

April 2022

Te Tai Tokerau Climate Adaptation Strategy



Far North District
tangata whenua
representatives



NRC Tai Tokerau Māori
and Council (TTMAC)
representatives

Whangarei District
tangata whenua
representatives



Kaipara District
tangata whenua
representatives



Table of Contents

Foreword.....	5
Executive summary	Error! Bookmark not defined.
Foundations	7
What are we doing and why is it important?.....	8
Part 1. Background and context.....	12
<i>Understanding and communicating about climate change</i>	12
<i>Central and local government adaptation: roles and responsibilities</i>	14
<i>What can the councils do?</i>	16
Part 2. Key adaptation issues, responses and opportunities	18
1. <i>Governance and management</i>	18
2. <i>Impacts on Māori</i>	24
3. <i>Coastal communities</i>	30
4. <i>Water availability</i>	34
5. <i>Natural hazards</i>	37
6. <i>Ecosystems and biosecurity</i>	40
7. <i>Public infrastructure</i>	46
Part 3. Enabling effective adaptation.....	57
Part 4. An evolving strategy	60
<i>Reporting</i>	63

Signatory page

Whangarei District Council

Whangārei District tangata whenua representatives

Far North District Council

Far North District tangata whenua representatives

Kaipara District Council

Kaipara District tangata whenua representatives

Northland Regional Council

NRC Tai Tokerau Māori and Council (TTMAC) representatives

About the authors

In early 2020, chief executives and mayors of the four Northland councils recommended the establishment of the collaborative Joint Climate Change Adaptation Committee. It was agreed that the Joint Committee be comprised of eight members with an equal representation (50:50) of councillors and iwi/hapū representatives from across the region. Each council nominated one elected member (with another as back-up/alternate) and one iwi/hapū representative (with another as backup/alternate).

The Te Tai Tokerau Māori and Council Working Party provided their nominations for membership on behalf of Northland Regional Council at their March 2020 meeting. District council elected member representatives were determined at the respective council meetings. District council tangata whenua representatives were nominated through tangata whenua forums and then endorsed by representative bodies (Far North District Council, Whangarei District Council), or through direct engagement based on partnership agreements (Kaipara District Council).

This strategy was drafted in a collaborative process by Climate Adaptation Te Tai Tokerau, a joint working group made up of staff from all four Northland councils (Kaipara, Whangarei and Far North District councils, and Northland Regional Council), as well as hapū and iwi representatives. A key objective for the group is to align local government climate adaptation policy, information and methodologies, and pursue collaborative opportunities to enable effective regional adaptation planning.

This strategy has been endorsed by Northland's Joint Climate Change Adaptation Committee; a formal standing committee set up under the Local Government Act 2002. Each council has independently contributed to, reviewed and formally adopted this strategy.

Foreword

There is no longer any doubt our climate is changing – we are facing a climate crisis. The question now is what will the impacts be, and how can we best prepare our people, places and industries?

New Zealand's government declared a climate emergency on 2 December 2020 and holds the lead responsibility for Aotearoa's transition to a low-emissions society and economy. Local government has a supporting role in this climate change mitigation mahi, to assist and enable the required transitions in districts and regions.

Climate change adaptation, however, must be led by councils, iwi, hapū, industry stakeholders and the wider community. This strategy represents a first step by Northland councils towards a collaborative, region-wide response to the impacts of climate change. We are already living with the effects of a changing climate, and many communities in Te Tai Tokerau have been using their own resources and networks to develop plans to prepare and adapt. Through this strategy, Northland councils and tangata whenua are building on these plans, seeking integration and alignment across the region, and working to create meaningful partnerships to help us all adapt together.

This strategy is the foundation that sets out our commitment to taking action, to aligning with our communities, to listening, understanding, and working together. We expect the strategy will evolve and actions will change as this adaptation kaupapa progresses and our understanding grows.

Through this strategy, we are asking these important questions of ourselves and of Te Tai Tokerau. What do our communities need to effectively adapt to the impacts of our changing climate? What can councils do to support local initiatives? Where are the areas that are most at risk, who are the most vulnerable? What information should we be guided by and what flow-on effects should we be planning for? How does the climate change kaupapa fit with tangata whenua whakaaro, and how can councils integrate and honour that whakaaro in future planning cycles?

These questions need to be carefully worked through; bringing representatives from Northland councils and tangata whenua to the same table to develop this strategy has been an important first step. The scale and complexity of the climate challenges ahead provide an opportunity for inclusive, progressive and creative solutions. Our actions and decisions from now must be focused on the future we want for our children's children.

Together, we can adapt and thrive.

Amy MacDonald – Chair

“If fear is on one end of the scale, then complacency is on the other.”

– Delaraine Armstrong, Te Orewai hapū of Ngāti Hine, Deputy Chair of Climate Adaptation Te Tai Tokerau

As a tangata whenua descendent of 31 generations from Kupe arriving in Aotearoa, through my earliest Ngāpuhi whakapapa to Rahiri, to a further 20 more generations till I feature, I am anchored firmly to Te Ao Māori through my Ngāti Hinetanga, through the hapū of Te Orewai. As such, I am typically representative of iwi Māori.

Before Kupe, we tātai through the cosmic creation of the universe, to the creation of ngā Atua followed by the common physical world where tangata have evolved. Change is dynamic in this holistic world view. The view and responsibility for tangata whenua and climate change is physical, spiritual and social across generational relationships from the long past and into the distant future.

The ethnocentric lens of Te Ao Māori is fundamentally different to the dominant cultural view of the natural world in which tangata whenua live and interact. The differences between the indigenous world view and the prevailing world view creates systemic differences which divide us and, in many instances, create inequities for tangata whenua, including and beyond climate change. The definition of tangata whenua, as people of the whenua, personifies the spiritual relationship between tangata whenua and the natural world. This world view is difficult to capture and genuinely have regard for in the current structural practice and implementation of local government bureaucracy, including climate change adaptation.

We must work hard to rebalance the systemic framework, and co-design new, relevant tools and practices to ensure tangata whenua are resourced to work in genuine partnership to reduce the gaping inequities for Māori communities who are kaitiaki of the previous generations of sovereign rights and responsibilities over wahi tapu, whenua Māori and the broader landscape of Aotearoa. The concept of property rights is in direct conflict with tangata whenua relationships to the whenua, ngā awa, ngā maunga, te ngāhere. This is the challenge confronting the development of climate adaptation and the many other reforms that are interactive in addressing natural resource management in the future.

The rhetoric of tangata whenua involvement must be genuinely enabled and supported. However, this responsibility doesn't sit only with non-Māori. Tangata whenua must step into the space we demand and provide clear advice and structural options for a new framework to work with councils. The beginning of this journey in Tai Tokerau is reflective of the willingness to do that, but far more resource is needed to build capability and capacity with tangata whenua, communities and workforces.

Delaraine Armstrong – Deputy Chair

Executive summary

Our planet is on an undeniable climate change trajectory. We now know more about the causes and implications of climate change than ever before, and our timeframes have shifted from imminent to immediate. Effects are already being felt across Te Tai Tokerau. It is our responsibility to identify ways in which the councils can help communities adapt to the localised impacts of a changing climate.

The main, and most urgent, response to the causes of climate change is mitigation through reducing greenhouse gas emissions. While central government controls the main policy and economic levers to drive emissions reductions nationally, the councils can and should help the transition towards net-zero emissions. However, this will not resolve the need to address the impacts of climate change that are already locked in.

This strategy focuses on adapting to the impacts of climate change in Te Tai Tokerau. It is not a solution to climate change impacts and risks. It indicates the strategic and practical direction our local councils need to take to create equitable, lasting adaptation approaches that have positive outcomes for our communities and natural environment.

The strategy outlines the key ways climate change will affect council functions and services, lists some of the councils' current adaptation actions, and proposes future actions that are likely to be required. Affected council services cover a wide range of activities, and are presented as seven broad themes:

1. governance and management
2. impacts on Māori
3. coastal communities
4. water availability
5. natural hazards
6. ecosystems and biosecurity
7. public infrastructure.

The strategy also outlines a comprehensive programme of actions covering four areas where the councils can improve their response to climate change (see Part 5):

1. building stronger relationships and partnerships
2. improving how the councils understand climate impacts and the risks they pose to communities and the natural environment
3. taking concrete actions to reduce existing and projected risks
4. building capacity to respond.

These actions are divided into short-, medium- and long-term categories. Short-term actions are the immediate priority. Te Tai Tokerau is already experiencing the effects of a changing climate. These impacts will continue to increase in the coming decades. Some changes, such as sea level rise, will take centuries to slow or reverse, and some may be irreversible. Te Tai Tokerau councils need to understand and prepare for climate risks to reduce the impacts of these changes.

Climate impacts compound existing factors that reduce well-being and have a large and potentially disproportionate effect on Te Tai Tokerau's tangata whenua. Climate change affects their relationship with te taiao and ngā whenua (the natural world and the land), cultural and whānau values, and iwi/hapū taonga.

Tangata whenua hold evidence-based knowledge of Te Tai Tokerau's history, natural environment and communities, which is integral to addressing climate impacts. Developing strong and lasting partnerships with tangata whenua is key to a successful long-term response to climate change.

Councils have an important role to play to support the resilience of communities and natural systems as we adapt to climate impacts. They possess tools that can help address climate impacts, such as planning frameworks and the provision of infrastructure. Given the complexity of climate change's challenges, it is essential for the councils to work alongside iwi/hapū, communities and stakeholders to co-develop flexible solutions that address existing limitations on wellbeing, respond as the climate shifts, and recognise opportunities for betterment.

This strategy, including its recommended priority actions, is a living document. Our responses to climate change need to be dynamic, so significant changes in evidence, community context and legislation can inform how our adaptation approaches evolve. Ongoing engagement with tangata whenua and communities is likely to highlight new evidence and perspectives that may result in changes to how the councils approach, resource and implement adaptation.

There are also significant changes in government legislation currently in development, including Resource Management Act reform, a new Climate Change Adaptation Act, Three Waters Reform and the creation of a national adaptation plan. These will lead to a greater focus on climate change, and new tools for local government to carry out adaptation actions.

Case law is also developing apace. Councils are now being challenged in the courts on planning decisions, both for being overly restrictive and for not taking sufficient precautions. In addition, new law in Aotearoa requires the mandatory disclosure of financial risks associated with climate change by financial institutions. This new law is likely to affect local government, as insurance and banking organisations seek to reduce risk exposure.

Given this rapidly evolving physical, social, legislative and legal environment, councils need to be extremely attentive and agile in developing climate change programmes and policy. This strategy has an inbuilt review function that enables it to respond to changes as needed, allowing future adaptation approaches to progressively build on the foundations currently being developed.

The purpose of creating a regional strategy is to ensure the approach to climate change adaptation by Te Tai Tokerau councils is robust, consistent and coordinated. The Joint Climate Change Adaptation Committee and the Climate Adaptation Te Tai Tokerau working group provide a platform to support this coordinated approach and ensure the effective use of resources. While this is a team effort, each council will need to take responsibility for individual actions as part of realising the joint approach.

If councils, iwi/hapū and communities work together flexibly across Te Tai Tokerau, we can be resilient in the face of climate change.

Foundations

WHAKATAUKI

Te amorangi ki mua, te hapai o ki muri.

The leader at the front and the workers behind the scenes.

This is about everyone having a role, playing a part. It is a reference to marae protocol where the speakers are at the front of the meeting house and the workers are at the back making sure everything is prepared and that the guests are well looked after. Both jobs are equally important, and without one, everything would fail.

SCOPE AND PURPOSE

Mitigating climate change through emissions reduction and carbon removal is the urgent, primary response we must adopt to address climate change. Central and local governments have roles in mitigation, providing information and support, setting rules and policy, and making operational decisions. All Northland councils are working on reducing greenhouse gas emissions through complementary strategies and plans.

Given a certain amount of warming is locked in, the necessary, secondary council response to climate change is to implement measures that ensure our people and environment can adapt to current and future climate impacts. This can include limiting the exposure to climate hazards and increasing resilience and adaptive capacity.

This strategy is intended to ensure positive long-term outcomes for Northland. We can do this by embracing a robust, collaborative approach to developing local government adaptation responses to the impacts of climate change. Building a foundation for effective local action also involves acknowledging the need to remain agile in a changing legislative environment.

Vision

The people and the environment of Te Tai Tokerau thrive and are resilient in a changing climate.

Mission statement

Across Te Tai Tokerau, we work together with iwi/hapū partners, communities and stakeholders to proactively understand, plan for, and respond to the impacts and opportunities of climate change.

Principles

- **Treaty of Waitangi and Te Tiriti o Waitangi:** work collaboratively with tangata whenua, demonstrating the principles of partnership, participation and protection.¹

¹Local government has responsibilities under the LGA and RMA in relation to the Treaty of Waitangi. The Treaty is referenced as 'the Treaty of Waitangi (Te Tiriti o Waitangi)' in the definition of the RMA and has the same definition as in the Treaty of Waitangi Act 1975, being that the 'Treaty' means the Treaty of Waitangi as set out in English and in Māori in Schedule 1 (*of the Act*). For hapū in Te Tai Tokerau, He Whakaputanga o nga Rangatira o Nui Tireni and Te Tiriti o Waitangi need to be read together and Te Tiri o Waitangi forms the basis for the relationship between hapū and local government.

- **Whanaungatanga:** work together to build relationships and a sense of connection across the region, enabling sincere partnerships and collaborative working relationships.
- **Western science and mātauranga Māori:** alongside Western science, enable mātauranga Māori (Māori knowledge) to help understand climate change and inform decisions.² The right answers for the future are best found by first understanding the mātauranga left to us by our tūpuna.³
- **Equitable:** empower communities and ensure ‘no one is left behind’ through fair and tika processes, resourcing and outcomes.
- **Considered:** use research-led, evidence-based, values-driven policy and decision-making to proactively manage risks and identify opportunities.
- **Ka mua, ka muri:** walking backwards into the future – balance present-day needs and responsibilities with the rights of future generations, learning from the past using guidance from our ancestors.
- **Transformative:** use innovation to take advantage of opportunities to build a better future.
- **Transition:** address and reduce transition risks.
- **Holistic:** strengthen the four wellbeings – enhancing social wellbeing, regenerating mauri and environmental systems, supporting cultural values, and promoting economic resilience.
- **Integrated:** embed a climate change lens across all council activities and align adaptation with emissions reduction.

Objectives

- Improve and broaden our understanding of the risks of climate change in Te Tai Tokerau, especially in relation to local government activities.
- Clarify adaptation needs and responsibilities.
- Identify opportunities to improve local government adaptation responses.
- Recommend priority actions for local government.
- Outline a process by which the strategy will be responsive to feedback and changing circumstances.

The principles and objectives of this strategy align with the vision of all four councils, and iwi and hapū member reference groups.⁴ The objectives and priority actions also align with the strategic goals identified by Northland Regional Council’s Te Tai Tokerau Māori and Council Working Party that relate to climate change (goals 10, 11 and 12).

What are we doing and why is it important?

Climate change will increasingly affect Northland’s wellbeing

A changing climate affects our social and cultural wellbeing, our businesses and economy, our homes, buildings and infrastructure, and the ecosystems and natural world that surround us. We are seeing and experiencing effects on these realms now. From a te ao Māori perspective, the environment can be understood as the

² Te Iwi o Ngātiwai, Iwi Environmental Policy Document, 2007.

