

Case study

Ā Te Taitokerau urutau i ngā āhuarangi Responding to a changing climate in Te Taitokerau/Northland



Ā Te Taitokerau urutau i ngā āhuarangi: Responding to a changing climate in Te Taitokerau/Northland - a case study from He Pou a Rangi Climate Change Commission.

The views and opinions expressed in this case study are those of the people we talked to during and after a visit to the region in March 2025. This compilation of insights from that korero was created by the Commission, with the input of the people we talked to.

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Cover image shows Ngātiwai kuia Bella Thompson (with Clive Stone at left) talking with Commission visitors at Tuparehuia (Bland Bay), east of Kawakawa in March 2025. Photo / Whangarei District Council

The tohu (signature pattern) used in this publication is part of the visual identity of He Pou a Rangi Climate Change Commission. It was devised by Dan Brown (Ngāti Ranginui) and inspired by a pātiki tukutuku panel which symbolises a future that is able to provide for everyone. In the same way making tukutuku is a technically precise methodical process, the mahi the Commission does requires a precise approach of measuring, reviewing and recording.

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From our Chief Executive

Tēnā koutou katoa.

Ko te wehi ki te Kaihanga.

Ko te whakahōnore ki Te Arikinui Kuini Nga wai hono i te po. Pai mārire ki te Kāhui Ariki whānui tonu.

Poroporoākītia ngā mate huhua kei runga i a tātou katoa.

E kore e ārikarika ā mātou kō He Pou a Rangi mihi ki a koutou ko mana whenua, rātou ko hapori, ko umanga, ko kaunihera. Nō mātou kē te hōnore i te rongo i ā koutou nei kōrerorero me ngā toro i ā koutou wheako whaiaro i ngā urutau mō ngā āhua o Rangi.

Kua rongo, kua kite mātou i ngā whiwhinga ka riro i a koutou me te mahi ngātahi ā hapori, ā whaitua, ā rohe, ā motu hoki. Arā, ki te whakamanahia a mana whenua me te hāpori i ā rātou ake urutau, ka tutuki. Inā kē te tauira, ki te kotahi te kākaho ka whati, ki te kāpuia e kore e whati.

Me tā mātou tūmanako, ka kitea koutou e koutou anō i ngā whārangi ki raro nei hei tauira mā Te Taitokerau, mā te motu. Anei anō te mihi.

This case study explores the impacts of a changing climate on Te Taitokerau/Northland and shares how communities and businesses are responding.

Hearing directly from people on the ground is one of the most effective ways for us to gather evidence and understand impacts. For an inherently local issue like climate adaptation, it is invaluable.

We hope that by releasing this case study, the insights shared with us will be more easily accessed by others working on this mahi, in central and local government, businesses, communities and beyond.

During our visit in March 2025, we travelled from the east coast to the west coast, and heard about the diverse and distinct needs of different communities.

Across all the conversations we had, I was struck by the determination and innovation shown by the people we met with. These communities and businesses aren't waiting for further impacts to hit. They're already figuring out responses to meet their needs and aspirations - solutions created and implemented by the people that need them. The question, and the challenge, is 'How can these initiatives be joined up and scaled up for lasting effect that helps everyone in the community to cope and build resilience?'

Many of the people we met talked about what they could achieve when they are able to define and drive their own adaptation. We heard calls for central government support for community-led adaptation approaches, as well as calls for specific government actions to enable those responses.

Case studies are one input into the reports we will be delivering in 2026, which combine these local insights with a wide range of other evidence to develop our formal assessments of national climate risks and progress on the national adaptation plan.

A huge mihi to everyone who opened their doors to us, sharing their experiences, knowledge, and their fortitude in face of climate adversity. Accounts like these are important contributions to our understanding of what's needed to build resilience at a local level.



j & Hendy

Jo Hendy Chief Executive

Introduction

These questions are at the heart of this case study - a story based on korero with people across Te Taitokerau/Northland in 2025.

- (?) Innovation and strength building - what makes it happen?
- What drives the action what climate risks are people facing?
- ? What support do locals want - what helps, what gets in the way?

When we visited the region in March our aim was to get a better understanding of how climate change is affecting the region, and what people are doing in response. That local experience is valuable for others around the motu and is a key input for our advice to government (see below).

This case study sets out what we saw and heard on our visit, illustrating the innovative responses people have to diverse climate challenges in the region. The stories are organised by the themes that emerged as we listened. It includes a summary of what people said about the central government action that would help.

Our thanks to everyone who hosted and talked with us: hapū and iwi, farmers and growers, businesses, community organisations, councils and the economic agency.

Thank you for showing us the challenges you face, the action you are already taking, and your aspirations for the future.

The value of a close-up view

He Pou a Rangi Climate Change Commission uses case studies as part of our mahi on adaptation. They are central to our research approach - so we can better understand how climate change affects Aotearoa New Zealand at the local level, and how communities are responding.

The insights that communities share with us are also useful to others working in adaptation in central and local government, business, hapori/communities and beyond. Many of the people we talked to in Te Taitokerau/Northland hoped their experience could be helpful to other regions.

Hearing directly from people on the ground is particularly important for adaptation, which is in its very nature a local activity. Shifts in rainfall and wind patterns, air and ocean temperatures, and sea levels play out differently in each area. So do responses from hapori/communities, councils and industries.

We have undertaken four case studies to date. In 2024 we used two case studies - of Wairoa and South Dunedin - in our first assessment of progress made on the Government's national adaptation plan.i

In 2025, our case study focus is on the region of Te Taitokerau/Northland and the town of Westport. These will feed into two of our 2026 reports.

These four locations were selected as they provide a view of a wide range of climaterelated risks, as well as kinds of community, and different stages of adaptation response. Our visits included meeting with a crosssection of people and groups to hear from diverse perspectives.

There are many common themes in the information people provided, and sometimes important differences - for some groups or for a particular area. These shared elements, and the distinctions, allow a picture to form of the complex ways that climate change affects the country.

It also lets readers see what restricts people's responses in different situations and helps us all to identify what is needed at a system level to support communities and businesses to adapt.

This case study report does not compare what people told us with the adaptation action that Government is taking (including under the National Adaptation Framework released in October 2025"), or the developing understanding of the climate risks the country faces.

That will be the focus of our 2026 reports, where local information from case studies will be combined with our analysis of data and research, and insights from central and local government, business and community organisations, researchers and subject specialists. Those reports are:

- the second national climate change risk assessment - this will assess a wide range of risks to the country from climate change, and will identify the most significant climate risks for the Government to respond to in the next six years (due to be delivered to the Minister of Climate Change by mid-2026)
- our second monitoring report on progress made under the Government's first national adaptation plan (due to the Minister in August 2026), which will include reviewing government action, including that set out in the National Adaptation Framework and making recommendations about what will be needed in the next plan.

i Progress report: National Adaptation Plan (August 2024), available on our website: https://www.climatecommission.govt.nz/our-work/adaptation/nappa/nappa-2024

ii For information on the Government's National Adaptation Framework see the Ministry for the Environment website: https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/adapting-toclimate-change/national-adaptation-framework/





Listening to learn: Site visits are important, and so is the korero that happens over a cuppa, like this chat in the North Hokianga near Mitimiti (left), and a kitchen table meeting with Northland Inc representatives in Hūkerenui (right). Photos / Far North District Council and He Pou a Rangi

Keeping it real

Case studies are not just research tools. Every day on our visit we were reminded these are also stories about people and places, full of history and connections to te taiao, the natural environment.

An account like this amplifies people's lived experience. It shines a spotlight on the everyday - and often increasingly intense reality for people dealing with the effects of a changing climate. It also reveals the many ways that adaptation is already, determinedly, underway.

Thank you to all who told us about your experiences and observations, and your willingness to share your understanding of what is needed to rise to the challenge of the changing climate, to thrive and grow in Te Taitokerau/Northland.

The stories we heard in Te Taitokerau/ Northland reflect locals' recent experience of changes in their climate, and their understanding of risks in the near future.

It is a closer view, in time as well as place, than the national reports these case studies will contribute to.

Our two adaptation reports due in 2026 - the second national climate change risk assessment, and our second assessment of progress under the Government's national adaptation plan - will provide a more comprehensive national picture based on a wide range of evidence, including long-term climate projections.

For other accounts direct from Te Taitokerau/Northland, see these 2025 Northland Civil Defence Emergency Management publications: Cyclone Gabrielle and Tai Tokerau Northland: Stories of community resilience and messages of support for the rest of Aotearoa New Zealand, and Titiro whakamuri, kōkiri whakamua: Cyclone Gabrielle final recovery report for Te Tai Tokerau Northland. Another view is in the climate writing of Nadine Hura (Ngāti Hine, Ngāpuhi) at www.thespinoff.com/authors/nadine-millar or her own site: nadineannehura.com.

Overview and background

Snapshots: innovation in the face of a changing climate

Primary sector resilience and early adaptation



Action

Growers are adapting farm practices, and trialling new crops. We heard the warming conditions and the region's soils and rainfall presented chances for production of new high-value crops. Examples of adaptation to the more variable rainfall patterns include manual pollination to replace bees that cannot fly in the rain, planting on mounds to reduce the effects of surface flooding, and more disease-resistant root-stocks.

