Te Kāwanatanga o Aotearoa
New Zealand Government

Urutau, ka taurikura: Kia tū pakari a Aotearoa i ngā huringa āhuarangi

Adapt and thrive: Building a climate-resilient New Zealand

AOTEAROA NEW ZEALAND'S
FIRST NATIONAL ADAPTATION PLAN

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Message from the Minister of Climate Change

Kei te whakapōrerea kētia tātou e te huringa āhuarangi, ō tātou hāpori me tō tātou ōhanga.

Climate change is already disrupting our lives, our communities and our economy.

E ngā muka tāngata ko rangitāmirotia e te kaupapa huia kaimanawa o te rā, tēnā koutou katoa.

As I write this, record-breaking heatwaves are being experienced across Asia, Africa and Europe. A state of emergency was declared in Timaru with evacuations overnight, while torrential rain caused widespread flooding and power outages in Christchurch.

Aotearoa New Zealand has always had dramatic weather. But floods and slips such as those in Tairāwhiti, storms such as those experienced in Westport and droughts such as those experienced, well, just about everywhere are becoming both more severe and more frequent.

More lives and livelihoods are on the line. The outlook is especially troubling, considering the potential for disproportionate effects on Māori, people with disabilities, low-income families and rural communities.

So as the image of tomorrow becomes clearer and more certain, a purely reactive approach to climate impacts becomes ever less credible. Instead, we need to plan and we need to prepare. For too long we have pushed climate adaptation to the back of the cupboard. Now is the time for a real step-change in our approach. Because the sooner we start, the more effective our efforts will be.

This document is Aotearoa New Zealand's first national adaptation plan. It brings together in one place the Government's current efforts to help to build our climate resilience. And it sets out a proposed future work programme, indicating our priorities for the next six years.

The actions in this plan are intended to drive a significant, long-term shift in our policy and institutional frameworks. They will ensure climate-resilient development in the right places and support communities in considering a range of adaptation options. And they will result in better information about what our future climate will look like, enabling better decisions about our response.

Of course, we mustn't lose sight of the urgent need to lower our emissions. Because the severity with which we will experience climate change can be lessened if we do all we can to limit warming. This is the role of New Zealand's recently published first emissions reduction

plan. But we know some climate impacts are locked in. And we know those impacts will be felt differently by different people and in different regions.

Central government will not bear every risk and cost of climate change, including climate change adaptation. Risk and cost will fall across different parts of society, including asset or property owners, their insurance companies, their banks, local government and central government. The Government can choose the role it plays and how it influences the way these costs and risks fall. Care will need to be taken to manage any perverse or unintended outcomes such as moral hazard (that is, inappropriate incentives to continue developing in at-risk areas).

Climate change will be felt by us all, but how vulnerable we are and the limits to how well we adapt vary across groups and sectors in society. This plan is the first step in a long-term adaptation strategy and process. Implementing the actions in this plan will require all New Zealanders to take action.

Together we can build a climate-resilient Aotearoa New Zealand.

Hon James Shaw
Minister of Climate Change

Message from the Secretary for the Environment

Ka whakapakari ake te mahere urutaunga ā-motu i a tātou kei mua i te aroaro o ēnei wero.

Aotearoa New Zealand's first national adaptation plan will make us stronger in the face of these challenges.

This plan is a very important milestone in the journey of every New Zealander to resilience and adaptation. It sits alongside the emissions reduction plan and together they lay out Aotearoa New Zealand's overall response to climate change so that we can transition to a low-emissions, climate-resilient future.

With this plan, for the first time as a nation we can see in one place what is being done already to adapt and proposals for what to do in the future. Actions within this plan will mean all levels of government, sectors and communities and all New Zealanders better understand the top priority risks and act to address them.

In response to what we heard during consultation on the draft national adaptation plan, the plan now has a greater sense of urgency.

There was strong support for a planning and resource management system that ensures buildings, infrastructure and developments are placed in the right locations away from rising sea levels and areas of frequent flooding. Several actions to address these risks are already underway.

Reforms of the resource management, emergency management systems and wastewater, drinking water and storm water management are underway alongside a review of the future for local government.

During consultation Māori asked to participate more in developing adaptation actions. A platform is being set up so Māori can put together tangata Māori actions that are more climate friendly and resilient.

We have a clear picture of the top-priority risks from the first National Climate Change Risk Assessment released in 2020. These include risks to coastal ecosystems, community wellbeing, potable water supplies, and buildings. This plan addresses those risks. We need systems, practices and tools that are set up to consider risk and uncertainty.

New Zealanders are already feeling the impacts of climate change. These impacts affect people and communities differently because they have varying degrees of exposure, or different capacity to prepare for and respond to climate impacts. We need to understand these different vulnerabilities to enable future actions to be targeted to support those most vulnerable to the impacts of climate change.

More change will come, and impacts will increase, disrupting nature and society, affecting people's health and wellbeing and damaging livelihoods. We need to change how we do things so we can thrive in a climate that continues to change.

At the same time as adapting, reducing emissions and limiting the severity of future climate change is just as important. The national adaptation plan and the emissions reduction plan lay out Aotearoa New Zealand's overall response to climate change.

Past emissions have already changed our climate and will continue to do so in years to come. How much more change and how fast change will happen depend on every country's contribution to reduce global emissions.