³ Ngāti Hine, Ngā Tikanga mo te Taiao o Ngāti Hine: Ngāti Hine Iwi Environmental Management Plan, 2008.

⁴ Far North District Council’s Climate Change Roadmap, Kaipara District Council’s Kaipara Ki Tua: Climate Smart Strategic Framework, Whangarei District Council’s Sustainability Strategy and Climate Action Plan, and Northland Regional Council’s climate change strategy *Ngā Taumata o te Moana*.

embodiment of generations of whakapapa from ngā atua.⁵ Hapū and iwi report that the realms of ngā atua and kaitiaki are degraded, mauri has been destroyed and there is potential for detrimental environmental, cultural and social effects.⁶ Generations to come will continue to experience the impacts of climate change.

Adaptation is the response to change. Adaptation helps us cope with the effects of climate change and reduces potential negative impacts. When we adapt, we reduce our exposure and vulnerability. We grow capacity in our communities, economies, and natural environment so we can keep adapting to whatever climate impacts are on the horizon.

Most importantly, adaptation offers opportunities for betterment. The legacy of our ancestors and the lives of our future generations are linked to the relationship we have with the natural environment. Adaptation is an opportunity to improve this relationship.

In meetings with elected members, opportunities such as the following were identified:

“What does going proactive on carbon banking look like?”

“What does it mean for tourism when we really become the winterless north? We keep telling people we are when actually we're not.”

“You can sell a product and have a carbon negative label on it.”

Responding to climate change impacts will affect how local government operates

Northland councils have an important role to play in adaptation, including providing education and advice, as well as planning and implementing adaptation responses at a local and regional level. Together with hapū and iwi partners, our communities and central government, Northland councils need to plan for and manage impacts on the things we value to help local communities become more resilient.

This is a new, challenging space for Northland councils and for many communities. To best facilitate adaptation and assist communities, Northland councils will continually work to improve our information and approaches.

This strategy sets out a vision for how Northland councils can improve their ability to prepare for and adapt to the impacts of climate change. It sets out clear steps to position Northland councils to respond to climate change, and to support community responses as well as possible. Adaptation will increasingly be part of our core business.

A strategy that evolves

Climate change is dynamic, and our understanding of its causes and consequences continues to evolve. Likewise, this strategy needs to be a living document so it can develop and adapt as Northland does. We will update this strategy as required, to respond to new evidence from mātauranga Māori and Western science, the changing needs of communities and iwi/hapū partners, and changes in the legislative and legal environment.

⁵ Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014. Pg 12, 13.

⁶ Te Iwi o Ngātiwai, Iwi Environmental Policy Document, 2007. Pg 11.

Ngāti Hau, Hapū Environmental Management Plan, 2016.

Ngāti Hine, Ngā Tikanga mo te Taiao o Ngāti Hine: Ngāti Hine Iwi Environmental Management Plan, 2008.

Te Uri o Hau Settlement Trust Environs Holdings, Te Uri o Hau Kaitiakitanga o te Taiao, 2011.

Upcoming legislation, including the Climate Change Adaptation Act, may change the legal landscape and the tools the councils use to implement adaptation. There is some uncertainty around the details, but leading legal research⁷ suggests councils should continue to follow best practice to ensure we are acting on our knowledge of climate impacts. The express aim of this strategy is to identify gaps and take advantage of opportunities to improve the councils' current capacity for adaptation decision-making, in preparation for new legislation.

This strategy also needs to respond to the voices of our communities and of tangata whenua. As Northland councils continue on this journey, feedback from iwi and hapū partners, communities, businesses and other stakeholders will continue long after the first version of this strategy is published. In particular, engagement with tangata whenua has so far been limited to feedback from iwi and hapū partner representatives. Actions within this strategy include a process to expand engagement across iwi and hapū to marae and whānau, to better reflect the understanding, experiences and aspirations of tangata whenua.

The strategy has six parts:

Part 1. 'Background and context' explains the rationale and context for the strategy.

Part 2. 'Key adaptation issues, responses and opportunities' provides detail on issues of concern, including governance and management, impacts on Māori, coastal communities, water availability, natural hazards, ecosystems and biosecurity, and public infrastructure.

Part 3. 'Enabling effective adaptation' outlines four areas for action to help improve adaptation responses in Northland: 1) improving knowledge and understanding, 2) growing relationships, 3) reducing risk and vulnerability, and 4) building capacity.

Part 4. 'An evolving strategy' outlines how the strategy will develop over time, in response to feedback and legislative changes.

Part 5. 'Priority actions' contains a list of 46 recommended actions for the councils.

Part 6. 'Climate risk overview' (technical report) provides an overview of different perspectives on climate change impacts and implications in Northland, and approaches to risk management.

⁷ Iorns, Catherine and Stoverwatts, J, Adaptation to Sea-Level Rise: Local Government Liability Issues (July 1, 2019). Victoria University of Wellington Legal Research Paper No. 62/2020, Available at SSRN: <https://ssrn.com/abstract=3685492> or <http://dx.doi.org/10.2139/ssrn.3685492>



Enviroschools planting at Lake Waiporohita. See <https://enviroschools.org.nz/>

Part 1. Background and context

The need for adaptation

Adaptation is about responding to the impacts of climate change. Adaptation does not replace the need for urgent greenhouse gas emissions reductions; it acknowledges that the climate is changing and that, in the words of the United Nations, we need to “develop adaptation solutions and implement actions to respond to the impacts of climate change that are already happening, as well as prepare for future impacts”.⁸

Adaptation is a key component of the long-term global response to climate change, to protect people, livelihoods and ecosystems. Regardless of the success or speed of programmes to reduce global emissions, greenhouse gases already in the atmosphere have a ‘locked in’ warming potential. Additional warming is ‘virtually certain’ to keep exacerbating climate change and its impacts in coming decades.

The Climate Change Adaptation Technical Working Group, established by central government,¹⁰ described effective adaptation as reducing the risks of climate change on two fronts:

- reducing the exposure and vulnerability of our social and cultural systems, natural and built environment (including physical assets), and economy
- maintaining and improving the capacity of our social, cultural, environmental, physical and economic systems to adapt.

There is an urgent need to understand, prepare for and respond to present-day and projected climate impacts. While local government will play a prominent leading role, we will also learn with and from our communities and mana whenua partners. Local knowledge, support and leadership will be vital for successful adaptation responses.

Understanding and communicating about climate change

The impacts and implications of climate change are complex and can be challenging to understand and communicate. Different knowledge systems, perspectives, objectives, worldviews and values can bring very different approaches for engaging with climate risks and framing the issues. While these different ways of understanding the impacts of climate change can be complementary, they can also be confusing and can get in the way of developing solutions that work for everyone.

This strategy attempts to use a systems approach to draw on both a Western scientific understanding of climate impacts (which tends to compartmentalise issues, then look at relationships between them), as well as Māori perspectives (guided by the core principle of whanaungatanga connecting everything¹¹). The Climate Risk Overview in Part 6 of this strategy (which is a technical report) explores this in more detail.

⁸ <https://unfccc.int/topics/adaptation-and-resilience/the-big-picture/what-do-adaptation-to-climate-change-and-climate-resilience-mean>

⁹ IPCC AR6 Climate change 2021 - the physical science basis. <https://www.ipcc.ch/report/ar6/wg1/#SPM>

¹⁰ <https://environment.govt.nz/publications/adapting-to-climate-change-in-new-zealand-stocktake-report-from-the-climate-change-adaptation-technical-working-group/>

¹¹ Te Uri o Hau Settlement Trust Environs Holdings, Te Uri o Hau Kaitiakitanga o te Taiao, 2011.

In thinking about risks from climate change, the National Climate Change Risk Assessment for New Zealand¹² report adopted a Western scientific approach. It grouped societal values into five broad value domains (natural environment, built environment, human, economy and governance domains). Value domains of this nature can be a practical way to create high-level summaries of climate change impacts from multiple hazards, but can also compartmentalise and separate social values.

This framing of climate risks into separate domains can create practical problems when trying to develop adaptive solutions for interacting or compounding climate hazards that cut across different value domains. The systems approach for mapping climate risks, which is explored in the Climate Risk Overview (in Part 6), attempts to overcome this issue by using a causal diagram to show interactions between hazards and affected areas of society and the environment. Nonetheless, neither approach reflects or incorporates Māori values, and ongoing work is needed to build a shared understanding of climate risks.

From a te ao Māori perspective, the environment can be understood as the embodiment of generations of whakapapa from ngā atua.¹³ Whanaungatanga describes genealogical relationships between people, between people and natural resources, even between related bodies of knowledge. Relationships of importance in mātauranga Māori are explained through kinship. Māori relationships with the cultural landscape are explained through whakapapa. The first step in understanding the Māori relationship with the landscape is to understand that descent from it is an essential Māori belief.¹⁴

What is whanaungatanga and why is it important?

Whanaungatanga: the principle of kinship. As explained in Ko Aotearoa Tenei, “In te ao Māori, all of the myriad elements of creation – the living and the dead, the animate and inanimate – are seen as alive and inter-related. All are infused with mauri (that is, a living essence or spirit) and all are related through whakapapa. Thus, the sea is not an impersonal thing but the ancestor-god Tangaroa, and from him all fish and reptiles are descended. The plants of Aotearoa are descendants of Tāne-mahuta, who also formed and breathed life into the first woman, and his brother Haumia-Tiketike. The people of a place are related to its mountains, rivers and species of plant and animal, and regard them in personal terms. Every species, every place, every type of rock and stone, every person (living or dead), every god, and every other element of creation is united through this web of common descent, which has its origins in the primordial parents Ranginui (the sky) and Papa-tu-ā-nuku (the earth). This system of thought provides intricate descriptions of the many parts of the environment and how they relate to each other. It asserts hierarchies of right and obligation among them.”

Pūrākau (stories, legends) and mātauranga passed down through generations describe the relationships with and between ngā atua, which help tangata whenua understand what practices need to be followed to tiaki (protect) the environment, to understand why certain effects and changes occur, and to identify the responses needed to address or adapt to the effects. Pūrākau also remind us that tūpuna (ancestors) Māori faced similar situations.

¹² <https://environment.govt.nz/publications/national-climate-change-risk-assessment-for-new-zealand-main-report/>

¹³ Ngati Hau, Hapū Environmental Management Plan, 2016

¹⁴ Waitangi Tribunal Report, *Ko Aotearoa Tenei: A Report into Claims Concerning New Zealand Law and Policy Affecting Māori Culture and Identity*, 2011.

Discussing climate risks from these starting points could be more relevant for Māori communities, and the solutions that are identified may offer options for application in other locations.

Central and local government adaptation: roles and responsibilities

Central and local government have different roles in adapting to climate change. Central government responsibilities are primarily delivered through functions set out in the Climate Change Response Act; and the key tools for adaptation are National Climate Change Risk Assessments and National Adaptation Plans. Once developed, these will set out government priorities and strategies for adaptation. The first national climate change risk assessment is complete, and the first National Adaptation Plan will be delivered before the end of 2022. Both are likely to have implications for local government, and influence adaptation at a regional and district level. We will need to review this strategy once the National Adaptation Plan is available.

Central government has also signalled its intention to reform the resource management system. This includes repealing New Zealand's core planning law, the Resource Management Act 1991 (RMA), and replacing it with three new statutes. Among the reform's key objectives are to better prepare for adapting to climate change and risks from natural hazards, and to better mitigate emissions contributing to climate change. The government has indicated that climate change adaptation and mitigation will be central themes in all three new statutes developed through the reforms.

The reforms will affect local government and could change the functions and roles of the councils in climate change adaptation. It is very likely, though, that there will remain a strong role for local government in planning for and implementing adaptation at community and regional levels. This will include undertaking risk assessments for council-owned and maintained community assets.

The Waitangi Tribunal report following Wai 262, the most comprehensive of all government claims, included recommended changes to the Crown's laws, policies and practices – including

but not limited to intellectual property, indigenous flora and fauna, resource management, conservation, science, education and health. The objective of many of the proposed reforms was to establish genuine partnerships.¹⁵ In response, central government is aiming to develop a whole-of-government approach to consider the issues raised by claimants and the Waitangi Tribunal in the Wai 262 enquiry. Direct and indirect changes for local

New climate change legislation

The Ministry for the Environment is currently drafting new legislation and guidance as part of the RMA reform, which includes a Climate Change Response Act. These will change how local government is able to respond to climate change impacts.

Items specifically related to climate change include:

- Climate Change Adaptation Act: to address the legal and technical issues associated with managed retreat and adaptation.
- Adaptation funding mechanism: creating a national funding mechanism for proactive adaptation and risk mitigation.
- National Adaptation Plan: to determine the approach for climate change, including the measures and indicators required.

In response, we will need to review this strategy. A review process is laid out in Part 4 – 'An evolving strategy'.

¹⁵ Te Pae Tawhiti: Wai 262 (tpk.govt.nz)

government are likely to result from this approach. These will need to be embedded in local government responsibilities, including climate change adaptation responses.

At a local government level, regional and district councils have different roles in adaptation which reflect their different functions. The Local Government Act 2002 states that the purpose of local government is (a) to enable democratic local decision-making and action by, and on behalf of, communities, and (b) to promote the social, economic, environmental and cultural wellbeing of communities in the present and for the future.

Regional councils are primarily concerned with environmental and coastal resource management and planning, flood management, water quality and quantity, pest control, and public transport. District councils (also known as territorial authorities) are responsible for a wide range of local services, including district planning, roads, stormwater, water reticulation, sewerage and refuse collection, libraries, parks, recreation services, cemeteries, local regulations, and community and economic development.

Councils need to plan for adaptation to manage the risks posed by climate change. Much of this responsibility relates to managing risks from natural hazards (such as coastal erosion or flooding) under the Resource Management Act 1991. Responsibility also extends to providing and managing infrastructure, obtaining technical information, managing natural resources and facilitating community adaptation processes. Adaptation, especially as it relates to increasing risks posed by natural hazards and climate change, is necessarily 'local' – hazards and values vary widely, as do response options.

Climate change mitigation (managing greenhouse gas pollution by reducing emissions and carrying out activities that capture and store carbon) is also a responsibility of local government. In New Zealand, the main mechanisms to enable broad emissions reductions lie with central government through the Climate Change Response Act 2002 and the Emissions Trading Scheme. However, the councils should work to reduce their own organisational emissions, and help enable the reduction of district and regional emissions through activities such as urban planning and public transport. Beginning in 2022, regional consents must also consider greenhouse gas emissions under the RMA.

As decision-making authorities delegated by the Crown, local government has a responsibility to uphold Treaty guarantees. Local government has legislated Treaty of Waitangi/Te Tiriti o Waitangi¹⁶ (Treaty) responsibilities that are applicable in all our activities, including responding to climate change and local government's adaptation responsibilities. A Waitangi Tribunal precedent signals local government requirements and the enforcement of Treaty duties. While there are no Waitangi Tribunal claims specifically related to climate change adaptation, there are claims such as Wai 262 and enough relevant cases to demonstrate that Treaty principles of "active protection and partnership, especially the facilitation of consultation, will apply no matter what the process is".¹⁷

¹⁶ Local government has responsibilities under the LGA and RMA in relation to the Treaty of Waitangi. The Treaty is referenced as 'the Treaty of Waitangi (Te Tiriti o Waitangi)' in the definition of the RMA and is stated to have the same definition as in the Treaty of Waitangi Act 1975, being that the 'Treaty means the [Treaty of Waitangi](#) as set out in English and in Maori in [Schedule 1](#) (of the Act)'.