Reason

Growers face threats from new pests and diseases, while changes in rainfall and temperature patterns are affecting the fundamentals of horticultural systems. People in the sector told us growing costs and risks require them to adapt quickly, but accessing affordable capital for adaptation projects is difficult.

See story on page 19.



Action

The pastoral sector is building its ability to respond to changes in the climate. Farmers in the region are linking up to share knowledge and create stronger community ties - in the wake of extreme weather events there is increased reliance on organisations like Rural Support Trust Te Taitokerau. Since our visit the Resilient Pastures programme has begun a pilot in the region.

Reason

Grassland farmers are grappling with the dual pressure of rising temperatures and prolonged dry periods affecting pasture quality and more frequent intense rainfall contributing to pugging and erosion.

See story on page 22.

Growing resilience in hapori Māori



Action

In the Hokianga, remote communities are drawing on a history of self-sufficiency to regenerate their food systems and build resilience in the face of rising prices and the pressures of climate change. He Kete Kai Food Security Programme is supported by Far North District Council and Northland Regional Council in a collaborative and equitable model focused on community engagement.

Reason

When extreme weather events happen, these communities can be particularly hard hit. When the region's stretched roading network fails, they lose access to schools, workplaces, and essential services for prolonged periods.

See story on page 25.

Collaborating at a catchment level



Action

Ngātiwai Trust Board and the Whangarei District Council are collaborating on a catchment-wide adaptation project covering a 165-square-kilometre area between Whangaruru and Oakura. This combines deep local knowledge with nature-based solutions to reduce community vulnerability to climate risks.

Reason

These east coast communities face risks of isolation, damage and loss from both coastal and river flooding in extreme weather events, declining health of the moana and loss of land and heritage from sea level rise and erosion. This threatens homes, schools, marae, ancestral land, family farms, kaimoana and cultural heritage, including urupā.

See story on page 31.

Adaptation in a network of rivers and streams



Action

River flood protection is a key focus of Northland Regional Council's climate resilience work. This includes long-running schemes such as on the Awanui River protecting Kaitāia, and recent close work with communities to protect the region's most at-risk marae.

Reason

We heard that across the region, flooding and poor river health are recurring concerns. Flooding presents widespread risks to transport and other infrastructure, communities and businesses. River health is also under pressure, which strains the natural systems people rely on, and has downstream effects in coastal waters.

See story on page 35.

Keeping connected - the supporting infrastructure



Action

Major commercial operators are contributing to regional resilience through improvements to their energy security and diversifying transport.

Reason

We heard lost connection from infrastructure failing in extreme weather events threatens businesses, employment and livelihoods across the region, as well as the safety of households and communities. Transport, power, telecommunications and digital networks and water systems were all described as fragile.

See story on page 39.

Overview: responses to a changing climate - practical approaches, connections and systems

In Aotearoa New Zealand's northernmost region, the effects of a changing climate are emerging in layered, often overlapping ways.

We heard about a wide range of climate changes – from slow shifts in seasonal patterns to extreme weather events hitting hard and often. And we heard about the growing pressure this is placing on people, communities and businesses, natural ecosystems and the infrastructure that supports and links the region.

Much of the korero focused on the importance of social and community connections as the foundation of climate resilience, and the ways different groups can come together to build strong responses based on deep local knowledge.

We heard innovation is already happening. The most enduring efforts were often those led from the ground up: blending climate adaptation with broader goals around economic opportunities, energy independence, food sovereignty, housing, and cultural renewal.

We were told those on-the-ground efforts could grow into the comprehensive response that Te Taitokerau/Northland needs, but they depend on critical inputs from government.

The summary on this page lists the key elements of what people told us they needed from central government to support and connect adaptation efforts across the country.

We heard calls for support for these ways of doing things

- Approaches to adapting to climate change that help all to cope and build resilience
- Responses that are founded on community strengths and values
- Opportunity to lead local adaptation action in ways that weave in broader goals
- Collaborative partnerships that help connect across communities and sectors

We heard calls for government action in these areas

- Reliable access to information and data, resources and technical support
- Long-term policy and funding pathways, including support to access capital
- Greater clarity about roles and responsibilities in legislation and national plans
- Investment in infrastructure to keep people connected and safe.
- i For more information: see the final section 'Summary what people said they need to succeed.'

The difference between climate hazards and climate risks - explaining the technical terms

Talking about risks related to climate change can prompt questions like 'Will my home flood?', 'Will the next big windstorm close the road?' or 'Are we going to be hit by drought again?'

These are important questions. But they are, technically, about climate hazards and exposure to those hazards, rather than climate risks.

Hazards

Hazards are the physical elements of climate change that create problems for us.

For example: the intense rainfall that results from warmer seas feeding more moisture into a storm.

Climate risks

Climate risks are the consequences we might experience - or, as formally defined by the Intergovernmental Panel on Climate Change (IPCC): 'the potential for adverse consequences for human or ecological systems'.1

For example: a climate risk driven (in part) by intense rainfall would be the risk to the availability and quality of drinking water supplies: if the rainfall leads to surface flooding that overloads stormwater and sewage systems, the community's drinking water could be contaminated.

Risks combine three factors:

- Hazards are the physical events or trends that can impact people, the environment, or the economy. For example, severe weather events, droughts, floods, sea level rise and wildfire are climate hazards.
- Exposure looks at whether the hazard reaches people, places or things.
- Vulnerability focuses on factors that determine how - and how much people, places or things are affected. It considers sensitivity to the change, and also ability to adapt.

For example: The risk to drinking water supplies from intense rainfall takes into account how much the water infrastructure is exposed (for instance if it is in a low lying area), and its vulnerability to that hazard (perhaps it is older and more likely to fail in a flood).

Background: the changing climate in Te Taitokerau/Northland



Flooding at Tangiterōria, a settlement between Dargaville and Whangārei, blocks State Highway 14 following Cyclone Gabrielle in February 2023, during the region's wettest summer on record. Photo / Kristen Edge, NZ Police

Dramatic weather events are not unusual in Te Taitokerau/Northland. Residents are well accustomed to the disruptions of sudden downpours, cyclones and droughts.

The region's warm, humid summers and mild winters are shaped by shifting influences – ranging from dry anticyclones to westerly wind flows and occasional tropical systems. All of this contributes to more volatile weather, including highly variable rainfall.

But the past decade brought a more intense element to these patterns: as notably shown in the summer of 2022/2023, when four powerful storms within seven weeks caused major flooding events in the region.

"Rising average temperatures, summer heatwaves and air pollution levels will affect human health. More droughts, floods and storms create significant economic and social issues for communities and whānau."

Northland Climate Change Projections and Impacts, NIWA and Northland Regional Council (2017)²

More powerful storms, more often

In ex-Tropical Cyclone Gabrielle in February 2023, six sites across the region recorded one-in-100-year rainfall levels and waves reached 10 metres off the Bay of Islands. Four rivers topped all previously recorded peak levels. The Poutō Peninsula recorded sustained rainfall of 63 millimetres per hour, while Glenbervie Forest received 420 millimetres throughout the event.3

Just weeks before Gabrielle, ex-Tropical Cyclone Hale brought up to 300 millimetres of rain in 24 hours and gusts of 128 kilometres per hour.4 Then, a fortnight after Gabrielle, another deluge swamped Mangawhai, submerging cars and flooding homes.⁵

It came during the region's - and much of the North Island's - wettest summer on record, with household insurance claims in the region alone soaring to NZ\$50 million.6

The connection between extreme events like Cyclone Gabrielle and climate change was demonstrated by a later nation-wide study that found human-caused (anthropogenic) warming intensified the storm's total rainfall. The study showed that anthropogenic warming increased the total rainfall of Cyclone Gabrielle by about 10%, and its peak hourly rainfall by 20%, compared to the same storm with no warming.⁷

These storms are examples of the significant changes already occurring in the region's climate - as well as more frequent and intense weather events, rainfall annual patterns have changed, average air temperatures have risen, and the number of days where frost will form have reduced.8

Even slow shifts bring far-reaching changes

The gradual trends - such as shifting rainfall patterns, and rising sea levels and average temperatures - may not be as immediately visible as fierce storms, but will bring profound and far-reaching changes to the region.

The latest climate projections for the country, published by the Ministry for the Environment in 2023, iv show that average temperatures are likely to rise across the region, with greatest seasonal change projected in summer. Frosts are expected to become rare events, and hot days more common.



The rolling countryside of Ruatangata West, Te Taitokerau/Northland. Climate projections for the region are for more uneven rainfall patterns, as well as average temperature rises, and more hot days (over 25°C). Photo / AG Images

Climate projections for the three districts in Northland Region are available from Ministry for the Environment (MfE) Aotearoa New Zealand climate projections. The projections are based on data from global climate models assessed in the Intergovernmental Panel for Climate Change (IPCC) Sixth Assessment Report, published in August 2021. They are relative to the 1995-2014 period.

