



# Productive Land

Land is one of our most valuable assets, providing recreational opportunities and giving us a sense of place and connection to our local environment. Farming and forestry provide dairy, meat, wool and timber products that contribute significantly to the regional economy and support communities.

The natural variations of climate, topography and soil shape how land is used and managed across the region. Regular rainfall and deep, fertile and free-draining volcanic soils surrounding Taranaki Maunga sustain intensive agricultural activities. Dairy farming is the predominant land use on the ring plain. On the steeper sedimentary hill country in the east of the region, the shallower, more erodible soils support less intensive agricultural activities, such as sheep and beef farming, and plantation forestry.

Land use creates pressures on the environment that must be managed. In intensively farmed areas, run-off

of nutrients and bacteria can affect the water quality in rivers, streams, lakes and estuaries. The erosion of streambanks and riverbanks can increase sediment concentrations, smothering aquatic life and degrading freshwater and marine ecosystems. If soils are not managed appropriately, soil health can deteriorate through changes to its chemical and physical structure and to its ecological microcommunities. In the hill country, avoiding erosion and the loss of soils to waterways is the most significant challenge and a key land management objective for the region.

The Council works with landowners to help them optimise the use of their productive land, while minimising the effects of their activities on the environment. We monitor impacts of land use on the environment and develop plans and strategies with the goal of achieving sustainable land use.

**464** Sustainable land management plans cover **68%** of private eastern hill country land

**5,523<sup>ha</sup>** erosion-prone land **retired** since 2009

**51%** of total land area is used for agriculture  
**7%** is urban

## What we know

### Land use

Around half of Taranaki land area is used for agriculture and horticulture. Dairy farming remains the predominant land use, accounting for 207,086ha, or 58% of land used for primary production in 2019. The area utilised for dairying across Taranaki has increased by 62,095ha (43%) since 2002, primarily through conversion from dairy support or sheep and beef farming. Much of this change occurred prior to 2012 and has slowed considerably in recent years. While there is some dairy farming in the lower hill country, most occurs on the ring plain of Taranaki Maunga and on the marine terraces in northern and southern coastal areas.

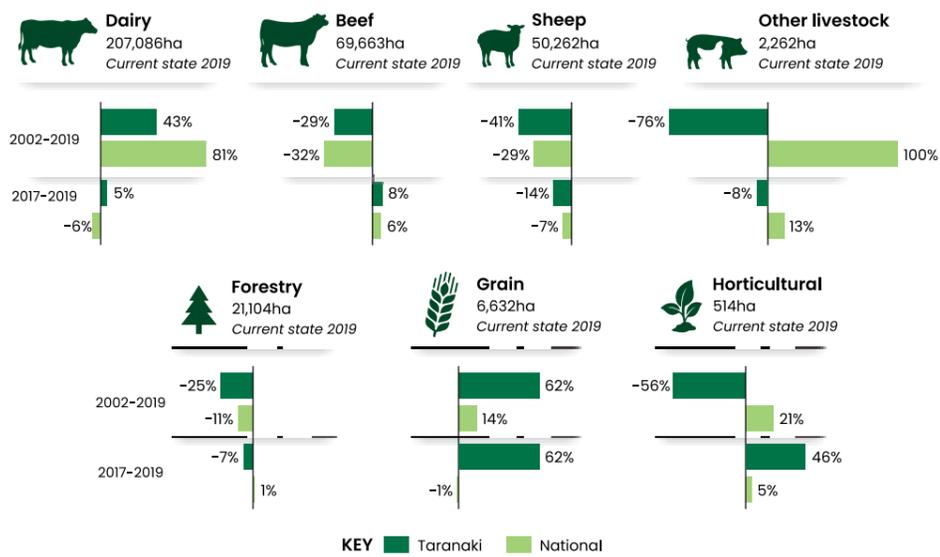
Sheep and beef farming occurs mainly on the steeper, less fertile slopes of Taranaki eastern hill country. Land used for sheep and beef farming in Taranaki has reduced by 35,389ha (-41%) and 28,901ha (-29%) respectively since 2002. The decline in the area used for sheep farming has continued in recent years, reducing by 8,128ha (-14%) since 2017, however the beef farming area has increased by 5,376ha (8%) over the same period. These trends generally follow those seen elsewhere in New Zealand.