The LGA does not provide an interpretation or definition of the Treaty, but it does reference responsibilities to meet commitments from other enactments, which of course includes the RMA. The absence of the LGA specifically referring to one text or the other does not give us the option of choosing which text we think it is referring to – but in any case, the contra proferentem principle applies and the indigenous language text takes preference.

¹⁷ Iorns Magallanes, 2019, p.62. Deep South Challenge, *Treaty of Waitangi duties relevant to adaptation to coastal hazards from sea-level rise* research is the most comprehensive and up-to date work covering coastal hazards adaptation and Treaty duties.

What can the councils do?

While the legislated functions of local government for managing the risks of natural hazards and providing infrastructure are well established, Northland councils are at an early stage in developing focused climate change adaptation responses. To date, these responses have broadly focused on capacity and relationship building, information gathering and analysis, and preparation and planning.

Councils have an important function in developing knowledge by investigating and collating locally relevant information on current and future climate change risks, and by undertaking ongoing monitoring and evaluation. They provide adaptation support to communities through leadership and guidance; and they can help enable co-designed solutions through community engagement and adaptation planning. Councils also manage climate risks, such as through land-use planning rules, providing public infrastructure, supporting emergency responses, and enhancing the resilience of natural systems.

While councils face many challenges as they begin climate adaptation journeys, there are many areas of strength and opportunity. Northland councils have developed strong inter-council working relationships and have background knowledge and information to support an ambitious works programme. All four councils and our hapū and iwi partners have collaborated to establish a joint governance committee on climate change adaptation. This group's existence is a milestone, and demonstrates the energy, commitment, knowledge, trust and networks characterising the partnership.

A growing awareness of climate change's significance and increasing support from council leadership enables the councils to take a stronger stand on adaptation planning. Widespread community buy-in and a desire for action to address climate change impacts also contribute to this approach. Public feedback through Long-Term Plan consultation processes has supported all four councils to significantly increase climate change adaptation funding in their 2021–2031 Long-Term Plans.

Tangata whenua have a strong interest in climate change adaptation. There is a significant opportunity for the councils and tangata whenua to build on the existing relationships formed at governance and staff levels, to partner in this mahi and achieve outcomes that everyone desires. Within hapū and iwi planning documents, reports to the councils and other government reporting, hapū and iwi within Tai Tokerau have articulated the challenges that local government processes and decision-making have created within the taiao (natural world) and their relationship with the taiao.¹⁸ Engagement with tangata whenua has highlighted the need to consider legacy relationship challenges between local government and tangata whenua, as well as issues and other socio-economic drivers when understanding and planning for climate risks with Māori communities. Te Tai Tokerau councils have committed to working- and governance-level relationships with hapū and iwi in this mahi. This is positive, and reflects a shift in council thinking to heal relationships and work towards genuine partnership.

Te Tai Tokerau councils can also support other highly affected communities, such as our farming communities, to build resilience and plan for adaptation. We can build on existing local government and community initiatives and carry out targeted engagement to identify needs and opportunities unique to agriculture and horticulture. These opportunities extend beyond responsibilities specific to local government but are important for the wider

¹⁸ Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014.

Waitangi Tribunal Report, *Ko Aotearoa Tenei: A Report into Claims Concerning New Zealand Law and Policy Affecting Māori Culture and Identity*, 2011. Chatham, J, Cooper J, Tautari R, *Tane Whakapiripiri: Lifting Nga Hapū o Whangārei Capacity to Engage with Local Government in Regard to Environmental Protection and Management*, 2019.

economic and social wellbeing of Northland's places and people and add momentum to the positive work already underway.

Part 2 of this strategy explores the key local government activities that are affected by climate change, what the current local government adaptation responses are, and highlights where opportunities have been identified as future actions by the four Northland councils. While the focus is on local government, we acknowledge a whole-of-community response to climate change will include activities and initiatives that are the responsibility of other agencies and parties. This could mean some local adaptation responses are led by non-council parties, such as iwi/hāpu or community groups.

Part 2. Key adaptation issues, responses and opportunities

A wide range of issues regarding local government's response to climate change risks have been raised by iwi and hapū, elected members, council staff, and community members. These issues involve seven themes:

1. Governance and management
2. Impacts on Māori
3. Coastal communities
4. Water availability
5. Natural hazards
6. Ecosystems and biosecurity
7. Public infrastructure

The seven themes are discussed in detail here, with insight into relevant issues, current responses, and future opportunities specific to local government. The insights in this section also inform Part 3 – 'Enabling effective adaptation' which outlines future directions and areas for action. Reference is made within this section to related actions in Part 5 – Priority actions'.

While the grouping of the issues makes sense in a local government context, it may not align with the integrated and interconnected approach of Māori. There are other more relevant groupings to Māori such as the four pou: wai (from which everything emerges¹⁹), kai, whenua and whare (as used by Te Hau Ora o Ngāpuhi and others in the health sector). It is likely that the four pou will be a more effective approach to engage with Māori communities.

1. Governance and management

WHAT ARE THE KEY ISSUES?

Councils across Northland have started to acknowledge their role in developing climate change adaptation responses in recent years. There are still opportunities to improve. There are external and internal risks for the councils relating to governance and management of climate change adaptation. External risks include those arising from the uncertainty of climate projections and the lack of clear guidance from central government. Internal risks include those arising from inadequate internal council policies, processes and capabilities.

Despite these risks, not doing anything to adapt to climate change is considered to be the biggest risk of all.

¹⁹ Ngāti Hine, Ngā Tikanga mo te Taiao o Ngāti Hine: Ngāti Hine Iwi Environmental Management Plan, 2008.

External issues

Effective adaptation by local government is inhibited by external barriers. For example, the complexity of climate impacts, and the uncertainty in projections of those impacts, can lead to hesitancy to take action. National policy and guidance can be poorly defined or non-existent, which makes it challenging to align local government responses. Existing legislation does not enable pre-emptive actions to reduce climate risks. It provides only partial guidance for local government on how to integrate complex adaptation plans into local regulations. At the time of writing, central government is working on new legislation that may help to address these issues.

Internal issues

Local government approaches to adaptation can be fragmented. There is often a lack of clarity about roles, responsibilities, and legal obligations. Internal policies and strategies can be poorly aligned. There is a risk that council responses to climate change will remain ad hoc, inconsistent, siloed, and potentially deferred. This could result in inadequate and inconsistent policy and strategic direction, leading to inappropriate infrastructure planning and poor community outcomes. For example, government approaches to environmental management are based on Euro-centric perspectives, which exclude Māori values. There is a risk that maintaining environmental management based on these perspectives may result in continued worsening environmental outcomes. This is expanded on in the next focus area, Part 2 – Impacts on Māori.

The relationships between the councils and communities is complex. In some places the two are disconnected or strained by historic issues. This is particularly evident in council relationships with Māori communities. The need for sincere engagement is acknowledged as a high priority. There are many opportunities for the councils to nurture ongoing relationships and incorporate a wider range of community views in decision-making processes. To be effective, adaptation planning will require building trust with communities. This will involve purposeful and resource-intensive engagement with communities across a range of areas.

Capacity to undertake effective adaptation actions will be an ongoing issue for the councils. There will be pressure on staff resourcing because there is a limited pool of adaptation expertise in the country and hiring and developing staff skills can be challenging. Furthermore, operational costs are high for risk assessments and adaptation planning, and funding of adaptation implementation actions is not secured.

Climate change adaptation requires shared understanding of climate risks across the organisation(s). At present there is no consistent approach to the integration of adaptation objectives into the councils' planning processes. For example, climate risk assessments in infrastructure asset management plans are not standardised. This is due to the emerging nature of the issue and the fact there is no policy to require consistent consideration of climate change in planning and decision-making. Climate change risks may not be sufficiently acknowledged, monitored, or disclosed. The ownership of mitigation actions is not clearly reflected in organisational KPIs across departments or articulated in job descriptions.

Implementation of adaptation actions can be expensive and contentious. The Hawke's Bay councils' experience with adaptation implementation illustrates the costs and complexities involved in proactively managing risks.²⁰ There is currently no central government or EQC funding for pre-emptive climate change risk reduction, and communities may not be willing or able to fund the costs of adaptation. Roles and responsibilities for

²⁰ <https://environment.govt.nz/publications/challenges-with-implementing-the-clifton-to-tangoio-coastal-hazards-strategy-2120-case-study/>

management and funding of adaptation responses between district and regional councils are also unclear, which impedes implementation.

WHAT ARE THE CURRENT RESPONSES?

Councils are building the foundations for the necessary leadership, relationships, internal processes, knowledge base, capability and capacity, and required funding to plan and implement effective adaptation actions.

The Joint Climate Change Adaptation Committee is a governance group comprising elected members from each council and equal tangata whenua representation from each council boundary (as distinct from hapū and iwi boundaries). This Committee has been established to provide governance oversight and consistency between Northland councils. It is supported by the joint staff group Climate Adaptation Te Tai Tokerau, which has been collaborating since 2018 to develop shared approaches and resources to enable a consistent adaptation response. All Northland councils have recently committed funds to support adaptation planning activities, by creating new staff positions and/or allocating operational funding in their Long-Term Plans.

Priority action 2 is to embed Māori values in council processes. This involves co-design with iwi and hapū representatives of a decision-making framework for Northland councils based on Te Ao Māori concepts and values. It is hoped this framework will assist council staff to understand and consider mātauranga Māori when making decisions on projects, policies or plans that may impact on the cultural values of iwi and hapū. It is also proposed that the decision-making framework will support Māori and technical specialists to better understand council systems and processes in the context of decision-making. The framework must recognise that there are regional and local differences within Te Tai Tokerau that affect how local authorities operate.

The process of developing the framework is an opportunity to build better relationships between the councils and hau kainga, marae, hapū, iwi and Māori practitioners. The framework will be developed by engaging with those on the ground within Māori communities. Relationships built through this work could form the foundations for the community adaptation planning that the councils intend to start over the next 12 months, within priority action 1.

The councils have yet to review their policies to understand the gaps and conflicts between internal documents and adaptation needs. These reviews are in the planning stage at each council. A proposal for a regionally consistent climate change policy is in development.

Current council adaptation funding allows for a small number of community adaptation planning pilot projects to be delivered across the region in the next three years. Existing funds will also support a small number of iwi/hapū-led adaptation planning projects. Investigation into some priority issues, such as the impacts of climate change on biosecurity and biodiversity, are not yet funded.

There is poor understanding of, or planning for, the capital infrastructure funding required to reduce climate risks such as coastal hazards and flooding. There are already places where the current flood management infrastructure does not provide adequate protection for the required planning horizon. For example, some property owners in Ruawai are unable to obtain resource or building consents because they are located within a mapped hazard zone. This is causing widespread community concern. Central government is working on funding mechanisms for climate change adaptation, but the details and timeframes remain unclear. Many infrastructure costs will continue to be the responsibility of local government and communities for the foreseeable future.

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

Our adaptation approach must be comprehensive and consistent. This requires coordination between the councils, and across council departments (e.g. civil defence, strategy, infrastructure, community engagement, RMA planning and consents teams). Such coordination requires leadership, dedicated staff, appropriate management structures and internal capacity-building. This should be supported by consistent internal strategies and policies. Many of the priority actions recommended in this strategy are designed to improve region-wide consistency.

Better processes to disclose climate risk, including the setting of KPIs and targets, will assist the councils to establish clear priorities for actions and risk reduction (priority action 40). A 'climate change maturity assessment' of policies will inform an improvement programme to support alignment and consistency within the councils. The development of an overarching regional policy framework will embed consideration of climate change impacts in council processes. Regular review and alignment with changes to central government legislation and guidance will be necessary. These issues are addressed in priority actions 38 and 39.

Priority actions #38 and #39

38 Joint climate change policy framework

- Aim:** Ensure consistent consideration of climate change issues across individual councils.
- Description:** Develop consistency between climate change policies that embed consideration of climate change impacts and adaptation responses in all council decision-making (which may also include council emissions reduction). This framework should define approaches and principles on data/information, definitions, reporting, standards and criteria.

39 Policy review and improvement plan

- Aim:** Embed climate change objectives across individual council policies, strategies, plans and processes.
- Description:** 1) Identify improvement opportunities by undertaking a maturity assessment for each council of all relevant policies, strategies, plans and processes (may also include council emissions reduction), and 2) develop and deliver a climate change policy improvement plan that outlines a programme of policy updates to embed climate change objectives within a defined timeframe.

We will increase interaction with central government initiatives, such as input into the National Adaptation Plan or nationwide forums such as the Iwi Chairs Forum climate workstream. This will help us share resources and knowledge and improve alignment between national and regional/local scales. Ongoing advocacy and engagement to ensure Northland's voice is heard in the development of new government legislation or funding streams is essential. Where there are multiple agencies and organisations addressing adaptation issues (e.g.

drought response), better coordination between funding avenues and supporting agencies will make the process simpler and more efficient, with improved outcomes. This is addressed in priority actions 4–6 and 36.

Priority actions #4, #5, #6 & #36

4 Advocacy

Aim: Promote Northland's voice in central government policy and legislation development.

Description: Targeted advocacy with central government, regarding the development of new funding mechanisms and legislation.

5 Central government engagement

Aim: Ensure Northland has input into central government adaptation policy and legislation development.

Description: Prioritise engagement and advocacy with MfE on development of new legislation including RMA reform, the National Adaptation Plan and the Climate Change Adaptation Act.

6 National partnerships

Aim: Develop partnerships and knowledge sharing with regional and sector groups.

Description: Contribute to collaborative projects and partnerships, and leverage existing knowledge from other regions and internationally.

36 Water resilience funding coordination

Aim: Improve coordination between agencies/organisations to improve water resilience outcomes.

Description: Improve coordination between agencies to build collaborative, aligned water resilience responses including: tangata whenua, CDEM, district councils (Four Waters Advisory Group), and agencies (FENZ, MPI, TPK, DIA).

Reducing greenhouse gas emissions is not the focus of this strategy. However, the transition to a zero-carbon society is important to Northland communities. The risks associated with this transition may need to be considered at the same time as adaptation planning. This is an opportunity for the councils to develop models that integrate transition risks (associated with emissions reductions and the move to a zero-carbon economy) with climate risk assessments and planning, including at the community scale. This consideration is likely to influence a number of priority actions (e.g. 9, 10, 16, 23, 24 and 39). Further participation in national research initiatives will enhance the councils' abilities to address transition risks (priority action 24). Northland Regional Council is planning a regional multi-sector approach to support the transition to a zero-carbon economy in Northland.

Effective adaptation requires ongoing investment in staff resources, training, operational funding and implementation. We could establish and resource a climate change management structure, with identified teams and roles, to develop organisational resilience and capacity. We could also work with hapū or iwi to develop

partnership structures to support the emerging requirements of climate change adaptation. Priority actions 43, 44 and 46 address these matters.

Priority actions #43, #44 & #46

43 Climate change teams

Aim: Establish appropriate portfolio, programme and project governance and management structures to build organisational capacities.

Description: Establish appropriate teams to deliver organisation-wide climate change implementation at each council, reporting to an appropriate level of management and given sufficient support.