We need to build on action that people are taking already. By preparing and working together, we can build an Aotearoa New Zealand that is resilient and ready to thrive in a changing climate.

Vicky Robertson
Secretary for the Environment

Executive summary

Adapt and thrive: Building a climate-resilient Aotearoa New Zealand

Aotearoa New Zealand experiences a wide range of natural hazards – from earthquakes and volcanoes to erosion, landslides and extreme weather events.

Climate change will increase the severity and frequency of some of those hazards, including flooding, heatwaves, drought and wildfire. We will also face new risks as a result of slow-onset, gradual changes such as sea-level rise, ocean warming, more hot days, and more rainfall in some parts and less in others. If the number and value of assets increases, that can also contribute to increasing risk exposure over time. These effects will impact New Zealanders in different ways – and there is a risk that some groups may be disproportionately impacted.

How much change we will see, and how fast that change will happen, is not certain. We have greater certainty about change in the medium term, but need to plan for longer time horizons. As our climate continues to change, the impacts and risks that we face will also evolve.

Changing the way we do things to emit less greenhouse gases and limit global warming is an important step towards adapting to the effects of climate change. That's why the first emissions reduction plan sets us on track towards a low-emissions, resilient economy.

But the climate has warmed by 1.1°C in the last 100 years and we are already seeing the devastating effects. We know there are uncertainties that come with our changing climate – and we have heard from New Zealanders that there's no time to waste. Taking action now will set the foundations for more climate-resilient communities and take account of climate risk in everything we do.

This document sets out Aotearoa New Zealand's long-term strategy and first national adaptation plan. The long-term strategy sets out the Government's approach to adaptation. This first national adaptation plan, and subsequent plans, will be prepared and implemented in accordance with this strategy.

The first national adaptation plan contains Government-led strategies, policies and proposals that will help New Zealanders adapt to the changing climate and its effects – so we can reduce the potential harm of climate change, as well as seize the opportunities that arise. It responds to the risks identified in the National Climate Change Risk Assessment 2020, which was prepared under the Climate Change Response Act 2002. It also draws upon the latest science from the Intergovernmental Panel on Climate Change and builds on recommendations of the Climate Change Adaptation Technical Working Group from 2018.

Adapting to the effects of climate change is a continuous process. We need to assess climate risks, plan and implement adaptation actions, then determine whether those actions were effective in reducing risks. For that reason, this plan is the first in a series of national adaptation plans that will be prepared every six years. Each plan will respond to a new national climate change risk assessment. All New Zealanders will be able to have their say on each plan.

Several actions to address these risks are already underway. The Government is reforming the resource management system, emergency management system and three waters services, and reviewing the future for local government. All these programmes of work aim to keep our systems fit for the future and responsive to the uncertainty of a changing climate.

Other major actions signalled in this plan that will support Aotearoa to build resilience and adapt to a changing climate include: a platform to work with Māori on climate actions; risk and resilience and adaptation information portals which will provide access to information; a rolling programme of targeted guidance; and a programme of work to unlock investment in climate resilience.

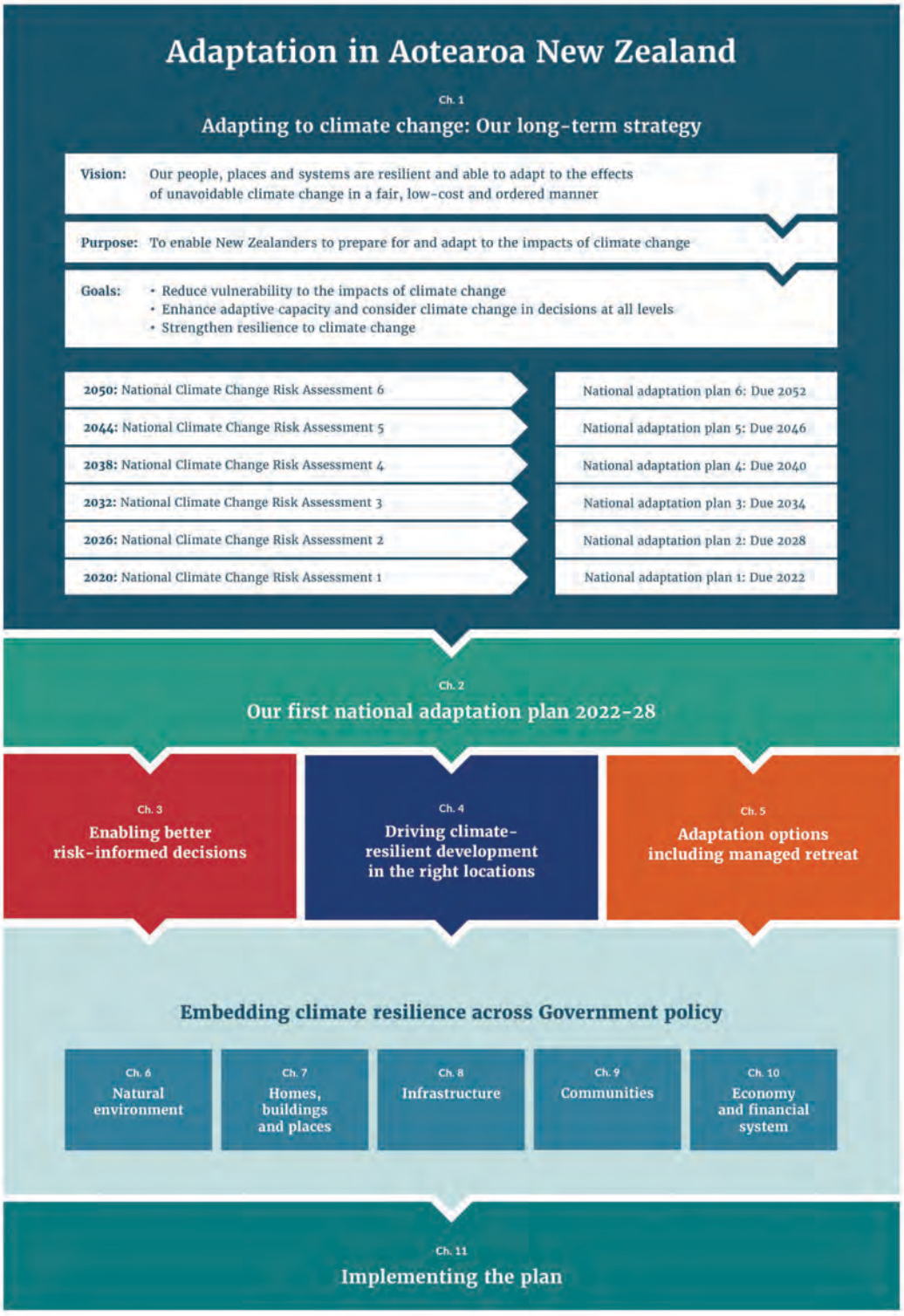
Together, the emissions reduction plan and this national adaptation plan form Aotearoa New Zealand's first comprehensive climate change mitigation and adaptation response.

