  
mental wellbeing  
► mātauranga  
► tikanga



**Taha whānau:**  
social wellbeing  
► manaakitanga  
► whanaungatanga

Adapted from Durie, 1985

## Mātauranga may not be passed on

Losing traditional resources from the moana, awa, and ngahere is not just a loss in the present. It affects future generations because the tikanga and mātauranga Māori associated with the resource and the practices around its harvest and use would also be lost.

## Glossary

awa: river | kai: food | karakia: prayer | mahinga kai: food gathering place | manaakitanga: the practice of hospitality | manuhiri: visitors  
marae: cultural gathering centre | mātauranga: knowledge | moana: ocean | ngahere: forest | rongoā: medicinal plants  
taonga species: treasured species | tikanga: customary protocols | tohu: environmental indicator | urupā: burial grounds  
wai: water | waiata: songs | whanaungatanga: socialisation | whenua: land