



Our land 2021 Summary

New Zealand's Environmental Reporting Series



Ministry for the
Environment
Manatū Mō Te Taiao

Stats^{NZ}
Tatauranga Aotearoa

Our land 2021 is the latest in a series of environmental reports produced by the Ministry for the Environment and Stats NZ. This report explores land-use change and intensification as it presents across different parts of the environment. This is a summary of the [full report](#).

► Land and our wellbeing

Land is our tūrangawaewae, our place to stand. It is central to our identity as New Zealanders. As tangata whenua – people of the land – Māori have a distinct and special connection to land.

Food, shelter, health, connections to other people, and the ability to provide for ourselves and our families contribute significantly to our wellbeing. All depend on having access to good quality land.

Land provides jobs and income, as well as goods to use and to sell like food, timber, and wool.

The health of the land and our wellbeing go hand in hand. Understanding how they are connected is critical for looking after the land and our wellbeing.

► The driving forces

The basics of life – where we choose to live and the food we choose to eat – have an influence on the demand for land and how it is used.

New Zealand's population is projected to reach 6.8 million by 2073, which will continue to drive the demand for food and housing.

Overseas markets are a significant driver of land use. Most of the products of agriculture and forestry are exported, and these activities cover about half of our land. In 2019, New Zealand's land-based primary industries generated \$44 billion in export revenue.

A growing global population increases the demand for timber and food. More people, higher incomes, and changes in consumer behaviour shift the demand for certain goods, causing changes in export markets.

► Land use and changes in land use

Some land (15 percent) is particularly good for food production. This highly productive land has a good climate, suitable soil, and is flat or gently sloping.

Highly productive land is at risk of becoming unavailable for agriculture due to housing developments.

Many of our cities developed on and around food producing land – market gardens provided a local food supply for urban dwellers. In the 1950s, urban development of market-gardening land in and around Auckland was already a concern, and it has continued in the past 60 years. The remaining market gardening areas have now been rezoned for development including for urban areas and lifestyle blocks.

The area of highly productive land that was unavailable for agriculture (because it had a house on it) increased by 54 percent for 2002 to 2019. During this period urban areas increased by 31 percent on land that was potentially available for agriculture. The area of residential (housing) land outside city boundaries (rural residential areas) also more than doubled during this time.

Fragmentation of highly productive land can shift it out of commercial production. This happens particularly with the development of lifestyle blocks. Highly productive land became more fragmented between 2002 and 2019, especially through residential development.

Our exports and domestic food production currently rely on the small amount of highly productive land we have. Using land that is not highly productive for food growing, especially horticulture, results in lower yields unless more intensive land management approaches are used.

► Land management and the soil

Half of the total land area in Aotearoa New Zealand is now used for agriculture, forestry, and housing.

Intensive land management is about getting the most from each hectare of land – maximising the yield of milk, meat, timber, fruit, vegetables, or crops. Intensive land management risks degrading the quality and health of the soil.

Nationwide, 80 percent of soil monitoring sites failed to meet the targets for at least one soil quality indicator. Soil in these areas can be less productive and may need more fertiliser and irrigation to keep up production. No declining or improving trend in soil quality was observed for 1994–2018.

Macroporosity (the number of pore spaces in the soil) was below the target range in 65 percent of dairy farming sites, 48 percent of drystock (beef, sheep, and deer) farming sites, and 46 percent of orchard/vineyard sites sampled between 2014 and 2018. Low macroporosity can reduce the growth of plants and the yield from pastures, especially in wet conditions. Also, water can pond on the surface then run off, which causes erosion and moves topsoil and nutrients into waterways.

Levels of Olsen phosphorus (the amount of available phosphorus in soil) were above the recommended target range for 61 percent of dairy farming and cropping sites and 46 percent of orchard/vineyards sites sampled between 2014 and 2018. A trend of increasing Olsen phosphorus was also observed at cropping and drystock sites for 1996–2018. High levels of Olsen phosphorus can indicate that too much phosphorus fertiliser has been applied.

A study of irrigated and non-irrigated pasture sites across New Zealand found that irrigated pastures had significantly less soil carbon and nitrogen than non-irrigated pastures. An increase in the area of irrigated land may increase the loss of carbon dioxide to the atmosphere and increase nitrogen leaching.

While soil at most monitoring sites was within the target range for nitrogen, many rivers are polluted with excess nitrogen. Soil quality indicators may not fully capture the impacts of intensive land use on the wider environment. (This includes issues around the use of nitrogen and its effects on freshwater quality.)

The concept of soil quality focuses on its intended use. Soil health, however, is a broader concept that includes a soil's ongoing capacity to function as a living ecosystem that sustains plant, animal, and human health. A better understanding of soil health, ecosystem processes, and the connections between environmental processes is needed. This would enable us to ensure that healthy soils are available for future generations.

Sustaining and enhancing the health of soil and other resources is a significant feature of Māori land management. Questions such as 'what can we do for the soil?' are encouraged.

Soil is a living ecosystem that sustains all life, including microbes, plants, animals, and humans. Soil degradation reduces its mauri (life force) and productivity, as well as the hauora (wellbeing) of people.