This executive summary outlines:

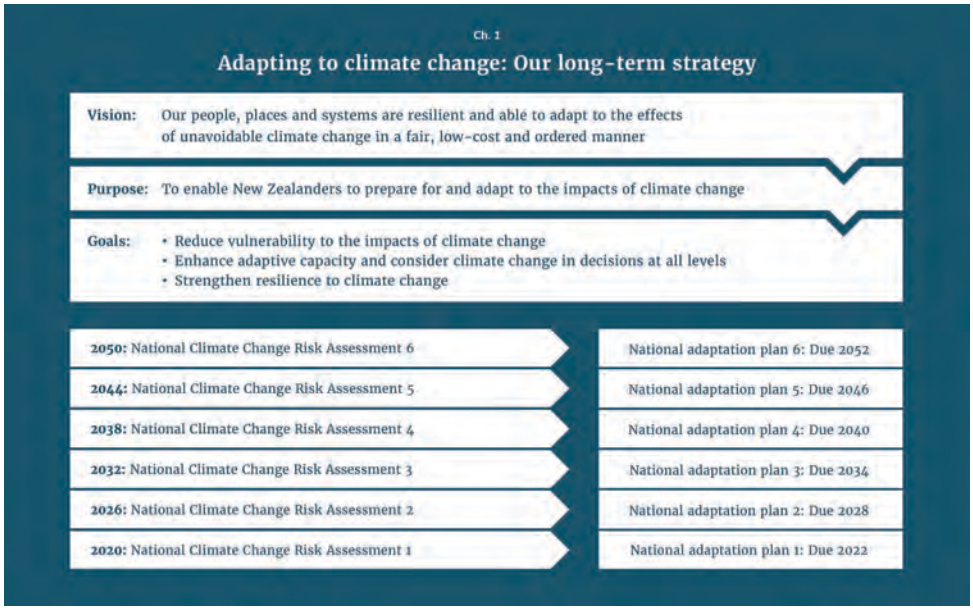
- the long-term adaptation strategy
- the priorities, objectives and outcomes for this first plan
- the actions the Government is taking over the next six years
- how the Government will implement the plan and make sure it is effective.

Below is a map outlining Aotearoa New Zealand's long-term strategy and first national adaptation plan. The map points you to the chapters of this document, where you can dive into as much or as little detail as you want.

Figure 1: Adaptation in Aotearoa New Zealand



Adapting to climate change: Our long-term strategy



In the past 100 years, our climate has warmed by 1.1°C, and in 2021 Aotearoa experienced its warmest year on record.[1] Sea-level rise is accelerating and extreme weather events – such as storms, heatwaves and heavy rainfall – are projected to become more frequent and intense.[2]

This poses a complex challenge as we must adapt to both slow-onset changes, such as rising sea levels, and increased frequency and magnitude of extreme events. The Climate Change Response Act 2002 sets out the process for assessing and understanding the risks posed by climate change, and taking action to manage these.

Changing the way we do things – so our people, natural environment, built places and systems are resilient and can adapt – is an enormous challenge. But we can meet it by working together now to understand the risks, and taking action to manage them. Alongside central government, local government, the private sector, iwi, hapū, whānau, communities and individuals all have different but complementary roles to play to build a climate-resilient Aotearoa.

Upholding the principles of Te Tiriti o Waitangi is a central aspect of the Government's long-term adaptation strategy. This means developing adaptation responses in partnership with Māori, elevating te ao Māori and mātauranga Māori in the adaptation process and empowering Māori in adaptation planning for Māori, by Māori. Māori face particular infrastructure challenges in rural and remote areas, and are vulnerable to road closures, power cuts and impacts on marae and other sites of cultural significance.