Rainfall patterns are expected to become more uneven. Although total annual rainfall might drop – particularly in spring, by up to 25% – the kind of heavy downpours that can increase the flood hazard will still happen.

The reality of these projections becomes sharper when you look at the numbers. The published information presents likely effects under a range of scenarios, from one that assumes the world acts to keep warming below 2° C with net zero CO_2 emissions reached by 2050 (SSP1-2.6), to one that has emissions doubling and warming reaching 3.6°C by 2100 (SSP3-7.0).

For instance, 'more hot days' in the Far North, could – under that higher emissions scenario – mean a change from current levels of about 24 days a year above 25°C, to almost 100 days by the end of the century. The projection for Whangārei district under the same scenario, is for just over 90 more hot days per year by 2090 (from the current average of 25 days a year), but the same or slightly fewer intense rainfall events (ranging from 1 more to 4 fewer very rainy days per year).

Those figures are an example using the projections for the end of the century under one scenario. This kind of information helps people consider what could happen, and the outliers of what they should plan for.

The uncertainty involved in projections, particularly over longer time periods, means the information is usually shown in ranges. For instance, the Government's projections for Kaipara district are for reductions of between 2% and 21% in rainfall in spring by 2090, and between 2 fewer and 10 more dry days per year from the current average of 221 days.

Twin risks of flooding and drought

For people living and working close to the land, the changes to the region's climate create a double burden of rising flood risk and greater drought pressure.

Longer dry spells will reduce soil moisture, limit pasture growth, and raise the chance of seasonal water shortages. Droughts are projected to become more frequent and last longer, with the highest risk on the east and west coasts, and southern inland area.⁹

This brings with it the risk of wildfire, particularly for communities living near forests.

On our March 2025 visit, people we met were still reeling from the effects of a major fire in the Waipoua River area in February, which burned almost 100 hectares of scrub and pine. ¹⁰ It was one of several fire events in the area, during a period of high temperatures and drought. This combination also poses a threat to native ecosystems in the region, where many species cannot survive long spells of hot, dry conditions.

v Each of the global climate models gives slightly different results for each of the variables and locations within a district. The results on the MfE website are presented as the average of the multiple models for each variable and district, and the uncertainty is calculated from the range of average values within the district.

Increasing coastal hazards

Higher average sea levels, which projections show could rise by up to 60 cm by 2080 and potentially 1.5 metres by 2130,11 pose significant challenges for Te Taitokerau/ Northland's extensive coastline.vi

With over 3,200 kilometres of coastline and numerous towns, settlements, and vital cultural sites nestled along its fringes, many of the places that matter to people are exposed to coastal erosion and to increasingly frequent, intense storm surge and river flooding events.vii

An initial regional study identifies approximately 70 towns and localities where properties and assets would be significantly affected by these coastal hazards.¹² In many places, effects of coastal erosion are already visible.

Climate change impacts on the moana also include the effects of warming seas and ocean acidification, and increase in nonnative marine species, as set out in the recent national environmental report Our Marine Environment 2025: Tō Tātou Taiao Moana. 13, viii

Implications for the region

The technical report underlying the 2022 Te Taitokerau Climate Adaptation Strategy includes this summary of climate change impacts and implications for the region.

"Te Taitokerau is likely to experience physical impacts from climate change such as increases in coastal inundation and erosion, more regular river flooding and sedimentation, extended periodic dry periods, increased fire danger weather, and alterations to seasonal weather conditions such as frosts and spring rainfall decline. These will increasingly create implications for our region, by disrupting our water, land and ecosystems, our people, culture and economy, and will fundamentally influence the way local government provides services to the community."14

This case study explores the ways the people of Te Taitokerau/Northland are experiencing and responding to these challenges, and the options they identify for national level action.

- More site-specific estimates of sea level rise were produced as part of the NZ SeaRise project. This was a fivevi year research programme funded by the Ministry of Business, Innovation and Employment and was carried out by Te Herenga Waka-Victoria University of Wellington, GNS Science, NIWA, University of Otago and the Antarctic Science Platform. The project produced site-specific estimates of sea level rise under different climate projections, and included estimates of the effect of local upward or downward movement of land on sea level rise. Find it at: https://searise.nz/
- vii More detailed estimates of flood hazards and exposure can be found as part of the Earth Sciences New Zealand flood hazard viewer, released in October 2025. The viewer is available at: https://niwa.maps.arcgis.com/apps/ dashboards/8c1db2b8e37841f29a57a38675388897.
- viii The accompanying report, 'The Stories Behind the Numbers: Ngā Kōrero mō ngā Tau' includes a case study of Kaipara Moana Remediation, a 10-year initiative to restore the health of the Kaipara harbour.

What we heard on the ground

Primary sector resilience and early adaptation

Travel anywhere in Te Taitokerau/Northland's rolling landscape and you see the stamp of the primary industries.

Agriculture, with forestry and fishing, is core to the regional economy. In the 2024 financial year, these sectors contributed NZ\$1.06 billion, representing 10% of the region's GDP - almost double the proportion those sectors contribute to national GDP (5%).15 Similarly, the 2023 Census shows the primary sectors provide employment for 9% of the region's population, compared to 5.1% for the rest of the country.¹⁶

The farmers and growers who work on the land are increasingly aware of shifts in the climate - both the extremes and the slow trends. One described their recent experience as a kind of whiplash, with conditions swinging

between extremes of heavy rainfall and drought. Another observed it was almost as if the seasons had changed, with unpredictable weather affecting long-established patterns for planting crops.

Many are busy finding ways to cope, and when possible, seizing the opportunities presented.

Luke Beehre, a dairy farmer and primary sector lead for Northland Inc, the regional economic development agency, put it this way: "If you're going to be a farmer, you have to be optimistic. We know we have adapted before, and will have to adapt into the future - it's just we don't know what that looks like."

"We know we have adapted before, and will have to adapt into the future - it's just we don't know what that looks like."

Luke Beehre, primary sector lead, **Tuputupu Grow Northland initiative**



Patrick Malley, general manager and director of Maungatapere Berries, west of Whangarei, which has made extensive changes in response to climate shifts - and to rebuild from extreme weather events. It is getting harder and harder to roll with the punches, he says. Photo / AG Images

Responding to a new reality, and opportunities

Luke and his colleague Jeanette Johnstone, a horticulture specialist in the Tuputupu Grow Northland Initiative, told us there is wide variation in how farms and other businesses experience the region's changing climate.

The region is characterised by differences in landforms and soil types, a myriad of microclimates, and diverse social and economic conditions. This means there is also a wide range in producers' ability to respond.

There were opportunities in the changes in climate, we were told. Provided the right support was in place, the warming conditions and the region's soils and rainfall presented chances for production of new high-value crops. Growers were experimenting with bananas, pineapples and dragon fruit - a crimson red, avocado-sized fruit sought after in Asian markets. In the hills above Doubtless Bay, the world's southern-most commercial coffee farm opened its gates in 2023.17

Two 2025 studies commissioned by Northland Inc as part of its Pūtake Whakatupu initiative to explore land use and manufacturing options indicate possibilities for more diversification, such as papaya.18

At the same time, growers stressed that new niche crops cannot replace Te Taitokerau/ Northland's established staples. There were also practical limits for small operators to commercialise new crops without marketing coordination.

Pests on the rise

The counterpoint to the opportunities of warmer weather is an unwelcome shift in pest dynamics. Fewer frosts are enabling greater survival of insects and diseases - many of which, like the fast-establishing fall armyworm, are new to the region.

The lack of a cold dormant period provides good conditions for the Guava moth. The pest first arrived in Te Taitokerau/ Northland 15 years ago, and with no effective control it is now significantly affecting crops such as feijoas, citrus and apples.¹⁹

Growers showed us new pasture weeds such as Madagascar ragwort, the spread of which is linked to warmer temperatures and changes in rainfall patterns. Within just a few years, the weed has gone from being largely unnoticed to requiring a major chemical management programme.20

Biosecurity was described as on a 'knife edge', with growers expressing concern about potential incursions like fruit fly or brown marmorated stink bug. We heard a single incursion of a market-sensitive pest could be worse for regional horticulture than the toll of Gabrielle.

Current regulatory settings for biosecurity management were seen as inadequate, and too slow to respond to emerging threats - the 12-18-month period for approving a chemical response was the time it might take for the new pest to become established.

"It's the totality that's more of an issue"

One consistent message we heard across the primary sector was that climate change impacts were adding to the challenges farmers and growers were already grappling with: rising costs, labour shortages, pressure on water infrastructure, regulatory burden and limited access to capital and to affordable credit.

Patrick Malley, general manager and director of Maungatapere Berries, a major berryfruit producer west of Whangārei, described dealing with the combined pressures as like being backed down a road towards a wall: the climate shifts took up what little space was left, and with no room to move, it was hard to absorb any other change.