Horticulture and grain production accounts for just 7,146ha (2%) of the total area used for agricultural and horticultural production in Taranaki, with less than 1% in horticultural land use. However, this is increasing. Between 2017 and 2019 the area in grain production grew by 2,540ha (62%), and horticultural land use by 162ha (46%).

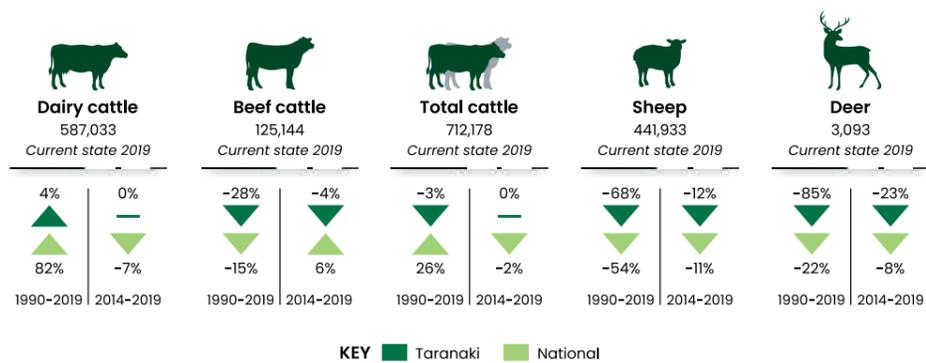
As of 2019, there were about 587,000 dairy cattle in Taranaki, up 4% (24,000 cows) from 1990. Nationally, the total dairy herd increased 82% over the same period. However, from 2014 to 2019, dairy cattle numbers remained steady in Taranaki, while nationally there was a 7% decline. The most notable change in livestock numbers in Taranaki has been the significant long-term reduction in beef cattle and sheep. As of 2019, there were 28% fewer cattle (-49,244) and 68% fewer sheep (-933,407) in Taranaki compared to 1990. Since 2014, these numbers have continued to decline, although at a reduced rate of -4% and -12%, respectively.



In Taranaki, 51% of total land area is used for agriculture and horticulture, 38% remains under indigenous forest cover, urban areas account for 7%, and production forestry 4%.



Change in land use area, 2002-2019.



Change in livestock numbers, 1990-2019.

### Reducing erosion

Most of New Zealand's erosion-prone hill country is in the southeast and west of the North Island, with around 15% in Taranaki. Soft sediments, steep slopes and high rainfall, combined with the loss of the original vegetation cover, mean this land is susceptible to accelerated soil erosion. The loss of land's productive capacity for farming has a detrimental effect on in-stream water quality and aquatic ecosystems, causes downstream effects on property and infrastructure and can smother seabeds in the coastal marine area. It is estimated New Zealand loses 192 million tonnes of sediment per year due to erosion.

The Council has monitored sustainable land use in the eastern hill country since 1994. It is estimated 87% of eastern hill country land in private ownership is now managed sustainably. The Council assesses this by comparing current land use practices to those practices the land is able to sustain, using a nationally accepted classification system for land use capability.