44 Staff resources

Aim: Ensure sufficient staff resourcing and capacity.

Description: Ensure sufficient staff resources are allocated to enable ongoing organisation-wide climate change response, including climate change focused roles and professional development and training.

46 Inter-council collaboration

Aim: Continue to develop collaborative inter-council programmes and shared services.

Description: Continue to support and invest in the regional collaborative adaptation work programme, including establishing a process for sharing of resources between councils on specific projects, acknowledging the significant benefits and efficiencies of collaboration. Expand group to include Northland Transport Alliance.

Councils need to identify funding opportunities for the implementation of adaptation plans. These plans will be varied and may involve activities such as large infrastructure projects, nature-based solutions, changes to planning rules, property purchases, and increases in monitoring requirements. Potential funding options could include targeted rates, lease-back arrangements, low-interest loans, private-public partnerships, or alternative revenue streams. As the experience from Hawke's Bay shows, it is essential to define the adaptation management and funding responsibilities between the councils prior to implementation. Councils will need to identify existing funding streams and advocate for new, external sources, such as government grants and philanthropic trusts. Developing 'shovel-ready' infrastructure projects ahead of time allows the councils to take advantage of intermittent funding opportunities. Priority actions 4, 42 and 45 are relevant responses.

Priority actions #4, #42 & #45

4 Advocacy

Aim: Promote Northland's voice in central government policy and legislation development.

Description: Targeted advocacy with central government, regarding the development of new funding mechanisms and legislation.

42 Alignment of adaptation plans

Aim: Ensure community adaptation planning processes are aligned with council funding processes.

Description: Develop processes to ensure alignment of community adaptation plans with council plans and policies, including long-term plans, infrastructure strategies and financial plans.

45 Adaptation funding

Aim: Identify and pursue adaptation funding avenues.

Description: Investigate and prioritise potential funding opportunities to enable the implementation of adaptation responses.

2. Impacts on Māori

Conversations about climate change between the councils and Māori are beginning to yield shared understanding and agreements. However, as the councils listen more closely to the voices of iwi and hapū, knowledge and insights about the real impacts of climate change from a Māori perspective will emerge. It is vital for the success of adaptation in Northland that the strategy evolves in an ongoing manner in response to insights from Māori.

WHAT ARE THE KEY ISSUES?

Hapū report that the realms of ngā Atua are degraded, the mauri has been destroyed and there is potential for detrimental environmental, cultural and social effects.²¹ Some contend that local government decision-making (based on Euro-centric perspectives) has contributed to this environmental degradation.²² Environmental management practices have not required the restoration of mauri, which is necessary for survival and a key part of future adaptation responses.

²¹ Iwi and Hapū Environmental Management Plans: Patuharakeke, Ngāti Wai, Ngāti Hine, Ngāti Hau, Ngāti Kuri (2018), Ngāti Rēhia (3rd ed, 2018) Whatitiri Resource Management Plan, Te Urioroi Hapū Environmental Management Plan & Whatitiri Hapū Environmental Plan, 2016. Te Uri o Hau Settlement Trust Environs Holdings, Te Uri o Hau Kaitiakitanga o te Taiao, 2011.

²² Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014. pg 21.

Royal, Te Ahukaramu Charles (Ed), *The Woven Universe: Selected Writings of Rev. Maori Marsden*, 2003.

Ngāti Hine, Ngā Tikanga mo te Taiao o Ngāti Hine: Ngāti Hine Iwi Environmental Management Plan, 2008.

Chetham, J, Cooper J, Tautari R, *Tane Whakapiripiri: Lifting Nga Hapu o Whangarei Capacity to Engage with Local Government in Regard to Environmental Protection and Management*, 2019.

Iwi and hapū representatives say their ability to successfully adapt is intimately connected with how local government decision-making over current and future environmental management takes place, and whether Māori are partners in that decision making.²³ Currently, local government decision-making does not give sufficient voice to the specific needs of tangata whenua.²⁴ There is inequity in the information local government relies on, from whom the information is sought, the resourcing of data collection, and how the information is valued. If we do not address how local government makes decisions, council responses to climate change may limit the ability of tangata whenua to adapt to climate change. If the ability of tangata whenua to participate in decision making is limited there is increased risk of maladaptation; and a perpetuation of existing inequalities and breaches of Treaty obligations.

For some time, iwi and hapū representatives and kaimahi have highlighted the pressure on their capacity to participate within local government processes and operations,²⁵ although the aspiration and necessity remains. The need to be involved in climate change responses by local government adds further pressure. There is an opportunity to build relationships between the councils and Māori and to enable tangata whenua to take the lead on adaptation planning for Māori communities. The complex and sometimes strained relationship between Māori and the councils creates a playing field that is not equal between Māori and Pākehā. This work presents a real opportunity for Māori to participate in council decision-making processes.

For many Māori, climate change is not an isolated risk but one that is intrinsically connected to other issues such as social development needs, housing, environmental degradation, and poverty. We have heard from hapū that climate change poses an existential risk and may result in an inability to enjoy the customary use of their whenua. Climate impacts on ecosystems have implications for spiritual connection to taonga and to whakapapa, as well as for practical issues such as food security.

Some hapū say climate change could exacerbate inequalities already faced by Māori and is likely to have disproportionately large impacts on Māori cultural values and community wellbeing.²⁶ This is because many Māori communities are exposed to physical climate effects, both geographically and economically. As expressed by Ngāti Rēhia, “the economic future of Ngāti Rēhia is linked inextricably to our natural and heritage resources.”²⁷

Exposure

There are many factors which indicate high levels of exposure for Māori communities. Due to land confiscation, land remaining in Māori ownership often has some form of natural hazard limiting development potential and increasing risk. Many hapū have strong cultural and historic affiliations with coastal areas projected to be impacted by climate change. This means that flooding, coastal erosion, storm surge and regular tidal inundation may disproportionately affect Māori communities. There are likely to be impacts on cultural infrastructure such as marae and urupā, places for food gathering such as mahinga mataitai, and places of cultural significance such

²³ Climate Adaptation Te Tai Tokerau Risk Assessment Workshops with Māori, Feb 2020.

²⁴ Chetham, J, Cooper J, Tautari R, *Tane Whakapiripiri: Lifting Ngā Hapū o Whangarei Capacity to Engage with Local Government in Regard to Environmental Protection and Management*, 2019.

Whatitiri Resource Management Plan, Te Uriroi Hapū Environmental Management Plan & Whatitiri Hapū Environmental Plan, 2016.

²⁵ Key issue raised in the Te Karearea Standing Committee of Whangarei District Council

Chetham, J, Cooper J, Tautari R, *Tane Whakapiripiri: Lifting Ngā Hapū o Whangarei Capacity to Engage with Local Government in Regard to Environmental Protection and Management*, 2019.

Thomas Hohaia and Delaraine Armstrong, Climate Adaptation Te Tai Tokerau meeting, 4 November 2021.

²⁶ Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014. pg 37.

²⁷ Ngāti Rēhia, 3rd ed, 2018

as wāhi tapu and archaeological sites.

Climate change will impact people's homes and incomes. Housing unaffordability and global pandemics contribute to greater numbers of whānau returning to their tūrangawaewae from other regions and nations, increasing the number of people exposed. Adaptive responses may be limited under current regulatory provisions because of natural hazard notations or high amenity notations, such as Significant Natural Areas, over land most suitable within their rohe for retreat.

Rural Māori are often not connected to reticulated secure and safe drinking water supplies and can be more susceptible to the effects of drought. Other less-visible effects may involve health impacts in rural areas; for example, an increase in mosquito-borne pathogens due to higher temperatures.

Indirect economic impacts may affect hapū and iwi. There may be changes to agricultural productivity. There is likely to be a loss of transport connectivity for settlements serviced by roads at risk of regular inundation due to sea level rise. In Whangaruru, for example, some school children are frequently unable to attend school because of flooding. The impacts this has on their education has been raised with elected members by local schools and by the children themselves.

Sensitivity and vulnerability

Iwi and hapū in Te Tai Tokerau are vulnerable to climate change from a socio-economic and infrastructure services perspective. Across Tai Tokerau, Māori experience significant disparities in incomes and public services received. This disparity increases for Māori communities/whānau living in more geographically isolated places. Income disparity can reduce Māori communities' capacity to afford the costs of protecting against, avoiding, and recovering from droughts and extreme weather events. In terms of infrastructure vulnerability, services in outlying areas are more often affected by drought or weather events. For example, transport infrastructure in outlying areas tends to be more prone to flooding and slips.

Māori in Te Tai Tokerau are also largely employed in primary industries, a sector which is affected by weather extremes. Projected climate impacts such as extended droughts, fluvial flooding, salinisation of water tables, and tidal inundation of coastal land are likely to have direct impacts on the incomes of many whānau.

Risks related to the transition to a low-carbon economy are not often discussed alongside adaptation. However, emissions reduction policies have the potential to disproportionately affect Māori in Northland. Councils need to keep this in mind when working with Māori communities on adaptation planning, and should aim for the integration of adaptation, emissions reduction and carbon removal goals together.

Finally, climate change impacts are likely to threaten the taonga and natural systems that iwi and hapū whakapapa to. The inseparable links between Māori and the environment will mean that projected climate change impacts on natural systems, including on individual species, biodiversity, invasive pests and pathogens, ecosystem function, waterways, and coastal systems, will have cultural and personal impacts on Māori.

WHAT ARE THE CURRENT RESPONSES?

For Māori, mātauranga was developed from the need to live sustainably and in harmony with the environment and seasons to avoid ‘severe and drastic consequences’.²⁸ Successful management was reliant on the strength of whānau and hapū to work together for the collective good. It was reliant on the relationships forged by whanaungatanga and kotahitanga. These are relevant starting points for discussions with Māori communities so they can draw on their kōrero tuku iho, or traditions, to guide their pathways planning.

Hapū and iwi aspire to reaffirm their mātauranga, tikanga and pūrākau – their own frameworks of reference – as they consider and plan for climate change.²⁹

Hapū and iwi are well-known for intergenerational thinking when planning – looking to the guidance of their ancestors to plan for the wellbeing of their mokopuna and generations not yet born. This is reflected in how indigenous knowledge systems adapt to the changing world. Further to that, hapū and iwi environmental planning documents articulate the expectations that hapū and iwi have of local government responses to climate change.³⁰ These include:

- not increasing vulnerability and risk through council operations
- planning for and providing adequate infrastructure to cope with climate change (community-based, minimal-impact design solutions being preferred)
- ensuring communities are prepared for the negative impacts of climate change and doing effective adaptation planning, while being placed to take advantage of the opportunities
- recognising the impacts of climate change that will affect hapū and iwi, and incorporating that into strategic planning
- moving toward an integrated catchment-based management approach
- providing resourcing to enable hapū planning and responses
- incorporating mātauranga into local government strategies and plans.

Hapū and iwi are also taking action themselves. They use mechanisms such as iwi and hapū management plans to present policy positions and work with regional councils, crown research institutes, government departments, universities and other organisations to contribute to regional, national and international climate change policies and processes.

Northland councils want to listen to, and learn from, iwi and hapū to reach agreement on respectful and appropriate ways to be guided by Māori perspectives in adaptation responses, both at a strategic governance level and operationally. Hapū and iwi have indicated support for the collaborative adaptation approaches being developed. At the time of writing, a hapū-based kairangahau (researcher) is reviewing examples of successful adaptation engagement processes with Māori across the country. This work will add to the repository of information and tools that support hapū and iwi adaptation responses and assist the councils to engage with Māori communities in meaningful ways when planning.

²⁸ Ngāti Rēhia, 3rd ed, 2018

²⁹ Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014. pg 37.

³⁰ Patuharakeke Te Iwi Trust Board, Patuharakeke Hapū Environmental Management Plan, 2014. pg 39; Ngāti Hine Environmental Management Plan, 2008. Page 82; Ngāti Rēhia, 3rd ed, 2018; Te Aupōuri (DRAFT)(2018).

In section 2.1 – ‘Governance and management’ we refer to the development of a decision-making framework for local government that is based on Te Ao Māori, which addresses priority action 2. The intention is to build an understanding of cultural differences into council climate change adaptation processes. The framework will be accompanied by a suite of tools to support its implementation.

Relationships between the councils and iwi and hapū are at different stages of maturity. Influences include the quality of legacy relationships, multiple overlapping hapū and iwi interests where Treaty Settlement processes add complexity, and the quality of current relationships with staff and leadership.

Priority actions #1 & #2

1 Tangata whenua involvement

Aim: Ensure tangata whenua are appropriately involved in adaptation decision-making.

Description: Ensure inclusive processes for tangata whenua representation at all stages of adaptation decision-making, including providing appropriate resourcing, supporting training and developing targeted programmes.

2 Embed Māori values in council processes

Aim: Ensure Māori values and worldviews are included in council processes and decision-making relating to climate change.

Description: Co-design with iwi and hapū representatives of a decision-making framework based on Te Ao Māori concepts and values. The framework will include implementation tools and will recognise that there are regional and local differences within Te Tai Tokerau that inform how local authorities operate.

The establishment of the Joint Climate Change Adaptation Committee is a significant step forward in collaborative co-governance, with equal numbers of elected and tangata whenua representatives from each council. Te Ao Māori decision-making frameworks draw on kōrero tuku iho and pūrākau to guide engagement with Māori communities. This work responds to priority actions 1 and 2 and should enable stronger foundations to undertake other priority actions, including 7–10 and 32–36.

Through whakapapa and whanaungatanga, the close social ties and cultural networks of Māori communities enable whole-of-community responses to build resilience, such as those shown during the Covid-19 response. In terms of kaitiakitanga, kotahitanga and whanaungatanga, some hapū see opportunities for collaboration within and between hapū for the collective good.³¹ These values, and priority actions 9 and 10, will support Māori-led adaptation responses.

³¹ Ngāti Rēhia, 3rd ed, 2018

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

For Te Tai Tokerau councils to address the consequences of climate change, we must acknowledge issues specific to Māori. The stresses and hazards climate change bring are part of a changing array of challenges threatening Māori cultural integrity and continuity. Councils need to work alongside Māori to develop a response to climate change that respects the diverse needs and aspirations of Māori. This might be through establishing inclusive structures and processes to enable co-design of adaptation planning programmes, as well as supporting Māori communities to develop their own responses. We understand that for some Māori communities, there is anticipation and openness toward the opportunities that climate change might present, as their histories tell examples of their tupuna successfully adapting to and using change for their betterment.³²

Priority actions #9 & #10

9 Māori adaptation impact assessment

Aim: Improve bi-cultural understanding of climate risks and consequences.

Description: Work with tangata whenua to undertake iwi- and hapū-focused risk assessments, including communicating risks from Te Ao Māori perspectives, identifying risks associated with climate hazards, impacts of adaptation responses and limits to Māori adaptive capacity. This may include direct impacts on cultural values such as wāhi tapu; as well as compounding risks, such as interactions between councils and government legislation resulting in unintended consequences, or barriers for Māori adaptation responses.

10 Iwi/hapū-focused adaptation

Aim: Enable iwi/hapū-led adaptation planning at appropriate scales.

Description: Work with tangata whenua to develop a programme to facilitate hapū or iwi-led holistic climate change adaptation plans to integrate multiple climate risks as well as other community objectives. Draw on approaches to adaptation engagement with Māori that have been successful in the past. This may include provisions to support iwi/hapū with risk assessments and technical analysis as well as enabling data sovereignty.