There was fatigue, especially given the toll taken by the extreme weather events of 2023. Nearly 70% of the region's kūmara crop was destroyed in the storm. While the kūmara industry has proved resilient, with a rebound in supply after initial scarcity and price spikes, the recovery involved significant effort and financial cost for growers.²¹

At Maungatapere Berries, entire crops were flattened by Cyclone Gabrielle, and growing infrastructure damaged by high winds. "The preceding season was just as destructive, because we had a massive amount of rainfall, Patrick told us. "It's the totality that's more of an issue, as opposed to that specific incident."

Like many growers, his business absorbed not just the immediate losses but the knock-on impacts for production schedules and supply continuity. It forced adjustments to everything from planting times to the choice of crop varieties.

Finding solutions - and chances to team up

Growers were working out their own solutions, but that brought them added costs. Examples of adaptation to the more variable rainfall patterns were practices such as manual pollination to replace bees that cannot fly in the rain, planting on mounds to reduce exposure to surface flooding, and investing in more disease-resistant rootstocks.

In the far north, an iwi-owned operation is stretching to explore new crop management practices, crop trials (including dragon fruit) and significant development of water resources. The new Tupehau reservoir on Te Rarawa whenua near Ahipara supplies nearby farmland and the 212-hectare Bells Produce market garden owned by the iwi since 2019.

Producers such as this Te Rarawa business emphasised their readiness to work out a response - with staff and owners often driving adaptation efforts rather than waiting for external or central government guidance.

However, growers and business-owners also stressed the need for wider efforts that could together make the sector more resilient. These included stronger planning connections across the region, smarter infrastructure, better biosecurity response models, improved access to finance, and a regulatory system that does not impede innovation.

Some were also keen to support land use that absorbed carbon dioxide - as part of overall efforts to reduce greenhouse gas emissions. There were risks, they noted, of current policy settings accidentally discouraging development of those other land uses.



Project manager Paul Hansen with a Commission visitor above the Tupehau reservoir north of Kaitāia on Te Rarawa whenua. The dam can hold 350,000 cubic metres of water - enough to fill 140 Olympic-sized pools - drawn from the Awanui River when flow permits. The project was established with funding through Kānoa, the Government's regional economic development and investment unit. Photo / He Pou a Rangi



Michelle Ruddell on her farm at Ruatangata West, west of Whangarei, where they work hard to improve efficiency despite pasture challenges. Farmers helping farmers through networks like Rural Support makes a lot of sense, she says. Photo / AG Images

Stronger connections

Michelle Ruddell, the chair of Rural Support Trust Te Taitokerau, knows a lot about linking up for greater strength.

Michelle, a Whangārei dairy farmer, told us how the cumulative strain of weather swings, amid other pressures, could take a heavy toll. "Going from one extreme to the other, from dry to wet, is not only hard on the farm ... it's actually really hard on the family."

Michelle told us Rural Support's activities were especially valuable after extreme weather events like Cyclone Gabrielle, when more formal assistance could be slow to arrive, and the long recovery wore people down.

The Rural Support model centres on supporting people with direct assistance, such as coordinating mental health support, connecting growers with financial and advisory services, responding to local emergencies, and arranging social functions between farmers.

We heard the personal connections created by the trust could be a lifeline for isolated communities. This was increasingly important as programmes from industry bodies were dialled back.

Riding the swings between drought and drenching rain

Michelle's pastoral farming sector is experiencing issues around pasture quality and stock water availability after prolonged dry periods. At the same time, more frequent and intense rainfall is contributing to soil damage such as pugging (where hooves compact wet soil), erosion and animal health issues.

Shifting grass growth patterns are disrupting traditional grazing calendars and feed budgeting, making planning more difficult for farmers. Dairy farmers we talked to noted that pastures that once lasted 10 years now often required renewal after only four years due to changing climate factors - including the poor growth of rye grass above 25°C.

The nasty surprise of Cyclone Gabrielle in February 2023 laid bare many vulnerabilities, bringing severe flooding and wind that devastated crops and disrupted operations.

More than 250 dairy farms in the region were without power during the event, and at least 150 dairy farmers had to dump milk. Some stock animals were killed.

Recovery for dairy farms largely involved re-establishing access and power, though some faced ongoing infrastructure damage and mental health tolls.

For many affected sectors and individual farmers, full financial and emotional recovery is a long-term process, with some still grappling with the lingering effects.²²



Sheep cover a hillside in Kohukohu, in the Hokianga Harbour. The pastoral farming sector is central to Te Taitokerau/Northland's economy. However, farmers are grappling with the dual pressure of prolonged dry periods affecting pasture quality and more frequent intense rainfall contributing to pugging and erosion. Photo / AG Images

Shifting from reaction to coordination

The response to climate change from Te Taitokerau/Northland's farmers and growers is largely a reactive one, we heard. There is limited ability to coordinate and plan for the changes they can see coming (such as warming temperatures), or to gear up for the stressful exposure they have to more frequent, high intensity weather events.

We heard repeatedly about the need for leadership to transition to a more sustainable, climate-ready food system.

We heard how individual growers, despite their ingenuity and self-reliance, are limited in their capacity to address systemic challenges such as inadequate regional infrastructure, the absence of coordinated biosecurity responses, or a lack of affordable, long-term capital for large-scale system changes.

One initiative announced since our visit is the Resilient Pastures Programme, a \$17 million seven-year science and research programme funded by Government and industry partners. It will run initially in Waikato and Te Taitokerau/ Northland - where it can build on Northland Inc's Tuputupu Grow Northland initiative. The focus is on developing region-specific solutions to pasture persistence that can withstand climate variability and extreme weather events.ix

Growers told us that big, region-wide shifts in how climate impacts were managed - which would enable proactive and coordinated adaptation rather than piecemeal reactions - depended on government working in partnership with the community like this.

We heard the gaps in the current government approach were in strategic direction and joined-up policy. For example, the recognition and management of new pests needed scientific research, effective import restrictions and updated environmental regulations.

It would be good, we heard, for the growers in a region hard-hit by changes in their climate to be able to join up with decision-makers. There was a big challenge to share and to work out - even through uncertainty - how to invest for the long game.

By the numbers: primary sector value and challenges

\$1.056 billion

Value of agriculture, forestry and fishing in Te Taitokerau/Northland's economy as of March 2024 - 10.0% of regional GDP.

90% and 40%

The region produces more than 90% of the country's kūmara, and is a key supplier of fresh produce to Auckland - up to 40% of the city's horticultural supply.²³

10,000 seeds produced by an adult Madagascar ragwort plant within six weeks of germination, enabling its rapid spread across Te Taitokerau/ Northland's pastures, exacerbated by warmer temperatures and changed rainfall patterns.²⁴

ix Resilient Pastures is led by DairyNZ with the Ministry for Primary Industries through the Primary Sector Growth Fund and industry partners Beef + Lamb New Zealand. For more information, see the DairyNZ website: https://dairynz-web.aueast01.umbraco.io/research/science-projects/resilient-pastures-programme/

Growing resilience in hapori Māori



Food systems researcher Maria Barnes with son Niwa Rawiri (12) at Koutu Beach at low tide in the Hokianga Harbour. For many families, kaimoana like pipi are a vital lifeline, but the resource is increasingly threatened by warming oceans and silt. Photo / AG Images

Transformation of food-growing systems is also happening in another way in rural communities in Te Taitokerau/Northland. This is part of work in hapori (communities) to build resilience from the ground up.

We met with community leaders and advisers who showed us some of the diverse ways hapū are adapting, guided by mātauranga, whakapapa and kaitiakitanga. Examples included efforts to replenish aquifers through regenerative land practices, planting native species to stabilise eroding dunes, and

installing solar power and emergency kits in community hubs.

In many hapori, the work on adaptation is tied in with broader aspirations around food security, economic opportunities, energy independence, housing, and cultural renewal.

Adaptation guided by deep local knowledge

In the Hokianga, we visited communities drawing on a history of self-sufficiency to regenerate their food systems and build resilience in the face of rising global food prices, as well as climate challenges.

Cyclone Gabrielle delivered an urgent wake-up call, Hokianga-based food systems researcher Maria Barnes told us. "We had nine to fourteen days without power and three to five days without communications."

Local marae, which act as important hubs during emergencies by providing food, shelter and support, are investigating installing solar power and emergency resource containers. To combat water supply problems, rainwater harvesting is being prioritised for homes and gardens.

He Kete Kai Food Security Programme, a collective food network across four valleys, has secured funding to be able to oversee the cultivation of fruit orchards and large gardens - which have raised beds for flood protection. They are supported by Far North District Council and Northland Regional Council.x

Hapū are also increasingly leaning on maramataka, the traditional Māori lunar calendar, as a living tool that can be adapted to contemporary climate shifts.

"I guess it's living sustainably," Maria Barnes said. "You know, as a people, we could be world leaders in showing how you can grow kai in harmony with nature, without having to degrade the soil and the whenua."

"As my uncle used to say, we should be passing onto the next generation resources and whenua that is in a better state than we got it."

While kaimoana remains a lifeline for many local families, Maria Barnes told us there is deep concern in Hokianga about how warming oceans and human impacts are harming this traditional resource. This was echoed in other rohe and areas (see following section).