To assess the sustainability of land use practices, 25 representative sites in the eastern hill country are analysed every five years. Up until 2007, there was an overall increase in sustainability of around 3%. Between 2007 and 2017 there was little change, with sustainability gains on more

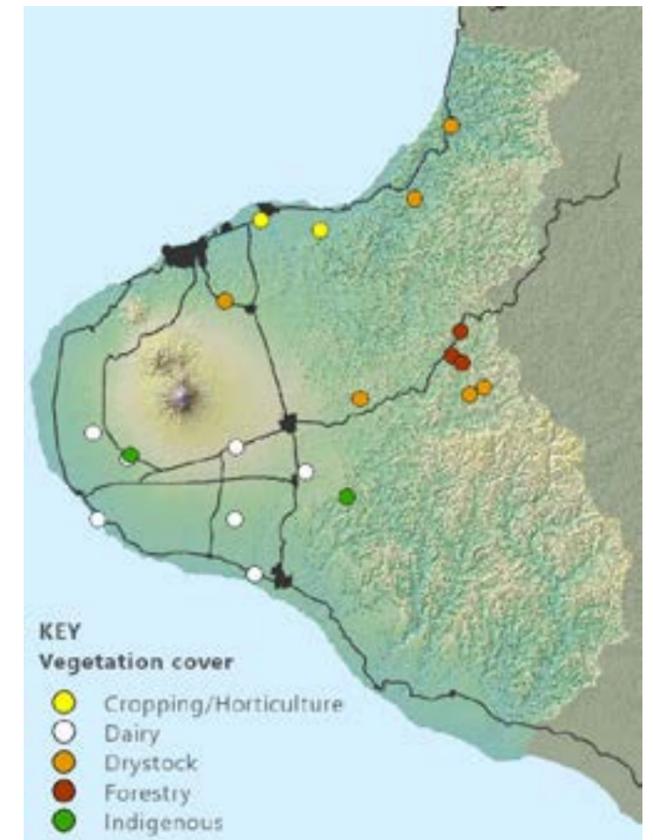
marginal land from forestry and reversion to mānuka offset by the conversion of drystock land to more intensive land uses like dairy farming. In recent years, there has been growing interest in actively reverting (or planting) marginal pasture land to mānuka or planting mānuka forests, as mānuka honey and biopharmaceuticals gain in popularity.

### Soil health

Soil health monitoring (undertaken every five years) shows most soil health indicators are in the target range. However, soil compaction and elevated nutrient levels from intensive grazing remain a challenge. The quality of soils has been monitored in Taranaki since 1995, with the most recent survey in 2017. When compared to 2012, the 2017 results showed a general decline in soil health at a number of monitored sites, mainly due to soil compaction.

Eighteen sites under active land use were sampled in 2017, including three plantation forests, seven dairy pastures, six drystock pastures and two cropping sites. Two indigenous forest cover sites were also sampled for comparison. Samples were assessed for physical condition, chemical fertility, trace elements, organic matter and microbial health indicators, which were compared against optimal ranges. For the 18 sites under active land use, the majority of soil health indicators were in the target range. Where there were exceedances, these were typically for macroporosity. Macroporosity is a measure of the proportion of large pores (spaces between soil particles) found within the soil. Macropores provide air for plant roots and allow water to flow through the soil. The ideal range for macroporosity was exceeded at 11 of 18 sites surveyed (61%), all of which were under either dairy or drystock land use. The loss of soil macropores at these sites is due to soil compaction, which can be caused by heavy machinery like tractors, high animal stocking rates or stock damaging soil when it is wet. Soil compaction is a common issue across New Zealand, particularly in areas of intensive agricultural land use. Elevated Olsen phosphorus and/or nitrogen levels were also found at some dairy and flatland drystock sites.

Manaaki Whenua - Landcare Research also monitored four coastal sand country sites between 1994 and 2017, finding an overall decrease in the area of bare sand at three of the four sites. This can be attributed to stabilisation planting, forestry planting, better grazing management and the re-contouring or clay capping of dunes and the establishment of irrigation. Analysis of aerial photography by the Council shows a decrease in the area of bare sand by 72ha across the region from 2012 to 2017.



Soil health is assessed at sites across the region under different types of land use and vegetation cover.

# What we're doing

## Sustainable land management and hill-country erosion

The Council works closely with landowners to reduce accelerated erosion through its Sustainable Land Management Programme. Council officers prepare comprehensive farm plans using land use capability mapping to determine property-specific soil conservation solutions.