No two communities will experience climate change in the same way. Inequity arises through multiple domains including income, housing, employment and accessibility. Climate change can also increase existing inequities. Some groups may be disproportionately affected by financial impacts or lack the resources to adapt. An equitable transition is core to our

1 NIWA. 2022. *Aotearoa New Zealand Climate Summary: 2021*. Wellington.

2 Ministry for the Environment. 2018. *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*. Wellington.

adaptation strategy and national adaptation plans must support New Zealanders in ways that recognise their unique needs, values and circumstances.

The following goals underpin Aotearoa New Zealand's adaptation strategy:

- reduce vulnerability to the impacts of climate change
- enhance adaptive capacity and consider climate change in decisions at all levels
- strengthen resilience.

Read more about our strategy and the goals and principles underlying this in chapter 1: Adapting to climate change: Our long-term strategy.

Our first national adaptation plan 2022–28

This plan is the first step towards meeting the Government's long-term vision and goals for a climate-resilient Aotearoa.

The National Climate Change Risk Assessment 2020 identified 43 priority risks (see Appendix 2) that Aotearoa faces from climate change and outlines the 10 most significant risks across five domains (natural, human, economy, built and governance).

The national adaptation plan must address the most significant risks. This plan will help address all 43 risks, and the risk to the telecommunications network.

Four priorities underpin the plan:

- enabling better risk-informed decisions
- driving climate-resilient development in the right places
- laying the foundations for a range of adaptation options including managed retreat
- embedding climate resilience across government policy.

To address specific realms of risk, the plan includes actions that relate to:

- system-wide issues (SW) or
- five 'outcome areas' which broadly align with the domains identified in the risk assessment:
  - natural environment (NE)
  - homes, buildings and places (HBP)
  - infrastructure (INF)
  - communities (C)
  - economy and financial system (EF).

The Government has identified a series of objectives that drive the actions. These relate to either system-wide issues or the outcome areas above. Many actions will help us achieve more than one objective.

Actions are identified as either critical, supporting or proposed. We must start on critical actions now. Supporting actions are either less urgent, or are dependent on the critical actions.

Proposed actions are future work programmes that reflect current thinking about what will be needed in future.

Read more about the structure and objectives of this plan in chapter 2: Our first national adaptation plan 2022–28.

Enabling better risk-informed decisions

Eight critical actions will provide information, scenarios and guidance to help decision makers. Some actions apply to all New Zealanders, while others are for specific sectors and groups.

Critical actions to enable better risk-informed decisions			
Establish a platform for Māori climate action	Provide access to the latest climate projections data	Design and develop risk and resilience and climate adaptation information portals	Deliver a rolling programme of targeted adaptation guidance
Develop guidance for assessing risk and impact on physical assets and the services they provide	Raise awareness of climate hazards and how to prepare	Support high-quality implementation of climate-related disclosures and explore expansion	Improve natural hazard information on Land Information Memoranda

Read more in chapter 3: Enabling better risk-informed decisions.

Driving climate-resilient development in the right locations

Many of our communities are located in places that are likely to see the impacts of climate change increase.

Seven critical actions will ensure that our planning and infrastructure investment systems are updated now, so they guide climate-resilient development in the right locations.

Critical actions to drive climate-resilient development in the right locations			
Reform the resource management system	Reform institutional arrangements for water services	Integrate adaptation into Waka Kotahi decision-making	Integrate adaptation into Treasury decisions on infrastructure
Embed adaptation in funding models for housing and urban development, including Māori housing	Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework	Establish an initiative for resilient public housing	

Read more in chapter 4: Driving climate-resilient development in the right locations.

Adaptation options including managed retreat

Many communities are already experiencing natural hazard events such as flooding, and these are expected to increase over time.

Nine critical actions will support councils, communities, businesses and individuals to consider adaptation options available for their area, including managed retreat where necessary. Some actions apply to all New Zealanders while others are for specific sectors and groups.

Critical actions to facilitate adaptation options including managed retreat		
Pass legislation to support managed retreat	Complete case study to explore co-investment for flood resilience	Publish the programme of work on how Aotearoa meets the costs of climate change and invests in resilience
The Future for Local Government review	Scope a resilience standard or code for infrastructure	Reduce and manage the impacts of climate hazards on homes and buildings
Prioritise nature-based solutions	Support kaitiaki communities to adapt and conserve taonga/cultural assets	Develop options for home flood insurance

Read more in chapter 5: Adaptation options including managed retreat.

Embedding climate resilience across government

A priority of this plan is to embed climate resilience in all government strategies and policies.

Chapters 6–10 set out critical actions, supporting actions and future work programmes for each of the outcome areas. Below is a snapshot of critical actions that will help achieve the objectives for each of the outcome areas.