In some local bays, pāua have been wiped out, and more research was needed to understand these changes. Recognising the risk, hapū have been discussing the need for rāhui (customary prohibitions or closures) and are looking to other iwi who have successfully implemented these measures.

They are also revitalising traditional practices to protect and restore kaimoana. These include adhering to kaitiakitanga principles such as leaving larger breeders in shellfish populations, respecting spawning periods, and implementing tikanga-based harvesting approaches.

We heard about efforts to clean marine environments and revive customary guardianship practices. Nature-based enterprises were emerging as a significant opportunity - community groups are exploring options aligned with climate goals, kaitiakitanga and cultural revitalisation. In Hokianga, such initiatives were seen as a way to create climate-resilient employment, particularly for younger generations, while strengthening the transfer of intergenerational knowledge.

Shifting from surviving to thriving

The people we met were focused on action, and on bringing people and groups together in ways that made everyone stronger. At the same time, they wanted us to be aware of other issues their communities were dealing with, that affect how they deal with climate change.

We heard often about households and communities that were already wearing climate change harder than others. For instance, in homes and hapori where people were dealing with damp or overcrowded housing, or difficulties with transport and reaching health care, climate change effects could land on top of – and worsen – existing pressures.

These inequities - particularly in income levels and access to public services - were most pronounced in isolated rural areas.

Decades of underinvestment in infrastructure meant that when severe weather events happen, these communities could be particularly hard hit. When the region's stretched roading network fails, they lost access to schools, workplaces and essential services for prolonged periods.

A community consultant working in Hokianga, Zonya Wherry, told us energy insecurity was a major concern: when power fails, the ripple effects can be significant, impacting everything from emergency services and communications to local businesses and household necessities.



Zonya Wherry, Hokianga community consultant. Photo / supplied

We heard about whānau relying on generators to keep essentials like water pumps and refrigeration running when outages struck – a stop-gap measure made more precarious when roads are blocked and fuel cannot be replaced. For households with limited access to transport and no spare cash, evacuating or restocking basic supplies could become difficult.

Recent extreme weather events had highlighted the disconnections between what people need on the ground and government responses (from both local and national government). The lack of adequate resources and support in and after those crises was creating further socio-economic strain, rather than reducing it.

"We all actually want the same things"

People we met across the region wanted more for hapori. They wanted to find ways for communities to realise their own goals. As Zonya Wherry told us, the aspirations of communities she works with reflect fundamental human needs.

"It doesn't matter where we're from, we all actually want the same things: we want food security, water security and a safe roof over our head."

Some communities started on the back foot, however. We heard that long-standing distrust of central and local government in some areas had required careful, trust-building dialogue before it was possible to act together with councils.

"Before we engage, before you try and have hui at marae with all these people, there is a trust issue that has been broken for so many generations," Zonya Wherry told us. "So basically, before you want to achieve your outcomes, the relationship needs to be built."

People we talked to in communities noted the efforts of the Far North District Council to develop a new approach to adaptation a collaborative and equitable model focused on community engagement. This included supporting local communities and tangata whenua to lead their own climate adaptation, providing dedicated support while respecting data sovereignty.

For communities leading their own mahi, however, the path was still far from straightforward. Most hapū and marae operated with volunteer trustees and staff, who were already burdened with jobs and family responsibilities.

We heard this could limit their capacity for administrative tasks like grant applications and reporting, with Wherry noting her own hapū is a minority among the 23 marae of Te Rarawa in having such dedicated capacity.

By the numbers: growing resilience in hapori Māori

39.9% As at 2023, there were 77,475 people in Northland Region of Māori descent, which is 39.9% of the total population in the region, and an increase of 11.9% since 2018.25

176 marae in Te Taitokerau, with 17 related iwi, as shown on maorimaps. com. Census data shows that hapori in Northland Region are more likely than the rest of the country to volunteer on marae and community groups.²⁶

Hokianga's He Kete Kai Food Security Programme planted more than 60 fruit trees in 2024, bolstering food resilience among hapū in the four valleys it serves.

Who gets hit harder by climate change?

Economic and physical vulnerability

Much of the population of Te Taitokerau/ Northland lives in rural areas, ²⁷ and many people are employed in climate-sensitive industries like farming and forestry. ²⁸ This amplifies the region's exposure to the effects of a changing climate overall – if the majority are affected by flooding and coastal erosion hazards, or by threats to their infrastructure and livelihoods, that intensifies the pressure felt across the region.

Te Taitokerau/Northland also has more children and older adults living in the region, compared to the national average. This can add to the climate risks faced by the population, as children and older adults – as well as those with disabilities or chronic health conditions – are more likely to be physically affected by climate impacts such as hotter temperatures.²⁹

Social vulnerability

Recent analysis by Environmental Health Intelligence New Zealand provides a view of dimensions that can contribute to 'social vulnerability' to climate.³⁰ Northland Region stands out on some measures:

 Nearly 40% of the population lives in areas of 'high socioeconomic deprivation' and 39% are not in the labour force - these are some of the highest scores on a measure useful for understanding whether people are likely to have enough money to cope with crises and losses.

- Over 14% of households in the region have no access to the internet, which means those people may not receive information about preparing for emergencies, or responding to a disaster.
- One measure of resilience is safe and healthy housing: 24.6% of homes in the region are always or sometimes damp while 20.3% of homes are always or sometimes mouldy.
- Adding to these pressures, 7.2% of households in the region are classified as crowded.

Social vulnerability is often made up of less visible factors that influence how people experience climate change, and how well different groups and communities can adapt. When people start with a disadvantage, such as poor health, xi or low income or education levels, they can be more affected by the impacts of climate change, and less able to change their circumstances to cope, or to influence decision-makers. Often such disadvantages are a result of long history.

This means some people have very limited options to avoid negative impacts of climate change. They can get left behind as others adapt. For instance, this can happen when people with the ability to do so move out of harm's way, while others who cannot move remain in a hazard zone – where they can be hit by repeated events.

xi The region's score on Infometrics' health indicator (59.4/100) is lower than the national score (70.4); the region's scores for life expectancy, mental health and suicide rates are all worse than the national mark.

This applies across the board in Te Taitokerau/Northland, and concentrates as an issue for iwi/Māori.

In the 2023 Census, nearly 40% of Northland Region's population were of Māori descent (77,475 people who are descended from Māori); this is significantly higher than the national average of 19.6%.31

As a group, iwi/Māori are over-represented in key categories: low income, lower education levels, unemployment, poor housing, poor health.

For example, in Northland Region the annual average unemployment rate for Māori in 2024 was 9.2%, compared to 4% for the national average for the entire population. The mean annual earnings for Māori in Northland Region in 2024 were \$63,000, compared to a national mean of \$79,000 for the entire population.³²

A large proportion of the jobs held by Māori in the region are in climate-sensitive primary industries. As projected climate impacts take effect,33 such as extended droughts, river flooding, saltwater intrusion into water tables, and tidal flooding of coastal land, the incomes of many whānau are likely to be directly affected.

The region ranks second highest in the country for the proportion of Māori-owned businesses exposed to climate hazards, including current-day flooding (79%), coastal inundation from rising sea levels (20%), future heatwaves (95%), extreme rainfall (50%) and wet spells (26%).34

Collaborating at a catchment level

In the east, on a sweep of coast north of Whangārei, we met a team building a comprehensive response to local climate issues in a partnership between council and iwi.

This is the region's first community-led adaptation project covering an entire catchment – a 165-square-kilometre area between Whangaruru and Oakura. It is run between Ngātiwai Trust Board and the Whangarei District Council.

The project grew out of the 2022 Te Taitokerau Climate Adaptation Strategy,³⁵ and its supporting organisations:

- Te Taitokerau Climate Adaptation
 Network (known as Te Taitokerau Can) –
 a cross-sector forum for sharing knowledge,
 building capability, and supporting locally
 led adaptation
- the cross-region Joint Climate Change Adaptation Committee, made up of equal numbers of elected councillors and tangata whenua - which aims to ensure governance and decision-making are integrated with Māori voices and local knowledge.

There is a similar community adaptation project in development in the Far North district³⁶ - both projects are building on lessons from the region's first community adaptation effort begun in Ruawai - in Kaipara district.³⁷

"When it comes to climate change, the biggest challenge for us is learning how to adapt, which is bigger than just talking about it."

Clive Stone, Taiao lead for Ngātiwai Trust Board



Ngātiwai kuia Bella Thompson (with Clive Stone at left) shares stories of loss - and determination to hold on to local stories and mātauranga - with Commission visitors at Tuparehuia (Bland Bay). Photo / Whangarei District Council

Creating solutions together

The partnership aims to reduce community vulnerability to climate hazards, such as extreme weather events and rising seas, by co-designing solutions to local challenges such as flooding at Punaruku and coastal erosion at Teal Bay, Oakura and Tuparehuia.

The challenges are diverse, ranging from upriver issues through to declining health in the ocean itself.

At Mokau Marae and during site visits, we heard how warming seas, shifting tidal flows, coastal erosion and increasing silt are degrading the mauri of harbours and estuaries. These physical and biological effects of climate change, combined with human activities like sand extraction, were contributing to the breakdown of coastal areas.