Over the last 25 to 30 years, we have prepared 464 comprehensive farm and agroforestry plans for around 210,294ha (69%) of the eastern hill country under private ownership, with 90% of farmers implementing these plans to some degree. Plans cover all aspects of a farming operation, specifically addressing management practices that protect soil and water, while maximising productivity. Through these farm plans, 15,697ha of forestry have been established and 63,730ha of marginal land have been retired.

Manaaki Whenua's SedNetNZ model estimates soil conservation works implemented over the past 25 years have resulted in a 29% net reduction in mean annual suspended sediment load across the region, with a further 15% reduction expected as existing soil conservation works mature. We expect further gains as the remaining 30% of landowners without farm plans join the Council's Sustainable Land Management Programme.

Critical to the success of this Programme is the provision of plants to support soil conservation and riparian management. The Council operates two plant provision schemes: one to support the planting of stream riparian margins, the other to stabilise erosion-prone land.

To date, the Council has provided more than seven million native plants to plan holders at cost to reduce streambank erosion. Additionally, around 75,000 poplar and willow poles have been provided to hill country planholders for open-

spaced planting to reduce accelerated erosion. We expect demand for poles to increase because of soil conservation recommendations in compulsory freshwater farm plans.

## South Taranaki Regional Erosion Support Scheme (STRESS)

In 2009, South Taranaki Regional Erosion Support Scheme (STRESS) grants became available which have helped fund the establishment of a further 46,000 poles. That year the Council secured \$1.06 million in Government funding. The scheme's initial focus was the Waitōtara catchment, which suffered significant damage in a 2004 storm. It now delivers poplar and willow pole planting, retirement and reversion fencing for erodible land right across the region.

The scheme has been well-received by the public, with around 40% of farm planholders now participating in STRESS. The Council has successfully renewed its four-year contract three times. The most recent funding round saw the scheme receive \$3.99 million in Government funding with prioritised works extended to the Pātea and Waitara catchments.

The Government's Afforestation Grant Scheme and One Billion Trees Programme (1BT) also assisted with afforestation and native reversion. Both schemes were delivered through the Council's Sustainable Land Management Programme, complementing STRESS. Council officers helped planholders access grants from 1BT, particularly for native reversion and forestry projects that sit outside STRESS criteria. Providing this service to planholders on behalf of the Government helps the Council achieve sustainable land use change, reduced sediment production and reduce sediment loss.



A council officer taking a soil sample.



of fencing erected to protect **894ha** of afforested areas and **5,523ha** of land retired through STRESS Between 2009 and 2021



Poplar and willow poles planted to treat more than **1,600ha** of erosion prone land Between 2009 and 2021