Actions critical to chapter 6: Natural environment			
Implement the Department of Conservation Climate Adaptation Action Plan	Implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy	Implement key freshwater management programmes	Engage with councils to implement the New Zealand Coastal Policy Statement
Deliver climate, biodiversity, and wider environmental outcomes	Deliver biosecurity actions to protect our indigenous ecosystems and economy from invasive species	Implement the National Policy Statement on Freshwater Management 2020	Implement the proposed National Policy Statement on Indigenous Biodiversity

Actions critical to chapter 7: Homes, buildings and places		
Reduce and manage the impacts of climate hazards on homes and buildings	Reduce the exposure of public housing tenants to climate hazards	Embed adaptation in funding models for housing and urban development, including Māori housing
Support kaitiaki communities to adapt and conserve taonga/cultural assets		

Actions critical to chapter 8: Infrastructure		
Develop guidance to support asset owners to understand and manage the risks of climate change on physical assets	Scope a resilience standard or code for infrastructure	Integrate adaptation into Treasury decisions on infrastructure
Develop and implement the Waka Kotahi Climate Adaptation Plan		

Actions critical to chapter 9: Communities		
Modernise the emergency management system	Develop the Health National Adaptation Plan	Raise awareness of climate hazards and how to prepare

Actions critical to chapter 10: Economy and financial system		
Deliver the New Zealand Freight and Supply Chain Strategy	Help financial entities to better identify and manage their climate risks and support financial stability	Strengthen the fisheries management system and support the aquaculture sector to sustainably grow
Develop options for home flood insurance	Support high-quality implementation of climate-related disclosures and explore expansion	

Implementing the plan and making sure it is effective

This plan involves many agencies, departments and ministries. Making it work requires new ways of coordinating effort across government, as well as with our Tiriti partners and with local government, the business community and civil society.

Successful implementation will involve:

- central government oversight and coordination
- indicators for assessing progress
- a research strategy to fill knowledge gaps.

A climate change interdepartmental executive board will oversee the emissions reduction plan and national adaptation plan, and report on progress. The Climate Change Response Ministers Group, chaired by the Prime Minister, will oversee the plan and drive progress.

Every two years, He Pou a Rangi – Climate Change Commission will report to the Minister of Climate Change on the implementation and effectiveness of the national adaptation plan.

CHAPTER 1:

Adapting to climate change: Our long-term strategy

Chapter 1: Adapting to climate change: Our long-term strategy

Adapting to climate change: Our long-term strategy
This chapter sets out the current and projected impacts of climate change on Aotearoa and the long-term adaptation strategy that will help New Zealanders prepare for and adapt to these impacts.
This chapter outlines: • our climate reality and why we must adapt to the impacts of climate change • the roles that central government, local government, Māori, communities and individuals, the private sector, and the research and scientific community will play in building a climate-resilient Aotearoa • how we will adapt in partnership with Māori • how our adaptation journey will be made in an equitable way • the goals for our long-term adaptation strategy, which are to: – reduce vulnerability to the impacts of climate change – enhance adaptive capacity and consider climate change in decisions at all levels – strengthen resilience.

Our climate reality

We must adapt to the impacts of climate change.

In the past 100 years, our climate has warmed by 1.1°C. Aotearoa New Zealand is experiencing more hot days and fewer cold days – 2021 was the warmest year on record, surpassing the previous record set in 2016.[1] Higher temperatures change our physical environment and weather patterns, presenting new and greater risks to the wellbeing of people and communities and their ways of life, buildings and infrastructure, our natural environment and the economy. Sea-level rise is accelerating, with an average rate of rise of 3.7 millimetres per year between 2006 and 2018[2]. By 2100, median sea-level rise in Aotearoa is projected to increase by a further 0.44 metres on average under a low-emissions scenario and 0.83 metres on average under a high-emissions scenario. Under the highest emission scenario, sea-level rise in Aotearoa is projected to increase by 1.09 metres on average.[3]

This poses a complex adaptation challenge. We must adapt to both slow-onset changes (such as rising sea levels that threaten coastal ecosystems and infrastructure) and increased frequency and magnitude of extreme events – such as coastal inundation and flooding that can damage homes, roads and other infrastructure, and affect access to coastal areas.

1 NIWA. 2022. *Aotearoa New Zealand Climate Summary: 2021*. Wellington.

2 Intergovernmental Panel on Climate Change. In press. *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge.

3 Ministry for the Environment. 2022. *Interim guidance on the use of new sea-level rise projections.* Wellington.

Projected changes and impacts on New Zealanders

Extreme weather events – such as storms, heatwaves and heavy rainfall – are likely to be more frequent and intense.[4] Tropical cyclones are likely to have increased wind intensity and rain rates, and to be stronger and cause more damage. More frequent and intense rainfall could reduce the availability of safe drinking water if treatment systems get overwhelmed, creating a significant risk to public health.

Projections show there will be fewer frost and snow days**.** Changes to the number of snow days will have significant impacts on hydrology and the seasonal cycle of snowmelt. This will affect the biodiversity of ecosystems, the energy sector and irrigation. Impacts will likely affect skiing and other snow activities, and therefore the tourism industry.

Changes in temperature and seasonality will affect agriculture and horticulture – for example, where certain crops, such as kiwifruit, can be grown. It will also change the timing of key events in the natural environment, from when plants flower to when animals migrate.

We can expect more frequent and severe droughts, particularly east of the Southern Alps / Kā Tiritiri o te Moana. That will put pressure on our freshwater resources – potentially affecting the reliable supply of drinking water, electricity generation and recreational activities like swimming and fishing. The agriculture sector will also be vulnerable to declining crop yields and pasture growth.

Projections indicate we will have stronger, northeasterly airflows in summer and stronger westerlies in winter – particularly in the south of the South Island. This will also affect rainfall patterns. Projected changes vary substantially around the country and by season. Annual increases in rainfall are projected for the west and south of Aotearoa; annual decreases are projected for the north and east.