Locally appropriate risk assessments underpinned by tikanga Māori will enable Māori perspectives on change, risks, vulnerabilities and consequences to be incorporated into adaptation decisions. Councils also need to acknowledge the role of planning rules and connecting infrastructure (e.g. roads and water networks) to enable successful adaptation for Māori communities. These are outside the control of iwi and hapū. Better involvement of Māori in infrastructure planning would help to bridge this gap.

At different stages of developing this strategy, hapū and iwi reiterated the need for tools to consider climate risks and impacts on resources, papakāinga, and marae under threat. They want to be able to develop appropriate responses that navigate a changing legislative environment. As part of the wider programme of adaptation, we

³² Ngāti Hine Environmental Management Plan, 2008. Page 81. Patuharakeke Hapū Environmental Management Plan, 2014. Page 37.

should develop a toolkit and resources to enable hapū-led adaptation at the local scale. This will help communicate climate risk in meaningful ways to Māori communities. Councils can work with local knowledge-holders to combine Western science and risk analysis with indigenous knowledge, and apply this in appropriate planning contexts. There is opportunity to support iwi and hapū to develop their own adaptation plans with tools, hazards advice and other support, while ensuring data sovereignty. Councils could support the development of these tools and their application in priority actions 9 and 10.

The inability to fund implementation of adaptation plans or other adaptation responses is an ongoing issue. The impact of this is exacerbated in small rural Māori communities, which may be unable or unwilling to pay for the costs of the long-term measures required to protect community values exposed to climate hazards. Advocacy and engagement with central government is essential to secure funding for equitable and proactive adaptation measures. Addressing the inability of smaller Māori communities to finance adaptation measures is essential, and alternative approaches such as philanthropic or international funding may be an option.

3. Coastal communities

WHAT ARE THE KEY ISSUES?

Northland has a coastline of over 3,200km. Many towns, settlements and cultural sites are located on the coastal fringe.

Sea level rise is projected to result in ongoing permanent loss of land, through coastal erosion and tidal inundation. It will also increase the frequency and severity of periodic storm surge events.

An initial coastal hazard risk screening study identified about 70 towns and localities where properties and assets are projected to be significantly affected by coastal flooding, erosion, and permanent inundation due to sea level rise. Both Māori and non-Māori coastal communities will be highly impacted. Many Māori communities, particularly in the Far North, occupy land nearby or on coastal floodplains, with several Marae projected to be directly impacted by coastal hazards. Farming communities will be highly impacted as a significant amount of agricultural and horticultural land is in low-lying, coastal flood areas. There are also rural areas under pressure from development within coastal hazard zones.

Council infrastructure such as roads, water supply, stormwater and wastewater networks, and coastal stopbanks, will be impacted by sea level rise. In many places the road network is located on estuarine fringes, such as in the Hokianga. Road connectivity will be increasingly impacted by inundation at high tide. The location of large council infrastructure, such as wastewater treatment plants, within the coastal environment will be increasingly impacted by rising groundwater levels. This will impact on the effectiveness of land disposal systems.

Coastal protection infrastructure operated by the councils, such as sea walls, will become increasingly difficult and expensive to maintain. In some places, sea walls and stopbank systems have been funded privately or directly by communities, and the increasing cost to maintain and/or upgrade them is becoming unaffordable. Higher tidal boundaries mean that the impact of river flooding is exacerbated, resulting in more days where roads are impassable. This impact is already being experienced in places like Punuruku and Panguru.

Most coastal communities do not have town water supplies, with households relying on tanks and shallow bores. Both of these sources of water will come under pressure with climate change due to increased drought and sea level rise. These communities are also often reliant on septic systems. Rising groundwater levels could impact on the effectiveness of waste disposal systems. Sea level rise will impact coastal agricultural areas as groundwater salinity impacts the ability to draw water for stock or irrigation, and low-lying land is affected by salinity.



Tasman Heights, Ahipara

WHAT ARE THE CURRENT RESPONSES?

There is a comprehensive programme of mapping coastal inundation and completing erosion hazard assessments across the region. These are being used to develop climate risk assessments and plan adaptation programmes. Councils are working together to develop an aligned region-wide programme, working with communities to develop local adaptation plans in at-risk areas (see 'Coastal adaptation programme' in the box below).

Coastal adaptation programme (see priority actions 29 and 30)

Northland councils are developing a work programme to address climate change risks to coastal communities. The programme will set out guidance on ways councils, communities, tangata whenua and key stakeholders can co-develop community adaptation plans.

The preferred, best-practice engagement and decision-making approach to be used in the coastal adaptation programme is adaptive pathways planning, which is described in the 2017 Ministry for the Environment document 'Coastal hazards and climate change guidance for local government'. This process enables communities to be intimately involved in developing adaptation plans for their own communities through a structured process. It uses community panels to collaboratively determine adaptive pathways using risk assessments, engineering designs, options assessments, and prioritisation processes.

The result will be a flexible, long-term adaptation plan for each community, signed off by a governance body and the relevant councils. While this approach will be appropriate for larger communities, we will also work with smaller communities to develop and implement community-led adaptation plans at the local or hapū scale. Funding for pilot community engagement projects has been allocated in the 2021–31 Long-Term Plans for all Northland councils.

Following the endorsement of community adaptive pathways plans, councils will be responsible for monitoring environmental indicators and delivering actions when specific trigger points are reached, such as changing land-use zoning or delivering new infrastructure. To ensure the plans are consistent with other organisational activities, councils will also need to embed community adaptive pathways

Current responses to coastal erosion and inundation by councils are guided by the New Zealand Coastal Policy Statement 2010, which states a preference for nature-based solutions. Private landowners are responsible for building and maintaining coastal protection for their individual properties, which can give rise to a patchwork of consented and unconsented coastal management approaches. Sea walls are generally only constructed by councils where infrastructure is at risk from coastal erosion, although there are situations where councils have constructed coastal protection on behalf of private landowners. Beach nourishment has been undertaken at a small number of sites, including recent work at Matapouri. Nature-based solutions, such as the Northland Regional Council's CoastCare coastal restoration programme, can help reduce the immediate risk of coastal erosion while providing additional biodiversity benefits.

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

There is an opportunity to develop an integrated approach to coastal management to ensure the long-term success of coastal adaptation responses. If we improve knowledge of coastal hazards and processes, particularly in complex systems like estuaries and agricultural drainage areas, we will improve our ability to understand and plan for future coastal impacts.

Working with coastal communities to plan how to reduce the risks posed by climate change is an emerging role for local government. The ways the councils work with communities, tangata whenua and key stakeholders to develop community adaptation plans will evolve. Community coastal adaptation plans are flexible plans that outline short-, medium-, and long-term actions and transitional pathways for the coastal community area. An adaptive pathways approach, similar to the 'dynamic adaptive policy pathways' (DAPP) process suggested in government guidance³³, is our preferred engagement, decision-making and planning approach. The programme of region-wide coastal adaptation planning is included in priority actions 29 and 30.

Priority actions #29 & #30

29 Coastal adaptation programme

Aim: Develop a programme of coastal adaptation planning projects aligned with community needs.

Description: Develop a region-wide coastal adaptation programme, identifying key locations, timeframes and engagement methodologies, using recommended considerations in *Coastal Community Profiles* and *Adaptation Engagement Framework* reports.

30 Coastal adaptation planning projects

Aim: Enable flexible, planned adaptation responses to coastal hazards by co-developing adaptation plans with communities.

Description: Deliver projects in the coastal adaptation programme. Undertake community pre-engagement to confirm site selection and appropriate engagement methodology. Work alongside communities to understand, plan and implement adaptation responses by co-developing community adaptation plans in at-risk areas, following the recommendations in *Coastal Community Profiles* and *Adaptation Engagement Framework* reports.

The resulting community adaptation plans will need to integrate with council processes and the regulatory environment. Implementation of these plans may challenge existing council processes. Councils will need to assess integration issues when the adaptation actions are identified, and the preferred pathways are decided. For example, some adaptation actions may require rules and policies to enable land-use planning changes or to provide for or change infrastructure. Where climate change risks require changes to operational council activities (such as infrastructure plans or environmental management programmes) the implementation of adaptation

³³ Ministry for the Environment (2017) <https://environment.govt.nz/publications/coastal-hazards-and-climate-change-guidance-for-local-government/>

plans will need to be embedded in each council's Long-Term Plan funding models, financial and infrastructure strategies, and work programmes.

4. Water availability

WHAT ARE THE KEY ISSUES?

Climate projections indicate that periods of low rainfall combined with high temperatures and evapotranspiration rates³⁴ are likely to result in droughts of increasing regularity and severity in Northland. Reductions in spring and winter rain are also likely to impact communities and the primary sector.

Fifty per cent of Northlanders are not connected to a municipal water supply (in the Kaipara this is closer to 70%, and in the Far North this is around 65%). Many homes and marae also have outdated or poorly functioning water collection, storage, and treatment facilities. Some council water supply networks are vulnerable to extended dry periods, especially those that rely on run-of-river sources or shallow bores. Climate change-related reductions in the reliability of summer rainfall will impact the already limited water resilience of affected properties. Increased volumes of rain falling during high-intensity weather events will also make it more difficult to catch and store water offline, as a larger holding capacity will be required. Heavy rainfall can create sedimentation and erosion issues, impacting on the quality for both rural and town water supplies.

Surface water and groundwater extraction is already highly- or over-allocated in several catchments, with little head room for increased water takes by the primary sector or by industry. Competing interests for water, such as new horticulture, alongside new minimum environmental flow requirements and allocation limits, mean that opportunities to extract freshwater from natural systems for use by the primary sector and by industry will become increasingly limited. Some groundwater supplies, such as the Aupōuri aquifer, are now supplying large quantities of bore water for horticulture crops – the science to support allocation of water from such sources can be very complex and this is compounded by the uncertainty around future effects of climate change.

In many coastal communities water is supplied via rainwater tanks with back-up bores which are reliant on shallow aquifers over summer. The impact of over-extraction during dry periods already creates significant salinity issues in shallow bores. With drier conditions and increased demand, water availability limits are likely to be reached more often. This effect also applies in places where irrigation is affected by groundwater salinity.

WHAT ARE THE CURRENT RESPONSES?

Water flow monitoring is conducted across the region as part of resource consent and state of the environment monitoring. Drought forecasting models have been developed to help predict drought in the near-term. As an emergency response, civil defence teams may provide backup water supplies in the event of droughts. Iwi and hapū networks have provided essential services by supplying emergency water to outlying communities.

District councils are responsible for the provision of drinking water to communities. Town water supplies have varying levels of reliability under drought conditions. Some supplies, such as Whangārei, have large storage facilities, dedicated catchments and plans in place for alternative supply options. However, other town supplies which rely on river takes or bores experience water shortages more regularly under drought conditions. While

³⁴ Evapotranspiration is the process where water held in the soil is gradually released to the atmosphere through a combination of direct evaporation and transpiration from plants (NIWA, <https://niwa.co.nz/climate/information-and-resources/drought/charts>).

the Three Waters Reform process will significantly change the management arrangements for water supply (and wastewater), the risk of prolonged drought conditions under climate change scenarios is unresolved.

Building long-term water resilience for communities outside areas with council water supplies has been largely uncoordinated. Numerous government agencies provide funding assistance, including the Ministry of Business Innovation and Employment (MBIE), the Ministry for Primary Industries (MPI) and the Department of Internal Affairs (DIA), as well as philanthropic trusts. Many of these agencies assist with funding for improved water collection, storage and treatment facilities at the household or marae scale. Northland Regional Council has allocated funding to help improve water resilience at the household level by funding improvements to private water collection, storage and treatment. More must be done. A government-funded programme is also operating that will see the construction of at least two large reservoirs to enable irrigation for horticultural use.

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

There is an opportunity to support early drought responses and long-term water resilience by providing better information, and through the use of models such as drought forecasting. We could include research on the interaction between population growth, water extraction demand, groundwater recharge, and sea level rise to improve understanding of water availability in coastal townships and agricultural regions. Ongoing investments in infrastructure to improve the reliability of town water supplies will be necessary to mitigate drought risk. In addition, demand reduction measures, including community education, are likely to be required.



Drought, Takou Bay area

It is a priority to assist rural communities and marae to establish water resilient infrastructure. Existing efforts to enable appropriate and equitable water supply solutions will be more effective with better coordination of multiple funding sources. These actions relate to priority actions 23, 35 and 36.

Priority actions #23, #35 & #36

23 Community drought adaptation opportunities

Aim: 1) Improve understanding of the impacts of drought on rural and community water supplies, and 2) identify opportunities to support community adaptation to drought.

Description: Collate data on drought vulnerability, and develop community vulnerability assessments. (N.B. The responsibility for this item may be impacted by the Three Waters Reform process.) Investigate priority hapū and community needs and existing adaptation/water resilience programmes/actions; and clarify opportunities for the Councils to add value in facilitating adaptation planning.

35 Water tank assistance

Aim: Improve community water resilience through water tank programmes.

Description: Provide assistance to communities to install water collection, storage and treatment with a focus on community resilience, e.g. NRC's water tank programme.

36 Water resilience funding coordination

Aim: Improve coordination between agencies/organisations to improve water resilience outcomes.

Description: Improve coordination between agencies to build collaborative, aligned water resilience responses including: tangata whenua, CDEM, District Councils (Four Waters Advisory Group), and agencies (FENZ, MPI, TPK, DIA).

Councils may be able to assist primary producers through water supply. Potentially, they can support research and provide advice on alternative, drought-resilient crops and livestock, and on incorporating alternative irrigation designs and additional supportive land-use practices. This support could involve targeted engagement and seeking external funding with farming communities and primary industries stakeholders to identify opportunities. Kaipara District Council's Kaipara Kai and Kaipara Water projects (resourced by MBIE's Provincial Growth Fund) are examples of these opportunities in action.

If rural fires become more commonplace, it is likely that increased volumes of dedicated firefighting water storage will be needed on rural properties.

5. Natural hazards

WHAT ARE THE KEY ISSUES?

Flooding due to heavy rain is one of the region's most commonly experienced natural disasters. Climate change projections indicate that heavy rain events are likely to become more frequent and intense, potentially resulting in increased damage to homes, properties and livelihoods. Flood management infrastructure is largely managed by the councils, including urban stormwater systems, river flood protection works such as stopbanks and spillways, and agricultural flood management schemes. All of these services will be impacted by increases in heavy rainfall events, effectively reducing the levels of service provided, and requiring further investment in risk management responses.

Sea level rise will also exacerbate river flooding in coastal communities, and future coastal protection works may create drainage problems behind coastal structures. Other hazards that may be influenced by climate change, that we have very little information for, include extreme windstorms and tornados, geotechnical stability and slips, and wildfire.

Landslides and slips regularly have major impacts on regional transport routes, with a number of key state highways cut due to slips in recent years (e.g. Mangamuka Gorge and Kawakawa). Projected higher intensity rainfall is likely to result in higher likelihoods of geotechnical failures, as were seen following the July 2020 floods across Northland.

While few serious wildfires have impacted Northland in recent years, future climate projections show an increased likelihood of fire weather due to the combination of prolonged drought, extended high temperatures and heatwaves, high pressure systems and strong winds. Northland's exposure to risk from wildfires may be increasing due to the expansion in fire-prone land-uses such as exotic forestry, alongside urban expansion into at-risk areas.