We saw marae, homes, schools, ancestral lands, family farms and roads that are regularly flooded (and at risk of more frequent and severe flooding), across three settlements valued by residents, holidaymakers and iwi alike.

Wāhi tapu (sacred sites) were under threat too, we were told by Clive Stone, Taiao lead for Ngātiwai Trust Board. Rising seas were encroaching on urupā that have stood undisturbed for generations. Some burial sites were already eroding into the sea, cutting intergenerational links to tūpuna.

"This is a big concern," Stone said. "A lot of our wāhi tapu are found along the coastline, adjacent to the sea, and erosion is exposing kōiwi (human remains)."

The team we met with Clive combines engineering and hydrology and project management expertise, with deep knowledge and mātauranga around the life and history of the area.

We saw how this could come together in Oakura, at a wetland restoration which is improving river health and flood management, alongside development of a sports facility for the wider community.

We visited areas where dune restoration is being considered to help stabilise eroded beaches. We heard how harder choices around moving homes and urupā were being faced, where erosion could not be prevented.

State of the moana

While the iwi was glad to team up with council to design solutions to the climate hazards on land in their area, they are also deeply worried about the state of their moana.

We heard, as we also did in the Hokianga and Te Hiku, that recent shifts in the marine environment were leading to a significant decline in kaimoana.

Clive Stone shared insights into a concerning new development involving caulerpa, an invasive seaweed species. This fast-growing seaweed, encouraged by warming waters, forms dense mats that smother sandy habitats of shellfish like pipi, disrupting their ability to settle and survive.

As a result, pipi populations are noticeably declining, raising alarm for both ecological balance and customary harvesting practices. For hapū who depend on these taonga species for kai, tikanga, and whakapapa, it was a concerning development.

Other invasive species, such as Mediterranean fanworms, are further altering the marine environment. These species, often brought in on boat hulls and anchors, were able to establish as coastal waters warm up.

There was also concern about a proliferation of kina barrens, and the emergence of long-spined kina, whose spread throughout the region's waters has been linked to warmer waters and fewer predators.

Clive Stone noted that climate impacts can also extend beyond the physical environment to deeply affect the wairua (spiritual wellbeing) of communities.

"The changing environment is having a detrimental impact on our spiritual and mental wellbeing, because it's affecting our maunga (with erosion in hill areas), our ngahere (with kauri die back and myrtle rust in the forests), our awa (with more silt in waterways), and our moana (ocean warming)," he said.



Clive Stone, Taiao lead for Ngātiwai Trust Board. Photo / supplied

"There is a saying: when the moana is not well, man is not well... when the ngahere is not well, we are not well."

"We do need support to address these things, and we don't have some of the necessary resources to do it," Stone told us.

Working together was the only way forward. "Collectively, we are stronger."

Collaborative efforts between iwi, hapū, Whangarei District Council and local community groups are beginning to show promising results. Climate change adaptation work is progressing across the catchment, including discussions around sand dune restoration at Tuparehuia, river management initiatives to clear blockages at Punaruku and Mokau, and a wetland restoration project in Oakura.



Ngātiwai Trust Board Taiao lead, Clive Stone, talks visitors through the layers of a project at Oakura supporting river health and flood management, and a community sports facility. Photo / He Pou a Rangi

We also heard from the council and iwi partnership that the project may provide the foundation for further work with the wider community to develop a climate adaptation plan "reflecting a united commitment to restoring natural ecosystems and building resilience for future generations".

This could build on the strong relationship built over the years between Ngātiwai Trust Board and local communities. The catchment projects were demonstrating to haukainga the possibility of effective partnership with council, with the assistance of the Government's Better Off Funding for water infrastructure projects that support community aspirations and wellbeing.

By the numbers: collaboration at catchment level

3,200 km of coastline in all of Te Taitokerau/Northland.38

165 km² The area covered by the Whangaruru-Oakura catchment.

6 marae in the catchment area: Mokau Marae, Oakura Marae, Otetao Marae, Punaruku Marae, Ngaiotonga Marae, Tuparehuia Marae.

significant projects underway already: the Oakura sports park and wetland restoration, and Punaruku awa work.

Adaptation in a network of rivers and streams

Across the region, river flooding and poor river health are recurring concerns. Waterways, and the people who live along them, are struggling to cope with the volatility of the climate.

Northland Regional Council's website describes the region as having "a dense network of rivers and streams", noting its "unstable hill country means many of the region's roads have been built on flood plains." The risk of flooding on roads and in places where many people live and work – already one of the region's most commonly experienced natural disasters – is expected to increase as heavy rain events become more frequent and intense. 40

Responding to this challenge is a key part of the regional council's climate resilience work. We visited one of the region's larger-scale flood protection schemes and heard about recent action with communities to protect the region's most at-risk marae from river flooding.

We also heard from people keen to work on building 'ecosystem resilience' so that rivers are looked after as part of wider systems that connect all parts of the environment. "If councils, iwi/hapū and communities work together flexibly across Te Taitokerau, we can be resilient in the face of climate change."

Te Taitokerau/Northland's first climate adaptation strategy (2022)



Flood managers never sleep: Northland Regional Council's Kaitāia area manager Peter Wiessing takes calls day and night from his community, fielding alerts and questions for the Awanui River scheme that channels water from a 250-square-kilometre catchment through a bottleneck at Kaitāia. Photo / He Pou a Rangi

Responsive flood protection

Flood management with built works around the Awanui River dates back to the early 1900s. Its catchment presents one of the region's most complex flood risks, with water from some 250 square kilometres of steep hill country funnelling toward a narrow bottleneck at the town of Kaitāia.

The current Awanui River Flood Management Scheme aims to protect the urban centre from a 'one-in-100-year' flood and surrounding farmland from a 'one-in-20-year' event rainfall level measures that climate change is projected to bring more often to the region.

In 2018 the regional council introduced a new funding structure to allow faster work to strengthen flood protection. This Flood Infrastructure Rate spreads the load between the local community and the wider region: local ratepayers pay 30% towards the cost of upgrades, with the remaining 70% funded by ratepayers across the region.

The Awanui River scheme proved its worth in July 2020 and again in August 2022 when it was able to intercept high volumes of sediment-thick floodwaters from the Mangamuka Ranges before they could flow through Kaitāia. The \$15.5 million project began in 2019 and was accelerated with COVID-19 recovery funding from central government.

The improvements completed meant that - despite heavy rains, power outages and slips on road networks - no homes required evacuation, and the town was spared from widescale damage. The scheme averted an estimated \$50 million in avoided losses as well as risk to people's lives. 41

Work continues on the scheme, to widen channels, relocate stop banks, and construct a new spillway through the middle of town that can carry as much as 70% of the river's flow directly to the sea during a major flood. Where width is limited by houses and roads, new floodwalls are being constructed.

However, challenges remain. The Awanui scheme interfaces with local drainage systems managed by the Far North District Council.

These are gravity-fed and vulnerable to backflow when the Awanui River is running high. Local authorities stressed the importance of quickly moving local water out before upland floodwaters arrive to reduce flood depth and duration.

And while the scheme is now designed to cope with 1.4 metres of sea level rise, it does not stretch to the separate coastal stop banks for communities just outside the town – these are regularly overtopped in king tides, exposing homes and marae to flooding.

Accelerated action to defend marae

We also heard about action to defend the region's most at-risk marae from river flooding.

Northland Regional Council's 12-month Marae Flood Resilience Programme has funding of \$4.2 million to support adaptation planning for 35 high-risk marae. It connects hapū with technical expertise and funding, focusing on the most exposed sites and ensuring communities are involved at every step, with local knowledge guiding decisions.

Local understanding of practical needs has led to effective innovation – such as changing the design of flood-proof doors for wharenui to make sure they could be operated by kuia when younger whānau were not around to help.

Another example we heard about was the hapū-directed efforts in the Whirinaki Valley, where the community has recognised their homes are as exposed as their marae. A locally-based project manager has led consultation with 80 whānau across three marae, and together the community is finding ways to relocate households and marae on safer ground while designing new community layouts and power solutions.

Safeguarding the rivers

We heard too that rivers are the lifeblood of the region, which were themselves at risk of damage from a combination of changes in land use and climate, particularly the more intense storms.

Delaraine Armstrong, a hapū representative for Te Orewai hapū of Ngāti Hine on the region's Joint Climate Change Adaptation



The Whirinaki River snakes its way through the south Hokianga countryside. River flooding is a key climate hazard for Te Taitokerau/Northland. Photo / AG Images

Committee, spoke about issues for Te Orewai from a landslip in forestry that contaminated the upper reaches of the Hikurangi River. In high rainfall the water runs orange with eroded soil (paru), forcing households to purchase and transport drinking water.

"We've been on our whenua 500 years. We are reliant on the Hikurangi. Now there's an orange river of paru that comes down our awa."

Her people in inland areas north of Whangārei feel climate change impacts at the household level, she told us. As working-age people moved to urban areas, it was the old and the very young left in the home communities, where the social and health impacts of climate change were hitting as hard as physical impacts.