Higher temperatures and wind speeds, and lower rainfall and relative humidity are likely to raise the risk of wildfire.[5, 6]

Figure 2 illustrates the range of changes projected as a result of climate change.

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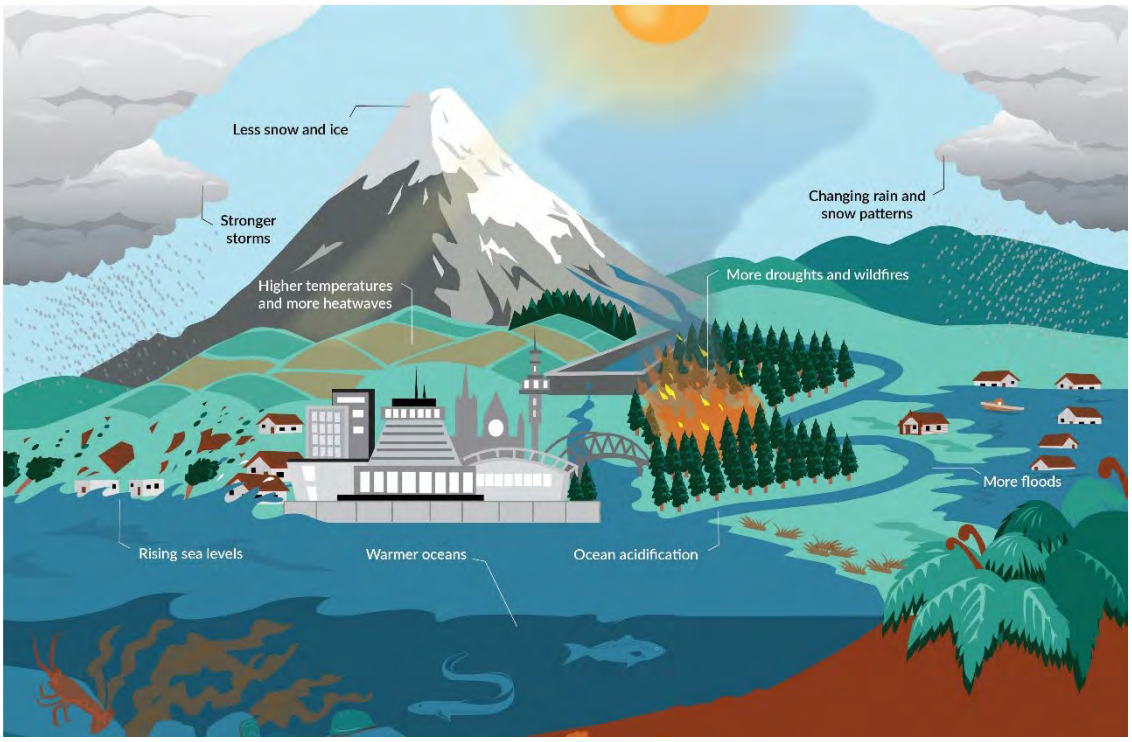
4 Ministry for the Environment. 2018. *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*. Wellington.

5 Ministry of Agriculture and Forestry. 2011. *Improved Estimates of the Effect of Climate Change on NZ Fire Danger*. Wellington.

6 Intergovernmental Panel on Climate Change. In press. *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge.

Figure 2: Projected impact of climate change on Aotearoa



The scope of these projected changes is broad. Some will increase the intensity and frequency of natural hazards that have large-scale social and financial costs. We will need to ensure our communities, homes, buildings and places are resilient enough to cope with these. Other impacts will arise from general changes in weather patterns. For example, older people may suffer heat stress from a warmer climate, farmers may need to cope with drier conditions, and warmer oceans will affect our aquaculture industry.

We therefore need to use a diverse range of climate change scenarios that cover a number of possible futures. This allows us to prudently plan for a range of outcomes, including testing worst case scenarios. A degree of uncertainty is not a reason for inaction. Limiting the level of climate warming by mitigating emissions and building resilience to climate risk is the most effective way to reduce further losses and damages from climate change.

Adaptation will bring new opportunities we must seize

Our adaptation journey will also bring new opportunities along the way.

Warmer climates and the process of adaptation could bring lower winter heating costs, increased agriculture and horticulture productivity in new places, new fisheries species, more business and employment opportunities in sustainable sectors and new tourism offerings.

Actions in chapter 10: Economy and financial system, such as action 10.3: Deliver the Aquaculture Strategy, action 10.7: Continue delivering the Sustainable Food and Fibre Futures Fund and action 10.8: Establish innovation grants, can help New Zealanders harness upsides from the transition.

Seizing those opportunities will help us adapt and build resilience in a fair, just and equitable way.

Adaptation is a process of assessing risk, planning, implementing, evaluating and adjusting

We are used to managing natural hazards in Aotearoa, but adapting to climate change requires a different approach.

Natural hazard management has tended to be static and reactive, taking past events as a proxy for their future likelihood and consequences. Climate change is exacerbating the natural hazards we typically experience – making them more frequent and severe. It is also changing weather patterns in ways that are not necessarily hazardous, but are still challenging.

We need to be proactive in building resilience to natural hazards and other climate impacts, and shape our responses in a holistic way. Climate-related risk over longer timeframes is inherently uncertain. We must be flexible, so we can change direction as new information and understanding comes to light.