WHAT ARE THE CURRENT RESPONSES?

Flood risk has been modelled and mapped across the entire region using new LiDAR data. This can be used to understand risk, help prioritise work programmes, and inform land-use planning rules. Local flood models are being developed to inform stormwater planning and long-term adaptation infrastructure, such as the Whangārei Blue/Green Network Strategy. Flood warnings are informed by river monitoring data and flood models, with emergency responses coordinated by civil defence teams.

The district councils manage urban and road flooding through the provision of stormwater infrastructure. When planning and designing new or replacement infrastructure, design specifications need to factor in the climate change projections for rainfall and sea level rise. However, additional solutions to address shortfalls in existing infrastructure will be required if climate projections are realised.

A large flood management programme will increase flood protection for priority at-risk townships including Kaitāia, Ōtiria/Moerewa, Kawakawa, Kāeo and Whangārei. The programme involves community consultation,

and the planning, designing, and construction of river management structures such as stopbanks, flood walls and spillways.

Priority actions #18 & #19

18 River flood risk assessment

Aim: Improve understanding of river flood risk under climate change and plan future river flood management programmes.

Description: Undertake risk assessments for communities exposed to flooding using region-wide flood model projections, and use this information to prioritise future flood management programmes. Ensure all river flood models include consistent climate change factors, including rainfall intensity and sea level rise.

19 Coastal hazards

Aim: Improve understanding of coastal hazards under climate change scenarios.

Description: Continue to improve coastal hazards assessments, including methods for understanding impacts, considering the combination of river and coastal flooding, sea level rise and ex-tropical cyclones, and coastal erosion.

The Northland Transport Alliance is working on a transport resilience project to identify key sections of the roading network at risk from slips and landslides. This will inform forward work programmes to reduce risk at sites across the region.

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

Using risk assessments to better understand flood risk to communities across the region will help the councils to plan future work programmes for river flood management. We also need to better understand the interaction of river and coastal flooding in estuaries to anticipate the potential impacts of ex-tropical cyclones (priority actions 18 and 19).

There are opportunities to reduce exposure to flood risk by adopting different approaches, such as ‘making room for the river’ and ensuring floodplains are free from inappropriate urban development. In some areas, investment in river management infrastructure will be required to reduce flood risk to existing communities (priority action 33). For large urban areas such as Whangārei, a multi-hazard, strategic approach will be required to address coastal inundation and river flooding concurrently. This might be achieved by working together to implement the Blue-Green Network Strategy (see priority action 34).

Priority actions #33 & #34

33 River flood management

Aim: Reduce flooding risk to communities through river management.

Description: Continue to deliver prioritised river flood management projects, and plan and secure funding for future flood management implementation across the region.

34 Coordinated flood risk management

Aim: Improve coordination between the District and Regional Councils in pluvial and fluvial flood management.

Description: Work together to promote projects with multiple partners and co-benefits (e.g. the Blue-Green Network involving WDC and NRC).

We can improve our ability to reduce risks and improve community resilience by building a more comprehensive database of hazards (e.g. landslides and wildfires) under climate change scenarios (priority actions 20 and 21). We can use downscaled national models (such as the Crown Research Institute Scion's assessment of wildfire risk under climate change scenarios) to enable more detailed assessment of potential exposure and key sites of concern. This can support setting of informed policy (e.g. vegetation setbacks, fire-fighting access, and water storage on properties) alongside emergency preparedness and planning with Fire and Emergency New Zealand. Close work with civil defence teams can also help bridge the gap between forward adaptation planning and hazard event responses (priority action 31).



We will work with Fire and Emergency New Zealand to manage increased wildfire risk.

Priority actions #20, #21 & #31

20 Land hazard data

Aim: Improve understanding of land hazards under climate change scenarios.

Description: Collate existing information on geotechnical instability and slips in a common spatial database; and look for research partnerships (e.g. GNS, Waka Kotahi, NTA) to further develop information and data.

21 Wildfire hazard data

Aim: Improve understanding of wildfire risk under climate change scenarios.

Description: Collate information on projected fire hazards and at-risk landscape information into a common spatial database; and look for research partnerships (e.g. FENZ, Scion) to further develop information and data.

31 Civil defence

Aim: Integrate civil defence and community adaptation planning objectives.

Description: Ensure alignment of civil defence response plans, climate risk assessments and adaptation planning.

6. Ecosystems and biosecurity

WHAT ARE THE KEY ISSUES?

It is expected that a shift towards a more extreme, hotter climate will bring profound and lasting changes to the ecological composition and character of Northland's natural environment. Northland's indigenous ecosystems have not evolved to cope with projected environmental changes such as extreme heat, drought, and wildfire. The resulting impacts on endemic temperature-sensitive species, such as altitude-limited plants and animals, may result in localised extinctions in the absence of human intervention. The rate of change also means species have limited ability to adapt, migrate or evolve response mechanisms.

Past environmental degradation worsens the impacts of these changes. The resilience and mauri of the indigenous ecosystems has deteriorated for generations due to wetland and swamp drainage, deforestation and vegetation clearance, intensifying coastal development and invasive species damage.

In 2020, the Department of Conservation released a five-year Climate Change Adaptation Action Plan³⁵, alongside a supporting science plan³⁶. The science plan notes the paucity of data to assist understanding and

³⁵ <https://www.doc.govt.nz/our-work/climate-change-and-conservation/adapting-to-climate-change/>

³⁶ <https://www.doc.govt.nz/globalassets/documents/our-work/climate-change/climate-change-adaptation-science-plan.pdf>

planning for climate impacts on natural heritage: “There are significant gaps in knowledge that limit our ability to both adapt our management and understand how climate change will affect the resources we manage. This is both in terms of current state, but also future risk. Amongst other effects, this includes how climate change will alter native species distributions, timing of phenology, prevalence and distribution of animal and plant pests...”.

Specific impacts of climate change on ecosystems in Northland are not well documented in the scientific literature. The resulting scientific uncertainty makes it difficult to prioritise adaptation responses such as monitoring, pest control and conservation interventions, given the burden of existing biosecurity and conservation threats and the limited resources available. While there is an urgent need to protect and restore remaining habitat, there is a corresponding need to be aware of future threats. We must prioritise our efforts to ensure future risks are managed alongside current issues.

Other relevant policies and plans addressing the impacts of climate change on ecosystems and biodiversity include the upcoming National Policy Statement on Indigenous Biodiversity, and the New Zealand Biodiversity Strategy Te Mana o te Taiao (2020)³⁷. The latter includes actions to ensure that potential impacts from climate change have been integrated into ecosystem and species management plans and strategies. It also calls for improved understanding of the potential for carbon storage from the restoration of indigenous ecosystems. While the Department of Conservation (DoC) has a central role to play, regional councils will have an important function to implement and monitor actions, particularly for ecosystems that fall outside the national conservation estate. Northland councils will also need to improve understanding and set strategic direction around support for ecosystem restoration under their respective emissions mitigation and carbon sequestration targets and work programmes.

Biosecurity

Being at the northern tip of an island nation means many species of indigenous flora and fauna are likely to migrate southwards to cooler climates, leaving voids that may be filled by exotic invasive species. These pests are likely to expand via new overseas introductions and the expansion of existing ranges. Impacts may include terrestrial (e.g. heat- and drought-tolerant invasive plants, insects and other animals, and pathogens), aquatic (e.g. aquatic weeds, parasites of native fish) and coastal/marine ecosystems (e.g. invasive crustacea and smothering algae). Climate-induced reduction in species resilience may also see a rise in the impacts of plant and animal pathogens, parasites, and insect infestations.

Coastal

Northland's coastal ecosystems are unique in the country. They are sensitive to climate impacts such as atmospheric and marine heatwaves, disturbance events from coastal storms and rising sea levels. Intertidal species have been shown to suffer high mortality in heatwaves, such as the massive shellfish die-offs seen in recent summers. These events are projected to increase in frequency. Marine heatwaves are likely to have significant impacts on near-shore habitats such as coral reefs and macroalgal communities.

Open coast areas are likely to suffer increased storm damage. This is already an issue for vulnerable ground-nesting birds such as fairy terns. Northland also hosts important migratory bird nesting sites including the sandy Eastern beaches and numerous estuarine and harbour environments, including the Kaipara and Rangaunu harbours. These coastal floodplains are likely to see a gradual change in vegetation and ecology due to sea level

³⁷ doc.govt.nz/nature/biodiversity/aotearoa-new-zealand-biodiversity-strategy/

rise, affecting available habitat for birds such as the Australasian bittern. Higher rates of sedimentation due to higher intensity rain events will impact estuarine and near-coast habitats, as well as freshwater systems.

Coastal squeeze is a real issue for Northland's coastal habitats. In many cases the need for ecological communities to migrate landward due to sea level rise may be restricted by existing land uses and coastal stopbanks. It is likely that the construction of new coastal protection structures and floodgates will further prevent re-establishment of coastal ecosystems such as mangroves, saltmarsh and tidal habitats, including inanga spawning sites on private land. Many of these ecosystems play critical roles as habitats and are important carbon sinks.

Freshwater

Northland freshwater ecosystems are extremely sensitive to climate change, given the current state of water quality and ecological health. Freshwater and riparian habitats are already extensively degraded, with water extraction during dry periods, eutrophication, high summer temperatures and high sediment loads currently affecting ecological communities. These impacts are expected to worsen given projected increases in mean temperatures, the frequency of heatwaves, and extended dry periods. Stratification³⁸ of water bodies can lead to extreme oxygen cycles, which can lead to ecological shifts from macrophyte to cyanobacterial/algal dominated communities. This is made worse by eutrophication caused by runoff from surrounding land use, impacting a wider range of ecological communities. More high intensity rainfall events could also worsen the impacts of sedimentation, which is already one of the region's most serious water quality issues.

Wetland habitats in Northland are adapted to periodic dry conditions. However, the increasing frequency and severity of drought is likely to place additional pressures on species which require permanent moisture. Wetland habitats are currently restricted by existing pressures from grazing and land conversion. This reduces resilience to weather events. Northland's diverse dune lakes are also threatened, and many of these host rare species which are especially vulnerable to changes in temperature and rainfall patterns.

Forests

New climatic conditions are likely to have significant impacts on forest ecosystems, including taonga species like kauri. The impacts of drought have been documented to affect kiwi food foraging and kauri snail mortality. However, measures to improve the resilience of native forests through control of browsing pests are reported to reduce the impact of drought on vegetation. This results in better food access for kiwi than in forests with higher pest loads.

The southwards migration of many indigenous forest species due to gradual mean temperature rise is likely to occur. This will lead to changes in ecosystem dynamics and open the way for a shift in ecological composition, favouring exotic and invasive species. Vegetation communities limited to higher altitudes may face localised extinction due to the limited availability of cool mountain climates to migrate toward.

³⁸ When water bodies, such as lakes, 'divide' into different layers of density due to differing temperatures.

Disturbance events through wildfire and severe windstorms may accelerate the shift in forest community composition, with fast-growing warm-adapted exotic species potentially dominating. An increase in extended dry periods and wildfires is also likely to impact the distribution of species and may ultimately affect the composition of vegetation communities.

Creating resilient Kiwi habitat through pest control

A Whangārei Heads biosecurity programme helped create a positive outcome for its resident kiwis. During the 2020 drought, when many kiwi populations elsewhere in Northland were suffering due to poor foraging conditions, kiwi in a Whangārei Heads reserve showed improved foraging and access to water. This shows that improving the resilience of our forests through pest control will provide direct, positive benefits for native fauna.

WHAT ARE THE CURRENT RESPONSES?

Councils already face huge challenges managing and monitoring existing pressures on ecosystems. There is a need to provide better resourcing to investigate, plan for, and deliver programmes to address climate impacts on the environment.

While climate change risks to the natural environment are acknowledged as being regionally significant, little is known of the detailed impacts on specific habitats and ecosystems. This knowledge gap means we do not have pre-emptive monitoring programmes in place to assess ongoing changes due to climate impacts. Nonetheless, existing environmental monitoring programmes such as state of the environment reporting, targeted monitoring of water quality, flow regimes in rivers and aquifers, and assessments of wetlands and coastal habitats all provide important data to assess long-term trends.

Northland has a well-established biosecurity programme that monitors and responds to ongoing threats. However, little is known of potential biosecurity risks under future climate change scenarios for terrestrial, freshwater or marine environments. In some open ecosystems such as marine environments, border controls are difficult or impossible to impose, making monitoring and control challenging.

Existing regional and district planning aims to reduce further environmental degradation and ensure the gradual restoration of natural values. However, the current planning structure does not effectively address the threats to natural values due to climate change.

WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

Investigations and research will improve the baseline understanding of climate change risks to the natural environment and ecosystems. This will reduce uncertainty and assist the councils in prioritising at-risk species and developing intervention plans. Possible investigations include the identification of potential biosecurity threats, hotspots and key indicator species. This would enable the development of targeted monitoring and early interventions (priority action 16). Investigations are required to identify at-risk species and ecosystems to help develop monitoring and response plans across a wide range of ecosystems (priority action 17). Modelling of potential impacts on the ecological parameters of at-risk species is needed to understand which species are likely to face increasing threats due to climate change. This would enable the councils to build ecological resilience and protect and establish refuge locations which will be critical to threatened species. In extreme cases in the future, it may be necessary to translocate species and establish genetically viable populations in southern locations.

Priority actions #16 & #17

16 Biosecurity risk assessment

Aim: Improve understanding of climate change-driven biosecurity threats and develop monitoring and response programmes.

Description: Undertake preliminary high-level investigations into future biosecurity threats (both sleeper and offshore), aligned with national research programmes and information from agencies (e.g. MPI and MoH). The scope may include: human pathogens, primary industry pests and pathogens (agriculture, horticulture and aquaculture) and environmental pests (freshwater, terrestrial and marine). Develop prioritised monitoring and response programmes for relevant target species.

17 Ecosystem and biodiversity risk assessment

Aim: Improve understanding of climate change impacts on biodiversity and ecosystem function and develop monitoring and response programmes.

Description: Undertake preliminary high-level investigations identifying major at-risk species and ecosystems, followed by targeted research into key ecosystems. Develop monitoring and response plans for key species, habitats and ecosystems, including wetland/peat, terrestrial, marine, freshwater, lakes, coastal dunes, and foreshore and estuarine ecosystems.

Increased use of nature-based solutions to address coastal erosion is an example in which ecological and aesthetic co-benefits can occur while achieving short and medium-term hazard mitigation. The existing Northland Regional Council CoastCare programme supports communities to undertake dune restoration in places subject to coastal erosion, while protecting the nesting habitat of migratory birds. Alignment of these projects with adaptation plans using recent coastal erosion data would help improve adaptation outcomes (priority action 32).

Better understanding of potential species migration requirements would assist planning of landscape-scale management such as establishing habitat corridors. Improved use of spatial planning tools may assist with the development of planning rules to build the resilience of natural systems; for example, land-use rules to maintain viable populations of saltmarsh habitat where this is threatened by coastal squeeze (see priority action 26).

Priority actions #26 & #32

26 Spatial planning

Aim: Embed climate change risks and adaptation planning into strategic spatial plans.