► Effects on the wider environment

Land connects every part of the complex system that is te taiao, the environment. How we use land can therefore affect the many interactions between lakes, rivers, oceans, air, climate, and native species.

Native vegetation continues to be removed in some regions, including the West Coast and Southland. About 25 percent of the total area of native vegetation cover in New Zealand is on land used for sheep and beef farming, compared with 1 percent of total area of native vegetation cover on land used for dairy farming. Only about 3 percent of the native vegetation on sheep and beef farms is permanently protected by covenants.

More intensive agriculture and urban expansion can increase pollution in the freshwater and marine environments.

Applying nitrogen fertiliser and animal effluent to the soil increases the risk of nitrogen moving into freshwater and leaching into groundwater. Phosphorus can accumulate in the soil when phosphorus fertiliser is applied continuously. It enters freshwater mainly when soil with high levels of phosphorus is eroded.

Nitrogen and phosphorus can cause algal blooms in rivers and lakes, reducing the amount of oxygen in the water for plants and for fish to breathe.

The leaching of nitrogen and other nutrients into groundwater can take a long time. In groundwater that was dated using tracers, a sharp increase in nitrogen and other agrochemicals was observed after 1955, corresponding to the start of intensified agriculture.

In 2018, 53 percent of New Zealand's greenhouse gas emissions by volume were methane and nitrous oxide, with most coming from agriculture. Emissions from livestock made up 86 percent of methane emissions. After those from animals, fertilisers made the largest contribution to emissions from dairy farms at 15 percent of their carbon footprint. Emissions from nitrogen fertiliser were the highest across all types of fertiliser.

The loss of native vegetation, water pollution, and climate change affect each other and can have cumulative impacts on the environment. The use of a te ao Māori (Māori world view) framework and mātauranga Māori is particularly helpful for understanding and addressing issues that affect several different parts of the environmental system.

► Land and a changing climate

Climate change is our generation's environmental challenge. Its effects are expected to become more intense in the coming years. They could cause agriculture, native ecosystems, infrastructure, and health to look very different in the future.

A longer growing season and warmer temperatures may bring new opportunities but more extreme weather events (like droughts) are likely to seriously affect agricultural production and forestry.

Changes in management practices are anticipated as climate patterns shift. Wine growers could respond by changing the varieties of grapes they grow, and farmers may alter the breed or species of their livestock. Some drought-tolerant grape varieties and pasture species are already being investigated and grown.

The ways we attempt to reduce greenhouse gas emissions and adapt to a changing climate may influence land use. Options include reducing the density of dairy cows, sheep, and other livestock; improving animal performance; using less fertiliser; and breeding sheep that produce fewer emissions.

Policies to mitigate or adapt to climate change will also affect how land is used in the future. In many places local governments have created plans to reduce emissions and manage the risks from sea-level rise and flooding.

Climate change will amplify existing risks to natural and human systems, and create new ones. Untangling the different drivers and their importance is therefore paramount.

► Ko au te whenua, te whenua ko au



For Māori, Papatūānuku is the source and sustainer of the land and all its life including humans. Our relationship with her has many facets.



Whakapapa

Our whenua is our identity. Through the whenua we whakapapa to our tūpuna/tipuna. We use the boundaries of our tribal land to introduce ourselves, referencing our mountain, river, land, and ocean.

Tūrangawaewae

The whenua is our home, our place to stand. The word whenua also means placenta. This demonstrates the lifelong connection formed when our placenta is buried after birth until we die and are returned to the whenua.

Hauora

A healthy whenua is fundamental to our health and physical, mental, spiritual, and social wellbeing. It provides resources to feed, shelter, and heal our whānau, opportunities to learn, and connects us to Papatūānuku.

Kaitiakitanga

When we act as kaitiaki and care for and protect our land, we uphold the mana of our ancestors and remember the struggles of those who came before us.

Tino rangatiratanga

Tino rangatiratanga is a way of living according to tikanga that safeguards the land and its resources for future generations.

Momotu

Different understandings and breaches of Te Tiriti o Waitangi led to conflict and the New Zealand land wars. Laws were also used to take away and alienate Māori from their whenua.

Signed in 1840, Te Tiriti o Waitangi formalised the partnership between mana whenua and Pākehā. Despite progress, considerable change is needed to honour the partnership and restore balance through utu and the rights of mana whenua.

Glossary

Ko au te whenua, te whenua ko au: I am the land, the land is me | hauora: health | iwi: extended kinship group | kaitiaki: guardian | kaitiakitanga: guardianship/stewardship | mana whenua: customary authority exercised by iwi/hapū | momotu: separated | Pākehā: non-Māori New Zealander, generally European | Papatūānuku: Earth mother | tikanga: customs/protocols | tino rangatiratanga: sovereignty and self-determination | tūpuna/tipuna: ancestors | tūrangawaewae: place where one has the right to stand | utu: concept of reciprocation or balance | whakapapa: genealogy/descent | whenua: land

► Healthy land, healthy soil, healthy people