Adaptation is a process (see figure 3). It is a continuous journey of making a plan to assess risks, implementing the plan, monitoring and evaluating how effective the plan is, and adjusting as necessary.

The Climate Change Response Act 2002 establishes a process for that journey.

National risk assessments

The Act requires the Climate Change Commission to prepare national climate change risk assessments every six years.[7] These will assess the risks to the economy, society, environment and ecology. They will also identify the most significant risks based on their nature, severity and the need for a coordinated response.

National adaptation plan

The next step is to prepare a national adaptation plan in response to the assessment and release a draft for consultation. Once New Zealanders have had their say on the draft plan, the plan is finalised and implemented.

Progress reports

The He Pou a Rangi – Climate Change Commission will then prepare two-yearly progress reports on how effective the plan is in reducing the risks. The Government must respond to the Commission's report within six months.

Adjustment

At this point, we have the opportunity to adjust the national adaptation plan to ensure it meets the intended outcome. We also have obligations to report internationally on our progress.

[7] The Government prepared the first national climate change risk assessment, but progress reports and subsequent risk assessments are to be prepared by He Pou a Rangi – Climate Change Commission.

Figure 3: Aotearoa New Zealand's adaptation process over time

We all have a part to play

Adaptation is a journey we will take together.

Changing the way we do things – so our people, natural environment, built places and systems are resilient and can adapt – is an enormous challenge. But we can meet it by working together now to understand the risks, and taking action to manage them.

New Zealanders know from our vast experience with natural hazards – such as flooding and earthquakes – that we all have to prepare for them. Climate change is no different, although the range of impacts is wider than an increase in hazard events. We will all feel the effects and we all have a role in building resilience.

Central government, local government, iwi, hapū, whānau, the private sector, the research and scientific community, and communities and individuals all have different but complementary roles in our risk management system (see appendix 3). Central government cannot bear all of the costs of adaptation. Risk and costs will need to be shared between asset or property owners, their insurance companies, their banks, local government and central government.

Aotearoa is a resilient and innovative country. We need to work together to understand and prepare for the changes that will affect us.

Central government

Central government will take a leadership role in partnership with local government. It can establish regulatory and institutional settings that support effective adaptation – including, for example, supporting the right development in the right place. It can facilitate the availability of information and data for good risk-informed decision-making, and set direction to support local government and communities in their planning. Central government can ensure climate policy is a whole-of-government approach, in which each department or agency plays a part.

Central government also manages the investment in and risks to its own assets and to infrastructure. These include schools, hospitals, police stations and prisons, as well as services such as conservation and biosecurity. It also cares for a significant amount of Aotearoa New Zealand's cultural heritage.

Central government funds post-disaster relief through mechanisms like the Toka Tū Ake EQC and the National Emergency Management Agency (NEMA). It also supports vulnerable individuals through the welfare system. Increased resilience across the country can help the Government manage those costs, as well as the costs of maintaining its own assets and infrastructure.

Local government

Local government is at the centre of risk management planning and response because most hazard events occur at the local or regional scale. Climate change is felt locally, so local government will maintain its central role in helping communities to understand and respond together. Many communities and sectors are already collaborating to plan for a changing climate. Councils have statutory responsibilities to avoid or mitigate natural hazards and to have regard to the effects of climate change when making certain decisions. They are also responsible for civil defence and emergency management, and improving community resilience through public education and local planning. Their functions and duties relating to natural hazards include:

- land-use planning under the Resource Management Act 1991, including national direction
- civil defence as outlined in the Civil Defence Emergency Management Act 2002 and civil defence emergency management (CDEM) group plans
- asset management based on the Soil Conservation and Rivers Control Act 1941 and councils' long-term plans and infrastructure strategies developed under the Local Government Act 2002
- building regulation based on the Building Act 2004
- disclosure of hazard information as required by the Local Government Official Information and Meetings Act 1987.

Councils also own assets, including infrastructure and forests, that are at risk from climate impacts.

Investment by local government in improved resilience can reduce the costs of new and improved infrastructure, support communities to pay rates, and reduce the likelihood of high-cost interventions such as managed retreat.

Many councils are already addressing the impacts, and proactively integrating climate risk into current and future planning.

Māori

Māori play a unique role in adaptation – as Tiriti partners, tangata whenua and kaitiaki.

Māori as tangata whenua (people of the land) and kaitiaki (guardians) of their ancestral and cultural landscape will be affected by climate change. Certain whānau, hapū and iwi will be disproportionately affected, as will Māori interests, values, practices and wellbeing.

In accordance with the principles of Te Tiriti o Waitangi, the Government and Māori will need to make decisions together in a way that balances kāwanatanga (the Government's right to govern) with rangatiratanga (the Māori right to make decisions for Māori). Mātauranga Māori (indigenous knowledge) and an indigenous worldview will provide a valuable lens for planning and considering solutions.

The platform for Māori climate action in the first national adaptation plan will be a key mechanism for empowering Māori to play a role in adaptation planning for Māori, by Māori.

Iwi across the country are also showing how we can adapt and thrive in a changing climate. In December 2021, South Taranaki iwi Ngaa Rauru Kiitahi published Ka Mate Kaainga Tahi, Ka Ora Kaainga Rua – The Ngaa Rauru Kiitahi Climate Change Strategy. The strategy outlines how the iwi will work with others in the community to better adapt to the impacts of climate change and reduce emissions. Similarly, the Te Arawa Climate Change Working group is working to protect cultural infrastructure and communities through the Te Ara ki Kōpū: Te Arawa Climate Change Strategy.