Description: Undertake region-wide spatial planning to highlight risks and opportunities for strategic land-use planning that enables adaptation responses and enhances wellbeing. (N.B. RMA reforms will impact this item and review may be required.)

32 Nature-based solutions

Aim: Promote nature-based solutions as interim hazard-reduction options for coastal impacts.

Description: Continue to support community dune restoration and enhancement projects such as the Coast Care programme in line with regional adaptation planning, and as alternative interim measures in place of hard protection structures.

The carbon-storage function of coastal blue carbon ecosystems (mangroves, saltmarsh and seagrass) also needs to be considered, with the potential for habitat expansion and restoration to be funded through carbon credits (Northland Regional Council has an action to investigate this in its climate change strategy).

Northland councils can develop clear policy on how to account for the carbon-storage and offset potential of ecosystem restoration activities to guide decision-making and encourage nature-based solutions. Where coastal stopbanks impede the landward migration of coastal habitat, infrastructure adaptation planning should consider habitat and carbon storage values in options assessments.

7. Public infrastructure

WHAT ARE THE KEY ISSUES?

Public infrastructure managed by the councils provides many of the basic functions that enable our communities to function. It includes a wide range of built assets such as: stormwater, wastewater and water supply (e.g. reticulation, storage, pump stations, treatment plants, devices and ponds); roads, culverts and bridges; flood management schemes and assets; agricultural drainage schemes; and coastal management structures. Other associated 'natural assets' include open drains, waterways, buffering, receiving environments and protective reserves. Non-council-owned infrastructure such as electricity distribution and supply networks form an essential part of the supply chain for some council assets such as pump stations and wastewater treatment plants.

Significant climate change hazards and stressors which are likely to impact infrastructure include: increased rainfall intensity, higher temperatures/heatwaves, permanent tidal inundation and groundwater salinity due to sea level rise, coastal erosion, coastal flooding, severe windstorms, and increased drought frequency and severity. Impacts can also compound across hazards and infrastructure types, creating further unexpected issues. An example of this is the impact of high sedimentation on water treatment plants due to high intensity rainfall after drought.

The level of the councils' understanding of climate change impacts on infrastructure varies between infrastructure types and hazards. There are many opportunities for improvement. In some cases there is good information on climate hazards, but the consequences are poorly understood (e.g. the impact of higher tides with sea level rise on stormwater drainage). Where there is uncertainty in the hazard data (e.g. the relationship between increased rainfall intensity and the geotechnical stability of roads) understanding is further limited.

Requirements for infrastructure upgrades to address climate change projections can be difficult to calculate given the high levels of uncertainty. This makes it difficult to develop cost projections. Balancing future planning requirements against the need to maintain current levels of service and replace aging infrastructure can be challenging in the absence of adequate climate risk information and planning tools.

Key risks for some major infrastructure groups are described below.

Water supply

Northland traditionally has a high mean annual rainfall spread over the entire year with a peak in winter, which allows urban water supplies to rely on consistent rainfall to maintain dam storage and extraction from river flows. Under climate projections, seasonal variations and increases in the frequency and severity of drought conditions are expected to create issues for water supply infrastructure.

A demonstration of Northland's sensitivity to prolonged periods without significant rainfall occurred in the 2020 drought, during which all three Northland districts imposed restrictions, and emergency water provisions were required in the Far North, including in the towns of Kaitiāia and Kaikohe. Following the flooding events that broke the drought, large amounts of sediment entered water treatment plants, resulting in cuts to water supplies in some areas. Drought can also affect non-council supplies, with many households running out of tank or spring water during the 2020 drought, resulting in prolonged waiting times for rural tanker supplies. Marae and rural communities were particularly affected, and a coordinated effort was required to provide emergency water supplies to communities.

Coastal communities relying on shallow groundwater to supplement tank supply (e.g. Matapouri and Russell) have experienced saline intrusion due to high levels of extraction during low rainfall periods, and limited groundwater recharge. Sea level rise is likely to exacerbate this occurrence and could potentially render the groundwater permanently undrinkable in some areas. Continued impacts on communities without council water supplies may result in increased requirements to provide a reticulated supply, or to improve emergency supply facilities.

Wastewater, stormwater and flood management

As rainfall intensity increases with climate change, what are currently infrequent minor flooding events are projected to become more regular events. This will affect councils' ability to provide expected levels of service for stormwater and wastewater. Other impacts related to rainfall intensity include the increase in sediment entering stormwater networks, causing pipe blockages, and an increase in the frequency of stormwater ingress into wastewater pipes systems, causing overloading of networks and exceeding the capacity of treatment systems.

While climate change projections are built into specifications for new assets, the existing stock of aging infrastructure is unlikely to be able to cope with the combined pressures of climate change, population growth and urban redevelopment. Retrospective upgrades of urban wastewater and stormwater networks to meet future needs are often prohibitively expensive.



Turntable Hill flooding

Stormwater services are also impacted by sea level rise. In some Northland townships (e.g. Whangārei and Dargaville), stormwater networks are located on low-lying coastal plains, with tidal tailwater conditions restricting drainage even at current day high tides. This can result in surface flooding at high tide, causing significant damage to property, which will be worsened with sea level rise. In townships where coastal flood protection is required, investment in stormwater pumping infrastructure may be necessary to remove ponded stormwater behind stopbanks. Ongoing investment in short to medium-term adaptation solutions such as sea walls can create the risk of incentivising development in areas that face future exposure to sea level rise. This may result in higher long-term risk for communities.

Raupo land drainage scheme

Since 1905 the Raupo land drainage scheme and stopbank system in Kaipara District has managed river and coastal flooding and catchment drainage for 8,200ha of highly productive land, including the township of Ruawai and settlements of Raupo and Naumai. Once Kahikatea and Kauri forests and swampland, the majority of this land is well below sea level. The drainage scheme consists of 130 kilometres of drains, 70 kilometres of stopbanks, 52 saltwater floodgates, three flood detention dams, and one pumping station (as the system relies mostly on gravity). Management of the scheme is predominantly funded by a targeted rate for farmers and residents residing in the drainage district.

Even with the flood management and drainage system in place, coastal hazards mapping shows extreme exposure for Ruawai, Raupo and Naumai residents and for public infrastructure. A high proportion of the roading network, wastewater systems, and water reticulation systems is exposed to 50 year and 100 year coastal flooding and permanent tidal inundation. Kaipara District Council and the Ruawai community are limited in their ability to fund future costs to upgrade the stopbanks and drainage systems to continue to manage coastal flooding, river flooding and permanent tidal inundation.

Most Northland councils operate flood management and/or agricultural drainage schemes that may be affected by increased rainfall intensity and sea level rise. For example, Kaipara District Council operates and maintains 30 drainage districts. Major schemes in Northland include the Raupo land drainage scheme (Kaipara District Council), the Hikurangi flood management scheme (Whangārei District Council), and the Awanui flood protection scheme and coastal stopbanks (Northland Regional Council). The ability of these schemes to continue functioning efficiently in future climate scenarios is poorly understood. Climate change impacts will likely make overtopping events more regular, which reduces the economic value of the schemes and requires investment. Urban flood protection schemes (e.g. Whangārei, Kaitiāia and Kāeo) will also be impacted, with further infrastructure likely to be required to maintain current levels of service.

Roading

Northland's roads are already affected by hazards such as river flooding (e.g. SH1 Whakapara), slips and geotechnical instability (e.g. SH1 Mangamuka gorge), coastal erosion (e.g. SH12 Ōpononi) and frequent coastal flooding (e.g. West Coast Rd, Panguru). In some areas local roads are also affected by tidal inundation, which impedes drainage from rain events (e.g. Punuruku).

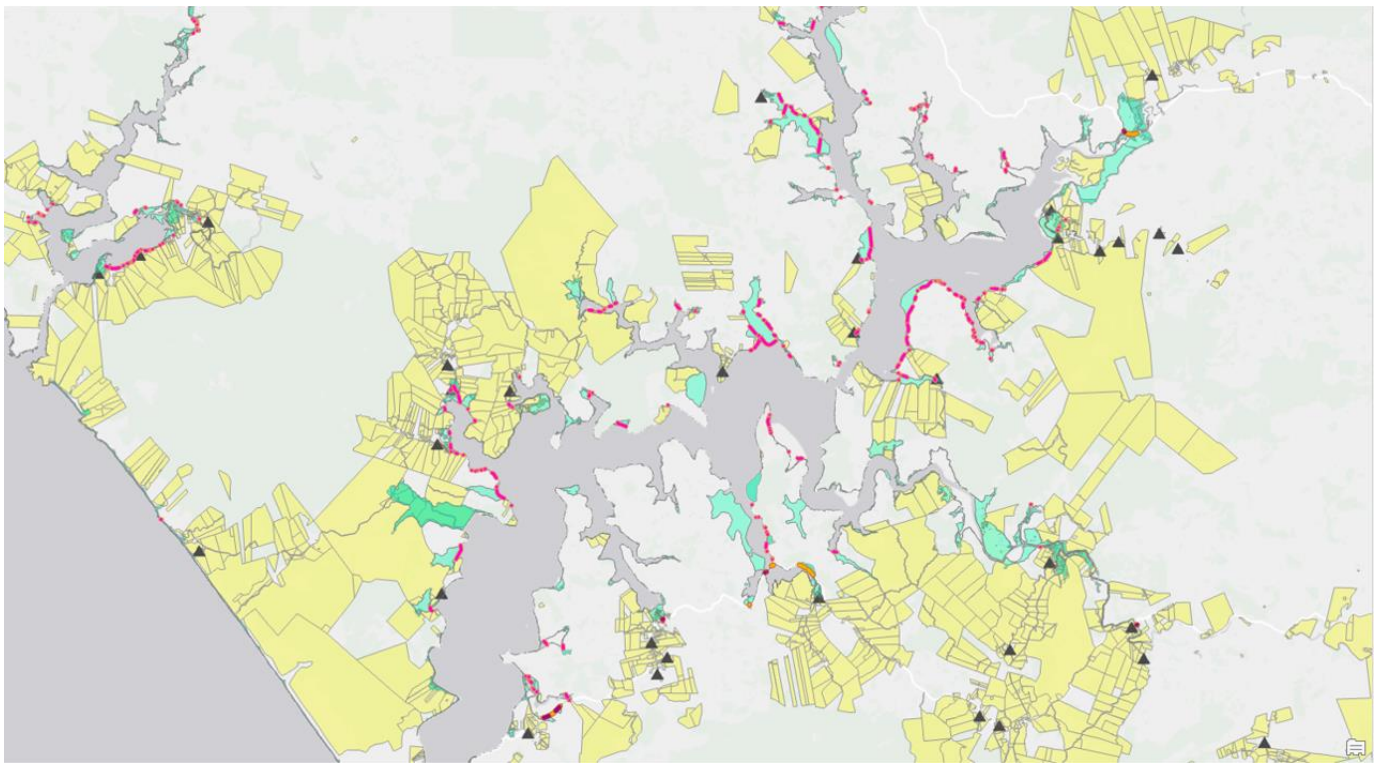
Climate projections indicate that these impacts will all increase in frequency and severity over time. A 2019 study by NIWA showed that Northland has around 10% of the total length of roads across New Zealand which are

projected to be exposed to coastal flooding under sea level rise scenarios³⁹. Analysis of existing roads in the northern Kaipara using recent modelling shows that up to 80km of roads could be inundated by regular high tides due to sea level rise by 2130. In a 100-year coastal flooding event, nearly 100km of roads are projected to be flooded to a depth of more than one metre. This indicates that interruptions to road connectivity, especially in outlying areas, are likely to become more regular and prolonged.

Mapping of permanent tidal inundation with sea level rise shows that many sections of Northland's roads will require raising or relocation. In some areas such as the Hokianga, roads are already affected by spring tides, so the projected impacts of sea level rise will affect the connectivity of communities over time. The costs of implementing effective adaptation solutions may be unaffordable for the councils, and poses a risk that these communities, which have high Māori populations, are likely to be disproportionately affected.

Waste disposal

Road inundation due to sea level rise – Hokianga



The map above shows Māori freehold land (yellow) and marae (black triangles), overlaid by projected extents of high-tide inundation by 2130 – land (green) and roads (pink/orange). Connecting infrastructure (such as roading) is likely to play a major part in climate adaptation responses for remote communities in this and similar areas.

³⁹ <https://deepsouthchallenge.co.nz/wp-content/uploads/2021/01/Exposure-to-Coastal-Flooding-Final-Report.pdf>

There are several landfill sites in Northland that may be subject to coastal or river flooding and erosion. These include both formal landfills (often operated and maintained by the councils) and informal sites (e.g. illegal or ad-hoc dumps), as well as unidentified sites. While some obvious coastal sites such as Pohe Island (Whangārei Harbour) are assessed to have a low risk, a number of historic landfills have been mapped as higher risk due to their proximity to areas prone to coastal hazards.

WHAT ARE THE CURRENT RESPONSES?

Information and planning

Detailed region-wide and catchment-specific models and information on river flooding and coastal hazards have been developed and are continually refined by Northland Regional Council. This information helps inform the specifications for new infrastructure, such as road levels and drainage requirements for subdivisions. The district councils are investing in models to help understand climate risks. For example, Whangārei District Council is developing a stormwater network model that will enable the development of engineering adaptation options. This information will aid community adaptation planning for the delivery of the Blue-Green Network Strategy, which aims to reduce river and coastal flood risk and provide transport connectivity and waterway restoration outcomes.

Councils are now using hazard information to undertake high-level climate risk assessments on infrastructure assets. The coastal adaptation programme (which is currently being developed) uses recent coastal hazard assessments to document at-risk three waters and roading infrastructure in coastal communities. The Northland Lifelines group is conducting a lifelines infrastructure risk assessment, and the Northland Transport Alliance is developing resilience assessments for roads. Nonetheless, infrastructure risk assessments in Northland largely remain at a relatively low ('risk screening') level of resolution. Mostly they do not consider multiple hazards, impacts on network connectivity, differential consequences across infrastructure types, or estimated costs of mitigation or risk management.

Risk management actions

Engineering designs for new council infrastructure generally incorporate design guidance requiring allowance for climate change, for instance stormwater drainage capacity (extreme rainfall), or tailwater levels and road surface height (sea level rise). Adaptation responses for existing infrastructure are generally limited to improvements during asset replacements and upgrades, such as bridge soffit levels.

Water supply infrastructure is in different stages of adaptation maturity. In Whangārei district, an adaptive planning approach has been taken to anticipate future drivers of demand for the city's water supplies. While this has largely been to address anticipated population growth, demand level indicators have been used to trigger different programme requirements. These include increasing efficiency of the current system, demand management, planning for future needs through engineering assessments, and obtaining resource consents for water takes and land purchases for water storage. In other areas, the focus has been on addressing immediate needs and reducing the risk of water shortages. The Three Waters Reform process should address some of the existing shortfalls in water supply infrastructure.

The region has a 30-year programme of river flood management work, focusing on priority at-risk locations (e.g. Awanui catchment/Kaitiāia, Moerewa, Kāeo and Whangārei). The programme will reduce risk for communities through the design and construction of stopbanks, spillways, benching and stream maintenance. Continuing this programme into the future is vital to reduce risks to communities at risk from flooding under climate change scenarios (priority action 33).

Priority action #33

33 River flood management

Aim: Reduce flooding risk to communities through river management.