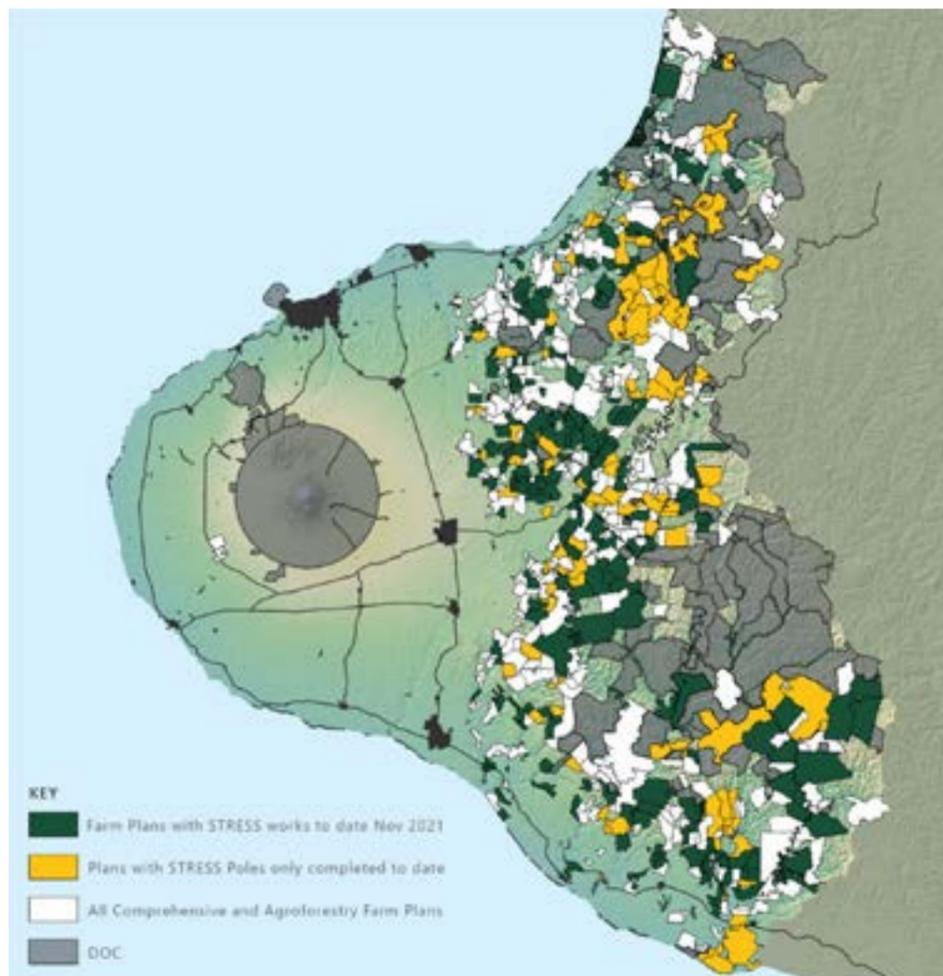
While the significant effort and investment in land stabilisation works in Taranaki has been successful in reducing sediment loads in erosion prone catchments, more work is required. Over the next three to five years, the Council will update soil conservation recommendations in its existing farm and agroforestry plans. We will also work to extend the Sustainable Land Management Programme to the 30% of the hill country in private ownership that don't yet have plans. Through appropriate regional rules, the Council's plans will direct the recommendations for soil conservation measures to reduce sediment production. Once these plans are in place for all farms, annual monitoring will track the implementation progress of recommendations, which can be used to report on sediment reduction targets.

## Soil health

Poor soil quality can be reversed with appropriate land management practices. In response to new Government regulations, the Council will monitor the use of synthetic nitrogen fertilisers to ensure application rates remain within set limits. Our on-farm compliance inspections will also cover high-risk activities like intensive winter grazing, which have the potential to adversely impact on soil health.



A council officer helping to plant poplar poles.



Farm plan holders participating in STRESS, 2021.

## Understanding and planning for the impacts of climate change

Climate change will influence the levels of intervention required to meet water quality targets into the future. More plentiful and intense rainfall can lead to accelerated erosion and increased run-off of contaminants from pasture and urban environments. How climate change will affect these processes is important when considering how effective our land management interventions are likely to be, and how they will help achieve water quality targets.

Modelling work in eastern areas of New Zealand has shown that in some catchments, sediment loss may exceed the reductions we can achieve through our current land management interventions. Ongoing action to reduce erosion and protect our valuable soils will be necessary to

ensure we don't lose traction or see a reversal in the gains we have made. The Council has commissioned work to better understand the likely implications of climate change for Taranaki. Further work using the Manaaki Whenua SedNetNZ model will estimate the potential impacts on forecasted sediment loads. We will then be able to reassess the reductions in sediment loads needed to achieve freshwater improvement in coming years.

## Soil mapping using S-map

Soil mapping gives farmers the information to make informed management decisions that optimise their agricultural practices. While we have some knowledge of our region's soils, there are large areas of Taranaki where soils are yet to be mapped.