Foundational natural infrastructure

In our meetings we heard calls for recognition that the natural environment is itself a kind of infrastructure. This echoes the view provided in recent national environmental reporting, of ecosystems and the natural environment as "a type of foundational natural infrastructure that supports our lives, livelihoods, health and relationships to nature".42

We heard how a lack of "ecosystem resilience" was reflected in an inability to withstand shocks. There were concerns about forest health and biodiversity loss, where different invasive species and ecosystem decline were undermining natural resilience.

Landslides were occurring not just because of heavy rain, but because of a history of overgrazed hillsides and - as one councillor put it a lack of the "right trees in the right place".

Investing in healthy waterways, native planting, erosion reduction and soil health was seen as a form of proactive infrastructure management, preventing costly damage.

This could also help support tourism as a local earner. The dependence of the industry on the natural environment is reflected in the

region's Taitokerau Northland Destination Management Plan and 'responsible tourism' programme, which is working with local operators to build climate resilience while also lowering greenhouse gas emissions, and share benefits more equitably.

Around Te Taitokerau/Northland, people talked to us about the interconnectedness of natural systems, emphasising that climate impacts did not occur in isolation. Rather they were felt from "the ridge to the reef".

Land-use choices were inseparable from the climate change hazards that communities were facing - people told us that increased planting in pine forests and the drier conditions made their settlements feel more exposed to wildfire dangers. Similarly, river flooding and bank erosion could lead to large-scale sedimentation. When the carried soil was deposited downstream it could smother riverbeds and coastal seafloors, affecting seafood supply.

People were ready to act, Delaraine Armstrong told us, even with limited capacity and finances. What was required was a willingness for decision-makers to listen, and a regulatory framework that reflected local issues and values.

By the numbers: network of rivers and streams

29% The Wairoa River is Northland Region's largest river. It runs for 150 kilometres into the Kaipara harbour (and is tidal for about two-thirds of that length). It drains a catchment area of 3650 square kilometres, or 29% of the region's land area.43

35 The NZ\$4.2 million Marae Flood Resilience Programme, led by Northland Regional Council, supports adaptation planning for 35 marae highly exposed to flooding.44

Keeping connected - the supporting infrastructure



The Twin Bridges, on State Highway 15 between Maungatapere and Kaikohe, cross the Mangakāhia and Awarua rivers. In all, Te Taitokerau/Northland is serviced by some 933 kilometres of state highway and more than 5,800 kilometres of local roads, with widely varying quality and resilience. Photo / AG Images

In Te Taitokerau/Northland, built infrastructure is all about connection: roading, power, telecommunication and digital networks, and waterworks.

We heard about the importance of these systems in all our conversations: their strengthening was seen as foundational to building regional resilience.

The fragility of networks affects households and businesses alike. This section presents two examples of local companies investing in energy resilience measures, alongside their efforts to develop low-emissions energy options. This is followed by a summary of what we heard about the key climate-related infrastructure issues for the region.

Business adaptation in the face of infrastructure risks

The recent experience of Golden Bay Cement, Te Taitokerau/Northland's largest industrial employer, illustrates the significant business continuity risks for industry from infrastructure fragility and power insecurity.

We heard how unplanned outages from storms and network failures could threaten supply and production schedules, damage machinery, increase costs and compromise worker safety.

Golden Bay Cement is the only domestic cement producer in Aotearoa New Zealand, manufacturing over 900,000 tonnes annually and meeting 60% of national demand. Changes to the company's cement manufacture process have increased the operation's energy security while reducing carbon emissions.

The company's reliance on (shipped in) coal has been reduced by 55%, replaced with wood waste and tyres as fuel. Currently 80,000 tonnes of waste is diverted from landfill, and the company plans to increase the use of diverted waste to reduce coal use by 80%.

Golden Bay Cement noted that reliable transport was essential for delivery of its alternate fuels as well as raw materials, largely sourced from Auckland and Waikato regions. Road closures can force the company to revert to coal, increasing operational costs and greenhouse gas emissions. Rail transport options were an increasingly important part of its logistics planning. While rail already provided some backup for moving product when shipping was disrupted, the company expected its reliance on rail to increase as it built its use of alternate fuels and raw materials. Top Energy - the electricity distributor for the Far North - told us it was developing a proactive approach to building network resilience.

The challenging conditions for power distribution across thousands of kilometres of rural lines made this an immediate issue; the key problems were slips blocking road access to fix outages, and increased growth of vegetation in the warming temperatures.

The company was focused on strengthening reliability of service to customers through remote network automation and localised generation (including through Ngāwhā Geothermal). Top Energy also works directly to support households struggling to afford power - 40% of Top consumers are in energy hardship; another 35% are on low-user plans for low-income households.

Top Energy was exploring ways to support communities' access to power through extreme weather events. This kind of development, for instance to roll out community hubs with remote generation, would require support to ensure there were clear structures to bring multiple parties together in efficient ways.



A truck navigates the winding Mangamuka Gorge, a vital transport corridor that has been repeatedly closed due to storm-related slips. The route was shut for more than 850 days between 2022 and 2024, with repairs costing over NZ\$200 million and forcing lengthy detours. Photo / AG Images

A fragile roading network

Winding 13 kilometres through the dense native bush of the Maungataniwha Range, the Mangamuka Gorge is one of the country's most scenic drives. However, its repeated closures have come to highlight the fragile state of Te Taitokerau/Northland's transport infrastructure in the face of a changing climate.

The route's vulnerability is a recurring and escalating challenge. In July 2020, a storm led to a nearly year-long closure and \$16.2 million repair bill. Then in August 2022 damage from a storm closed the road again, this time for two years, with a repair cost of \$204 million.⁴⁵ Communities lost their main route to Kaitāia and faced lengthy detours to hospitals, schools and shops, alongside disruptions to freight networks.

The Brynderwyn Hills route south of Whangārei, another vital corridor, has similarly experienced frequent shutdowns. When slips and road damage forced its closure during Cyclone Gabrielle in 2023, the economic cost of the 58-day event was estimated at over \$54 million across the year.⁴⁶

This underscores the region's reliance on a limited number of transport corridors.

In all, Te Taitokerau/Northland is serviced by some 933 kilometres of state highway and more than 5,800 kilometres of local roads.⁴⁷ They vary widely in quality and resilience.

In the Far North, for instance, around two-thirds of local roads are unsealed and many bridges are single-lane structures, not designed for current traffic volumes. Climate change is expected to further strain these networks, especially in areas prone to flooding and erosion.

A study of the compounding effects of 2022/23 extreme weather events on Northland's fragile local road network estimated the cost to repair and improve the local network was \$250 million. The report includes a summary of road conditions before Cyclone Gabrielle, noting there was an average of one recorded slip every kilometre of the roads that were ranked as most critical.48



Powerlines straddle a hillside near the south Hokianga Harbour. The fragility of Te Taitokerau/Northland's energy infrastructure is a major concern, especially in isolated areas that have experienced repeated disruption. Photo / AG Images

Critical connections: power, internet and cellphone networks

Other essential infrastructure in the region faces similar exposure. Across all our conversations, power outages were a frequently raised issue. This was particularly strongly felt in rural and isolated areas, where slips, storms and fallen trees can disrupt supply for extended periods. People told us how power cuts can also affect access to water, fuel and communications which multiplies the difficulties people face.

The region's wider telecommunications and digital infrastructure is seen to be increasingly vulnerable, especially as copper-based services are discontinued, and more reliance falls on mobile and internet services that rely on electricity.

While new infrastructure in Te Taitokerau/ Northland is being designed with future climate pressures in mind, the urgently needed work to strengthen and expand current networks is beyond local budgets, we were told. These ageing assets are also under pressure from urban development and population growth.

Water infrastructure: drinking, drainage and sewage systems

We heard the region's stormwater and wastewater systems are similarly under increasing pressure. Many of the region's systems operate on combined stormwater and wastewater networks, which means there is greater risk of sewage pollution during heavy rain.

In some areas the ageing pipes have extra issues that compound the problem. Nearly half of the 16 small-scale wastewater networks managed by Far North District Council are at risk from coastal hazards.

In Whangārei District, stormwater networks in older suburbs are close to their limits and have struggled to cope with recent high intensity rainfall.

In low-lying townships like Whangarei and Dargaville, tidal backflow already prevents stormwater flowing out to sea at high tide: a problem expected to worsen with sea level rise. These challenges for water infrastructure in the region are illustrative of a broader national issue highlighted in our 2024 assessment of progress under the national adaptation plan.⁴⁹

Whangarei District also provides examples of a council embedding adaptation into its wider infrastructure decisions. This includes upgrades like road-raising and improvements to culverts and stormwater systems.

The council is also building a district-wide stormwater network model to support its Blue-Green Network Strategy, which integrates flood protection with ecological restoration. Council representatives told us many of these decisions are made in partnership with Northland Regional Council and local communities.xii

By the numbers: supporting infrastructure

933 km and 5,800 km

Te Taitokerau/Northland is serviced by some 933 kilometres of state highway and more than 5,800 kilometres of local roads.