Description: Continue to deliver prioritised river flood management projects, and plan and secure funding for future flood management implementation across the region.

Risk mitigation of coastal flooding and erosion includes the use of sea walls, rock revetments and stopbanks. In general, the councils do not build coastal protection unless council-owned assets are at risk, and the adoption of nature-based solutions, like those promoted by Northland Regional Council's CoastCare programme, are often favoured due to the many co-benefits provided. In some areas such as Ruawai and Awanui, flood management schemes originally designed for agricultural purposes protect small rural townships from regular coastal inundation, although coastal hazard assessments indicate that the level of protection will not continue with future sea level rise.



Tangowahine flooding



WHAT ARE SOME FUTURE ADAPTATION OPPORTUNITIES?

Information and planning

Infrastructure planning is a significant council responsibility that has a major role in enabling communities to adapt. It is essential that infrastructure climate response plans are developed in alignment with community needs and adaptation aspirations (priority actions 15 and 28).

Priority actions #15 & #28

15 Infrastructure planning

Aim: Ensure consideration of climate change impacts in infrastructure planning.

Description: Develop and implement processes/policy to ensure consideration of climate change impacts in infrastructure planning, activity management plans and infrastructure strategies, including a monitoring and evaluation plan. This should include consistent application of climate risk assessments and adaptive management approaches. (N.B. This should also include emissions reductions considerations – see priority actions 11 and 12.)

28 Embed community adaptation plans

Aim: Ensure community adaptation plans are embedded in regulatory instruments.

Description: Investigate and develop methodologies to embed adaptive pathways plans into planning regimes, including using environmental cues to trigger changes to planning rules. (N.B. RMA reforms will impact this item and review may be required.)

There is an opportunity for the councils to invest in regionally consistent infrastructure climate risk assessments using improved information on climate hazards and infrastructure assets. High resolution data, such as stormwater pipe invert levels, can enable the development of accurate models that inform engineering options assessments and forward planning. Good understanding of the impacts of climate change hazards and stressors on assets will help asset planners develop potential infrastructure solutions under climate change scenarios, which are aligned with community needs and other socio-economic factors (e.g. population growth).

A good first step will be to develop aligned climate risk assessments across all infrastructure departments that demonstrate expected costs and damage loss assessments (priority actions 11–14). Further investigations into the interactions of multiple hazards and stressors on infrastructure is also required.

Priority actions #11, #12, #13 & #14

11 Consistent infrastructure risk assessment criteria

- Aim:** Improve consistency and quality of climate risk assessments for council assets and infrastructure.
- Description:** Develop consistent standards and processes for undertaking risk assessments for council assets and infrastructure (e.g. agreed criteria, hazard scenarios and damage functions).

12 Infrastructure risk assessments

- Aim:** Improve knowledge of climate risk for council assets and infrastructure.
- Description:** Undertake infrastructure climate risk assessments for each council and include documented climate risks in infrastructure and financial strategies.

13 Roding risk assessments

- Aim:** Improve understanding of long-term climate risks to roading infrastructure.
- Description:** Develop a regional roading network resilience plan, assessing critical roads at risk from landslides and slips, with the potential for future assessment of flooding and coastal hazards under climate change scenarios.

14 Lifelines risk assessments

- Aim:** Improve understanding of long-term climate risks to lifelines infrastructure.
- Description:** Develop a lifelines utilities infrastructure risk assessment, working with Northland Lifelines Group members' spatial data.

Planning appropriate infrastructure to cope with climate impacts will require a focus on risk management approaches for existing infrastructure. This requires scenario planning to anticipate future needs and avoid over-investment in short-term solutions. For example, this could involve moving from a risk elimination strategy (e.g. coastal stopbanks with stormwater pumping) towards a risk acceptance and avoidance strategy (e.g. long-term changes to land use, reduced levels of service and/or managed infrastructure withdrawal). Infrastructure planning approaches should limit reactive or business-as-usual investments that ignore long-term trends due to climate change. This is particularly relevant when climate hazards are experienced as rare events, such as coastal flooding due to cyclones.

Risk management actions

Once a reasonable understanding of risks is achieved, pre-feasibility investigations for cultural, engineering, and consenting limitations, alongside cost analyses, can help inform options analyses. These can be used in community engagement for decision-making, either through a community adaptation planning process or on a project basis.

Improved funding models will help embed adaptation in infrastructure planning. These models should include the benefits of proactive risk management in business cases and allow for flexibility in timing of implementation. Improved processes for cost forecasting and inclusion in financial and infrastructure strategies will also be required. Better understanding of the risks to infrastructure will improve the councils' ability to disclose their financial risks and better consider climate change when developing funding applications and business cases (priority actions 40 and 41).

Priority actions #40 & #41

40 Climate risk disclosure

Aim: Ensure transparent monitoring and reporting of climate risks and responses.

Description: Clear disclosure and reporting of climate risks, policy maturity, and progress on response actions in alignment with the recommendations of the Taskforce on Climate-related Financial Disclosure. This may include actions such as ensuring climate change is included in council risk frameworks, financial reports and infrastructure strategies; regularly reporting to auditors; and establishing KPIs for senior managers and CEOs.

41 Climate change in business cases

Aim: Embed climate change considerations in business cases and procurement policies.

Description: Ensure disclosure of climate change risks in business cases, proposals and procurement documents, including long-term risks such as sea level rise.

Examples of future infrastructure adaptation planning projects may include the following.

Roading

- Develop options to resolve long-term permanent tidal inundation issues, including a prioritisation plan/methodology and costings for road relocation or raising.
- Complete a comprehensive coastal erosion assessment detailing required protection for hotspots, and likely impacts on cultural, community and environmental values.
- Determine requirements for bridge and culvert upgrades, considering the impact of sea-level rise on coastal floodplains.

Wastewater

- Research the impact of higher temperatures on wastewater treatment, especially open ponds (including methane emissions).
- Investigate the impacts of increases of higher intensity rainfall on network and treatment plant capacity.

Stormwater and flooding

- Develop models to show the impact of tidal inundation on drainage in urban areas.
- Improve the integration of compound coastal and river flooding data, including a worst-case cyclone flooding model.
- Undertake better modelling of increased rainfall intensity on urban stormwater networks.



Coastal slip at Kerikeri Basin, below pā site

Part 3. Enabling effective adaptation

Future directions

Responding to the impacts of climate change will affect many activities the councils carry out, so it is vital to have widespread commitment and alignment across (and between) organisations. Climate change acts as a ‘risk multiplier’ and will likely create the need for different types of adaptation responses, depending on a wide range of activities. Some responses, such as regulatory policy development and environmental management programmes, may require major changes or entirely new activities. Others, such as infrastructure planning, will need to adjust risk management settings.

We have assessed adaptation needs across council activities with the aim of prioritising adaptation actions based on a) the level of understanding of climate risk and impacts, and b) the level of responsibility for the councils to manage the risk. The assessment highlighted areas that urgently required further investigation (such as impacts on biosecurity and biodiversity, and infrastructure assessments); areas where the councils need to do planning and engagement, such as coastal adaptation planning and impacts on Māori; and areas where continued action is required, such as river flood management works.

One recurring theme in adaptation is the need to bring communities along on the journey. This is consistent with the purpose of local government. Developing good relationships and trust with communities is a necessary condition for doing adaptation planning work, particularly where the impacts on communities may be big, or perceived negatively – for example, where adaptation involves progressively restrictive planning rules, or large costs to pay for infrastructure. Using appropriate community engagement processes, as well as decision-support tools that enable community ownership of the process, can help resolve complex and controversial issues.

Working collaboratively with Māori as tangata whenua – and demonstrating the principles of partnership, participation and protection – at all stages of adaptation is vital for the councils. Co-developing holistic adaptation responses to climate change presents an opportunity for the councils to work with Māori on a broad range of environmental, social and cultural issues, across many council functions.

Four areas of action

We have identified priority actions to enable local government to carry out effective adaptation in Northland. These are grouped into four areas:

1. Grow relationships (priority actions 1–8)
2. Improve knowledge and understanding (priority actions 9–24)
3. Reduce risk and vulnerability (priority actions 25–36)
4. Build capacity (priority actions 37–46).

Recommended actions are summarised below, and are described in detail in Part 5 – ‘Priority actions’, with additional information on lead organisations, delivery timeframes and funding status.

1. Grow relationships

- Partner with tangata whenua at all stages of adaptation planning, ensuring Māori voices are included in decision-making, including supporting hapū and iwi to lead local adaptation planning.
- Facilitate collaborative planning with local communities, by developing trust and long-term relationships and by helping residents and businesses pursue opportunities for resilience.
- Communicate with communities about adaptation information and processes, and listen to their feedback, particularly from farming and coastal communities.
- Work across departments in each council to integrate climate change priorities and ensure alignment between activity areas.
- Continue to coordinate adaptation programmes between the councils and share resources.
- Work together across different levels of government, and sectors including Māori, communities, businesses and research institutes.
- Advocate and engage with central government agencies on adaptation funding, legislation, policy and support.

2. Improve knowledge and understanding

- Identify key knowledge gaps and develop targeted investigations and research.
- Expand the existing knowledge base through research, assessments and investigations.
- Work with iwi and hapū to enable Māori traditional knowledge to guide the councils' climate change approaches.
- Work with communities to understand risks and the range of potential solutions, and to pursue current and future opportunities.
- Monitor, evaluate and report on climate risks, community vulnerability and environmental indicators.
- Develop research partnerships with institutes and collaborate on externally funded research.

3. Reduce risk and vulnerability

- Pre-emptively plan adaptation responses at the local scale, working with communities, tangata whenua, infrastructure providers, government agencies and stakeholders, using appropriate engagement processes and decision-support tools.
- Use adaptation planning engagement and education processes to empower communities to proactively pursue new opportunities, increase resilience and build adaptive capacity.
- Develop rules and policies that reduce risk and enable appropriate and flexible adaptation responses.
- Plan for, and invest in, long-term risk management infrastructure and solutions for a wide range of climate risks.
- Adopt appropriate nature-based responses and interim measures.

4. Build capacity

- Demonstrate leadership through effective and collaborative governance.
- Build internal staff capacity and resources, through specialist teams and across/between organisations.
- Develop consistent climate change policy between the councils, and integrate climate change objectives across council policies, strategies and processes.
- Provide sufficient funding for adaptation activities, including investigations, planning, engagement, and implementation where appropriate.
- Identify collaborative and external funding opportunities.



Riparian planting by a dune lake

Part 4. An evolving strategy

The need to respond to change

This strategy needs to be a living document to remain flexible and responsive to new information, feedback, and changes in the legislative and legal environments, or other major events.

We acknowledge that engagement with tangata whenua and our communities will take time. As we have wider and deeper conversations with those affected by climate change, our understanding of the consequences of climate change and the challenges of adaptation will improve. Updates to the strategy and projects in Part 5 – ‘Priority actions’ will need to be made as required.

The strategy will also need to be reviewed after the release of new government legislation or guidance, such as the upcoming National Adaptation Plan and RMA reform, including the Climate Change Adaptation Act, or other major changes such as local government reform. New scientific evidence or case law may also prompt the need for a review, as might regular updates aligned with the councils’ long-term planning processes. Changes could range from minor alterations to major overhauls, and these will require different approaches.

Review process

Below we outline an ongoing process for the strategy and priority actions to be updated in response to changing needs. Reviews are grouped into three categories.

1. **Technical:** new technical reports or updates to existing reports.
2. **Minor:** operational and minor updates to the strategy and/or priority actions.
3. **Major:** substantive review and major changes to the strategy and/or priority actions.

Reviews can be triggered by different events or requests, with varying levels of permitted changes, and corresponding engagement and approval processes as needed. At a minimum, the strategy will be reviewed at three-yearly intervals prior to Long-Term Plan consultation. Other reviews will occur in response to feedback, legislative change and other events. Updates to the priority actions will be made as required. Where possible, reviews will be combined for efficiency.

Below is an anticipated timeframe for required reviews.

YEAR	TRIGGER	REVIEW TYPE
As required	New technical reports or changes to existing ones	Technical reports
As required	Updates and additions to priority actions	Minor
As required	Tangata whenua and community feedback	Minor
		Major
2022	National Adaptation Plan	Minor
2023–24 (estimated)	Climate Adaptation Act Built and Natural Environments Act Spatial Planning Act	Major
2024	Long-Term Plan review	Major
2024 (estimated)	Three Waters Reform	Major
2026	Second National Climate Change Risk Assessment	Major
(Uncertain)	Local government reform/amalgamation	Major
2027	Long-Term Plan review	Major
2028	Second National Adaptation Plan	Minor

Details of the three review types are listed in the table below.

1. Technical reports	
Intent:	Provide new technical reports or updates to existing technical reports
Triggers:	- Iwi/hapū or community feedback - Joint committee requests - Staff recommendation (e.g. new information)
Changes permitted:	- Updates as and where required - New technical reports and data
Out of scope:	Changes impacting scope, intent or direction of strategy and priority actions
Engagement required:	- Relevant tangata whenua representatives - Must be evidence based
Approval:	- Approval by relevant sponsoring GMs - Presentation to Joint Committee
2. Minor updates	
Intent:	Operational and minor updates to strategy and/or priority actions
Triggers:	- Iwi/hapū or community feedback - Joint committee requests - Staff recommendation - New or updated information (strategy) - Changes in project scope, details or timeframes, additional funding for new projects (priority actions)
Changes permitted:	- Minor editorial changes - Addition of paragraphs, sentences or other minor elements (strategy) - Alterations to details in descriptions or timeframes (priority actions) - Addition of new projects (priority actions)
Out of scope:	- Removal of actions - Alterations to structure or foundational elements
Engagement required:	Relevant tangata whenua representatives
Approval:	- Approval by relevant sponsoring GMs - Presentation to Joint Committee (approval by individual councils not required if changes are operational)
3. Major review	
Intent:	Allow for substantive review and major changes to strategy and/or priority actions
Triggers:	- Long-Term Plan process - New government legislation or guidance - New case law - Additional scientific or other evidence - Local government reform - Three Waters reform - Iwi/hapū or community feedback - Joint committee request - Staff recommendation
Changes permitted:	- Major editorial changes - Alteration to structure or foundational elements

3. Major review (cont.)	
Changes permitted contd:	Addition of new sections and headings Addition of new text, diagrams, photos Removal or alteration of existing text
Out of scope:	N/A
Engagement required:	Wide engagement with tangata whenua (initially via representative groups, but in some cases wider engagement may be required) LTP review to be completed in year prior to LTP adoption, in conjunction with community consultation Elected members of all councils Relevant council staff and management
Approval:	Approval of review process by joint committee required Approval by sponsoring GMs of all councils Endorsement by joint committee Adoption by all Northland councils All exceptions to be noted in strategy and priority actions

Reporting

Governance

Progress on priority actions will be reported at each Joint Climate Change Adaptation Committee meeting. Progress will also be reported to individual councils and committees where relevant.

Iwi and hapū

Reporting to iwi and hapū will be via existing council representative groups, unless otherwise requested. A process for iwi and hapū engagement will be developed as part of priority actions 1, 2 and 10.

Public communications

A joint regional communications group has been formed to help support the ongoing, public-facing nature of the strategy and the collaborative adaptation work programme. A communications plan for the strategy, as well as for ongoing region-wide adaptation, is being developed as part of priority actions 7 and 8.