Over the next four years (2022-2026) we will work to improve the quality and comprehensiveness of soil mapping across the region using 'S-map', New Zealand's national geospatial soil information system. Manaaki Whenua scientists will carry out soil mapping and analysis, with the support of farmers and Council staff. The Council will contribute funding and in-kind support, with significant additional funding provided by the Ministry for Primary Industries (MPI).

Soil mapping will focus on the Waingongoro and Waitara Rivers, and southwestern ring plain catchments. Once mapping is complete, soil information will be digitised and made available to the public via the S-map online portal.

## Mapping our land surface

S-map is just one of many projects that will be able to make use of Taranaki new LiDAR (light detection and ranging) data. LiDAR surveys have been flown to gather land surface and elevation data. This is used to generate 3D maps and models that will have a wide range of potential uses in environmental management and planning, management of natural hazards, planning of facilities and infrastructure and tracking changes in the landscape over time.

Funding for the \$750,000 project has come from the Provincial Growth Fund, via Land Information New Zealand – Toitū te Whenua (LINZ), with contributions from Taranaki four councils and the University of Auckland. Taranaki Regional Council is the lead agency regionally.

The LiDAR data will also help New Plymouth, Stratford and South Taranaki District Councils in their land use planning and the provision of services like pipelines and roads. Auckland University came on board because it saw great

value in obtaining data on the volcanic cone of Taranaki Maunga. Other applications include:

- Assessing vegetation cover and habitat quality
- Getting a more accurate picture of erosion
- Allowing better modelling of the effects of floods and droughts
- Monitoring the changes in coastal dunes
- Providing a clearer picture of the steepness of hill country land
- Allowing sharper definition of sites of cultural significance

## Regenerative agriculture

In recent years, regenerative agriculture has started to capture the interest of New Zealand's farming community. Regenerative practices seek to optimise farmer performance while supporting farmer wellbeing, maximising stock health and reducing the impact of farming practices on the environment. Interestingly, many farmers in the region are already employing what could be recognised as regenerative practices.

The benefits are not always easy to measure using conventional academic approaches and there is a need to better understand what regenerative agriculture means for New Zealand. Scientists are working to test the claimed benefits of regenerative agriculture and fill the evidence gaps specific to New Zealand. Much of this work is being delivered through the Our Land and Water National Science Challenge.

# Putting cultural values on the map



Keith Holswich.

A Taranaki man believes so strongly that protection of sites significant to tangata whenua is an important national priority, that he's put countless voluntary hours into digitally mapping more than 100 sites special to his Ngāti Rāhiri hapū.

Keith Holswich is determined a hapū decision to share details of the sites will result in their protection, as envisaged at the time of the 'courageous' move to open up access to knowledge that had always been held closely.

Getting site details into a Geographic Information System (GIS) digital mapping format allows easy sharing with councils responsible for issuing consents, as well as with hapū members young and old, researchers and the public.

All the sites were accurately surveyed as a first step, and the GIS work started two years ago. The groundwork has been completed but maintenance and improvements will continue indefinitely.

Keith is heartened by the support he won by approaching corporate sponsors regionally, nationally and even internationally, with a specialist Australian GIS company providing valuable in-kind resources at no cost. "It demonstrates the willingness of good corporate citizens

to become involved in the preservation of historical sites in Taranaki, not just for the benefit of the hapū, but for New Zealanders as a whole. This is about the living history of the land we live in, the land that sustains us."

He's also grateful for the support and encouragement of Council officers working on a region-wide list of significant sites, for use in resource management.

Since 2019, Council staff have been researching publicly available information including press articles, old maps, video clips, treaty settlements, photographs and archival records. Details of about 800 sites have been compiled and officers are now working with individual iwi and hapū on changes and modifications. They're also working with the region's three district councils.

Keith firmly believes work of this nature is nationally important and should be resourced accordingly. But as a retired surveyor, he was happy to be able to utilise his skills on behalf of his hapū. "When you see that something needs doing but it's not being done, you jump in," he says.

Keith's effort was recognised with a Taranaki Regional Council Environmental Award in 2021.