850 days. The Mangamuka Gorge on SH1, south of Kaitāia, was closed for more than 850 days between 2022 and 2024 due to damage from 36 slips. The repairs cost more than NZ\$200 million, with detours adding more than 120 km to the journey. Storm damage also closed the Brynderwyn Hills route on SH1 for several months in 2023.

More than 200 communications towers were nonfunctional for two days during Cyclone Gabrielle.50

xii In August 2025, the three district councils of the region agreed to establish a Northland-wide council-controlled organisation to deliver drinking water and wastewater services from July 2027. More information is available on council websites, including this joint media release on 7 October 2025.

Summary – what people said they need to succeed

Te Taitokerau/Northland is already living with a changed climate. On other case study visits we have asked people whether they are feeling climate impacts - this was the first time everyone we met with said: "The effects are already here".

People told us climate changes were affecting their coastal and marine areas, rivers, whenua and forests - and the kai systems and livelihoods and communities based on them. Climate impacts were undermining built and natural systems, and loading new stress on communities already dealing with significant social and economic challenges.

We heard and saw a wide range of innovative responses to these pressures: marae installing solar infrastructure and water tanks, businesses developing local solutions to energy supply issues, communities developing catchment-wide water management, growers trialling new crops and land practices, and hapū regenerating kai systems using maramataka and mātauranga.

Many of those we met spoke of the potential ahead. They saw value in models that empower communities to define and drive their own adaptation.

We were told those on-the-ground efforts could grow into the comprehensive response that Te Taitokerau/Northland needs, but they depend on critical inputs from government. The specific calls for support we heard are summarised here.

This case study report does not compare what people told us in the region with the adaptation action that Government is already taking, including the National Adaptation Framework published in October 2025. That will be the focus of our 2026 reports, particularly the second monitoring report on progress made under the Government's national adaptation plan.

The content of this section is what we heard on the ground. These are not the Commission's recommendations, but rather direct reports from people working at local level. We have collected and shared them in case study form so they can be more easily accessed by others working on this mahi, in central and local government, businesses, communities and beyond.

We heard calls for government support for community-led adaptation

Approaches to adaptation that help all to cope and build resilience

Finding ways to make sure all communities in the region were able to cope with the effects of a changing climate and to build their resilience was a critical issue for many we talked to.

We heard how climate impacts are loading on top of existing socio-economic pressures. This applied across the board, and was a particular issue for rural Māori communities. When people's focus and energy was taken up by problems around money and health, for instance, there was little leeway to absorb or respond to climate change. This could mean impacts hit harder, and there was risk of climate pressures making inequities greater.

The need to look after everyone in Te Taitokerau/Northland was a statement we heard often.

As Clive Stone from Ngātiwai Trust Board put it: "Collectively, we are stronger."

Responses that are founded on community strengths and values

Hapū and iwi, community leaders, councils, and local businesses described a shared aspiration to lead their own climate responses, grounded in tikanga, whakapapa and the realities of their area.

We saw in communities how local knowledge and lived experience were shaping effective and deeply rooted responses to climate change. We heard from representatives of Rural Support and the

economic development agency Northland Inc about smart organisational initiatives anchored in the strengths of the local economy and communities.

Many whānau, hapū and iwi are at the forefront of this mahi, guided by matauranga Māori, intergenerational kaitiakitanga, and deep ties to whenua, wai and one another. The many marae of Te Taitokerau serve as sources of strength and support for building resilience and during crises, underpinned by the leadership and capacity of hapū and iwi.

Opportunity to lead local action in ways that weave in broader goals

We heard from hapori and businesses who were driving for solutions to current issues, alongside the climate risks they see in the future. The most enduring efforts were often those led from the ground up: blending climate adaptation with broader goals around food sovereignty, economic opportunities, energy independence, housing, and cultural renewal.

For many, the response to their changing climate was inseparable from deeper goals: building livelihoods, restoring ecosystems, protecting whakapapa, and ensuring that future generations inherit land, water and knowledge systems in better condition than before.

A common call from people we met was for better integration of Māori leadership and knowledge into adaptation planning, decisionmaking and funding processes — including more meaningful roles for hapū and iwi in designing solutions for their own communities.

Collaborative partnerships that help connect across communities and sectors

We also saw how people in Te Taitokerau were creating connections, across business and social networks, to explore new options. This included councils acting as partners and enablers, with trials of new models of collaborative engagement and funding underway in several districts.

There was need for more joined-up responses, with organised ways of working that avoided duplication and confusion. One example from the energy sector was the need for clear structures to bring multiple parties together to work on effective solutions for community access to power through extreme weather events. Another example was the lack of a coordinated approach after Cyclone Gabrielle for collective buying of essential equipment, leaving individual marae to pursue separate funding applications.

For many, strengthening connections meant attention to building long-term relationships based on trust. As Delaraine Armstrong from Te Tai Tokerau Joint Climate Change Adaptation Committee said: "We need something that compels councils and communities to create partnerships and plans. We need ways to ensure critical relationships that can endure across years and election cycles. These need to be strong relationships backed up by mana and values and korero - relationships of generational integrity."



Commission visitors with Far North District Council and community representatives at a visit to Tapuwae Incorporation's farm in North Hokianga, and their wetland restoration and Waikiwi papakāinga development. Photo / He Pou a Rangi

We heard calls for government action in four key areas

Reliable access to information and data, resources and technical support

Effective local-led climate action depended on reliable access to the right information and data, and technical support. Access to good scientific data - particularly on climate hazards like drought, wildfire, landslides, and hydrological projections - was a common issue for councils and communities. There was also a concern that small to medium businesses have limited understanding of how climate change may affect them.

There were calls for more continuous, highresolution data collection, including updated light detection and ranging (LiDAR) imagery and improved flood modelling software. This concern was echoed in regional planning documents, 51 which noted many existing risk assessments remained low resolution and failed to account for compounding hazards or adaptation costs.

People working in communities told us that their local initiatives were often well-supported by the wider area, but that innovative efforts were sometimes defeated by institutional frameworks and processes. There were opportunities to scale up what is already working, but that depended on help to find ways through the system, including to secure investment.

Long-term policy and funding pathways including support to access capital

Resourcing was a constant issue. We heard a critical element in building resilience at the local level was longer-lasting funding cycles and policy settings.

Businesses and communities and councils reported concern about how they will fund their recovery from the next extreme event, let alone the investment needed to comprehensively strengthen resilience for future events.

From councils, we heard the burden of maintaining existing infrastructure often fell on small, overstretched rating bases; this was acutely felt in rural districts. A clearer framework of funding options available to local authorities would help, we were told.

Greater clarity about roles and responsibilities in legislation and national plans

People we talked to flagged a lack of clarity in key legislation and regulations. This included uncertainty around councils' role in adaptation and responsibilities for emergency management, as well as the complex application of evolving resource management law (particularly around land use in hazard zones).

Since we visited Te Taitokerau/Northland, the Government has released its National Adaptation Framework. The Framework has four pillars: risk and response information sharing, roles and responsibilities, investment in risk reduction, and cost-sharing pre-and post-event. It is available on the Ministry for the Environment website: https://environment. govt.nz/what-government-is-doing/areas-of-work/climate-change/adapting-to-climatechange/national-adaptation-framework/

Extreme weather events like cyclones Gabrielle and Hale in 2023 had focused the attention of councils and communities on effective response to emergencies, and on recovery that built the region back stronger.52 One formal outcome of the Gabrielle recovery process was Te Tai Tokerau Resilience Action Plan, which "identifies the short-, mediumand long-term activities and investments necessary to increase regional resilience", with a particular focus on remote communities.⁵³ For that resilience action plan (and earlier strategies) to operate well for the region required more clarity from central government about the responsibilities and funding for local government, we were told.

There were other specific areas where people called for more joined-up government approaches. This included timely responses to new pest incursions. People also wanted to see the local links between action on adaptation and emissions reduction reflected in national plans and frameworks.

Investment in infrastructure to keep people connected and safe

The fragility of infrastructure across the region emerged as a clear theme in our korero. Power outages, road closures, water system failures and cut-off communications during extreme weather events were significant risks for communities. Households and businesses alike could lose access to essential services.

We heard repeated calls for significant investment into joined-up, long-term planning to strengthen the networks that connect and keep people safe.

This included - but was not limited to the built networks for roading, power, telecommunications, internet and waterworks. People across the region also spoke of the importance of integrated action to address the health of natural systems, and to strengthen social networks and the connections between decision-makers and communities.

The stories we heard in Te Taitokerau/ Northland reinforce some of the emerging findings in our work on the second national climate change risk assessment, and in our monitoring of progress under the Government's national adaptation plan. The key themes and examples from this case study will help inform those two reports in 2026 - that is where we will combine these local insights with a wide variety of other evidence to provide findings and recommendations for Government.

There are important distinctions between case studies based on people's lived experience, and the assessment of long-term climate risks and central government action (including the National Adaptation Framework) that form the basis of those reports.

Case studies provide a close view: what is happening in one area, at this time.

The longer view - that the country can use to assess what action is needed now to prepare for the future - is the focus of our 2026 reports.

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