Private sector

The private sector will face adaptation challenges. Businesses will need to strengthen their resilience to climate risks, including risks to their assets. Investment in resilience can both reduce risks and create new opportunities. Direct investment in adaptation can strengthen the resilience of infrastructure, production systems and supply chains. Good risk management includes understanding and developing strategies to manage these risks. Businesses may also find economic opportunities from better managing their risks, such as benefiting from new technologies and markets.

Banks and insurers may be exposed through their mortgage portfolios and liabilities. They can encourage resilience-building actions through their advice to customers, by providing loans or build-back-better post-event payments, and by sending market signals via their lending and insurance policies.

Research and scientific community

The research and scientific community can also contribute to adaptation. Adaptation decisions at all levels must be based on the best available science. Producing that science and making it accessible to address climate risk – by reducing vulnerability, building adaptative capacity and increasing long-term resilience – is a cornerstone of advancing Aotearoa New Zealand's adaptation action. The research strategy in chapter 11: Implementing the plan provides guidance on research to help us on our adaptation journey.

Communities and individuals

Climate change is increasingly affecting daily life – for example, rising costs due to disrupted supply chains, power cuts due to extreme weather, and the need to evacuate homes due to flooding or fires. Communities and individuals need to be involved in adaptation. Good information about the risks and impacts will help them make informed choices.

Individual asset owners will need to manage risks to their own assets – reducing risk, minimising the impacts of natural hazards when they occur, and avoiding adding to risk through poor development choices.

CASE STUDY
Climate Leaders Coalition

In many areas, the private sector is already taking action to manage risks from climate change. One example is the Climate Leaders Coalition (the Coalition).

The Coalition brings together more than 100 chief executives from various industries who have committed their organisations to taking voluntary action on climate change. The Coalition's mission is to respond through collective, transparent and meaningful action. For 2022, one of the Coalition's focus areas is adaptation. This means understanding the risks businesses will face and planning for these to help build resilience.

In 2021, close to a third of the signatories assessed and disclosed their risks, and more than half are working to disclose soon. Among the signatories, 80 per cent are already considering risks in their investments and planning. The Task Force on Climate-related Financial Disclosures framework is their preferred approach to assessing risks, and more than a third are either fully or partially compliant with it (as at April 2021).

By making the consideration and management of climate risk part of their operations, as well as reducing emissions, businesses are planning now for the future.

Adapting in partnership with Māori

Upholding the principles of Te Tiriti o Waitangi is a central aspect of the Government's long-term adaptation strategy. That means the Government will develop adaptation responses in partnership with Māori – including elevating te ao Māori and mātauranga Māori in the adaptation process – and empower Māori in planning for Māori, by Māori. The platform for Māori climate action provided for in the first national adaptation plan will be central to establishing a foundation for this partnership.

Many Māori communities are located in rural and remote locations, and are particularly vulnerable to the effects of climate change on their homes, infrastructure and sites of cultural significance to Māori – including marae, urupā (burial grounds), waahi tapu (sacred sites) and mahinga kai (food gathering sites). In the Tairāwhiti rainfall event in March 2022, Anaura Bay – a coastal community with a high Māori population – was cut off due to widespread flooding and road slips. Hinetamatea marae suffered significant damage and part of the urupā was washed out to sea. Similar stories of other remote communities – in Mohaka, Raupunga, Tolaga Bay, the Waikato, and the Wairua Lagoons – of road closures, power cuts, kaimoana contamination and the potential for further displacement were told in submissions and workshops during the consultation phase of this plan.

Mātauranga Māori at a hapū and iwi level will be critical to informing local and central government climate adaptation responses.

The Government will work together with Māori to support Māori to explore adaptation options for Māori, led by Māori as part of Action 3.3 Establish a platform for Māori climate action.

The Government recognises that its Tiriti partners have a worldview that sits outside western interpretations. It has commissioned Ihirangi to provide an indigenous worldview of the national adaptation plan – which is represented by the Rauora framework – to help facilitate its work in partnership with Māori.

The Rauora framework (figure 4) is published alongside this strategy and in chapter 2: Our first national adaptation plan 2022–28. It brings together Māori values and principles into an indigenous worldview of climate change. The Rauora framework is a lens through which the adaptation strategy and national adaptation plans will be progressed.

How the Rauora framework will inform our journey will be established in partnership with Māori through the platform for Māori climate action (action 3.3). The platform is a vehicle for both mitigation and adaptation action and is therefore also a key action in the emissions reduction plan. This is consistent with the Rauora principle of interconnectedness.

The Rauora framework is also a foundation from which iwi, hapū and whānau can apply their own mātauranga-a-iwi (knowledge with an iwi-specific base).

The notion of whenua ora, tangata ora, mauri ora recognises that the land, people and associated life forces are interconnected. In this way, a well land is a well people, and so too are the life forces of these components of the world healthy. The notion of kaitiakitanga is implicit in this approach, where Māori continue to strengthen their stewardship of the environment.

The Rauora framework supports and promotes transformative approaches, resilience building and supporting measures. It elevates and celebrates the contributions indigenous values and mātauranga Māori can bring to climate action.

Figure 4: Rauora: A climate change framework

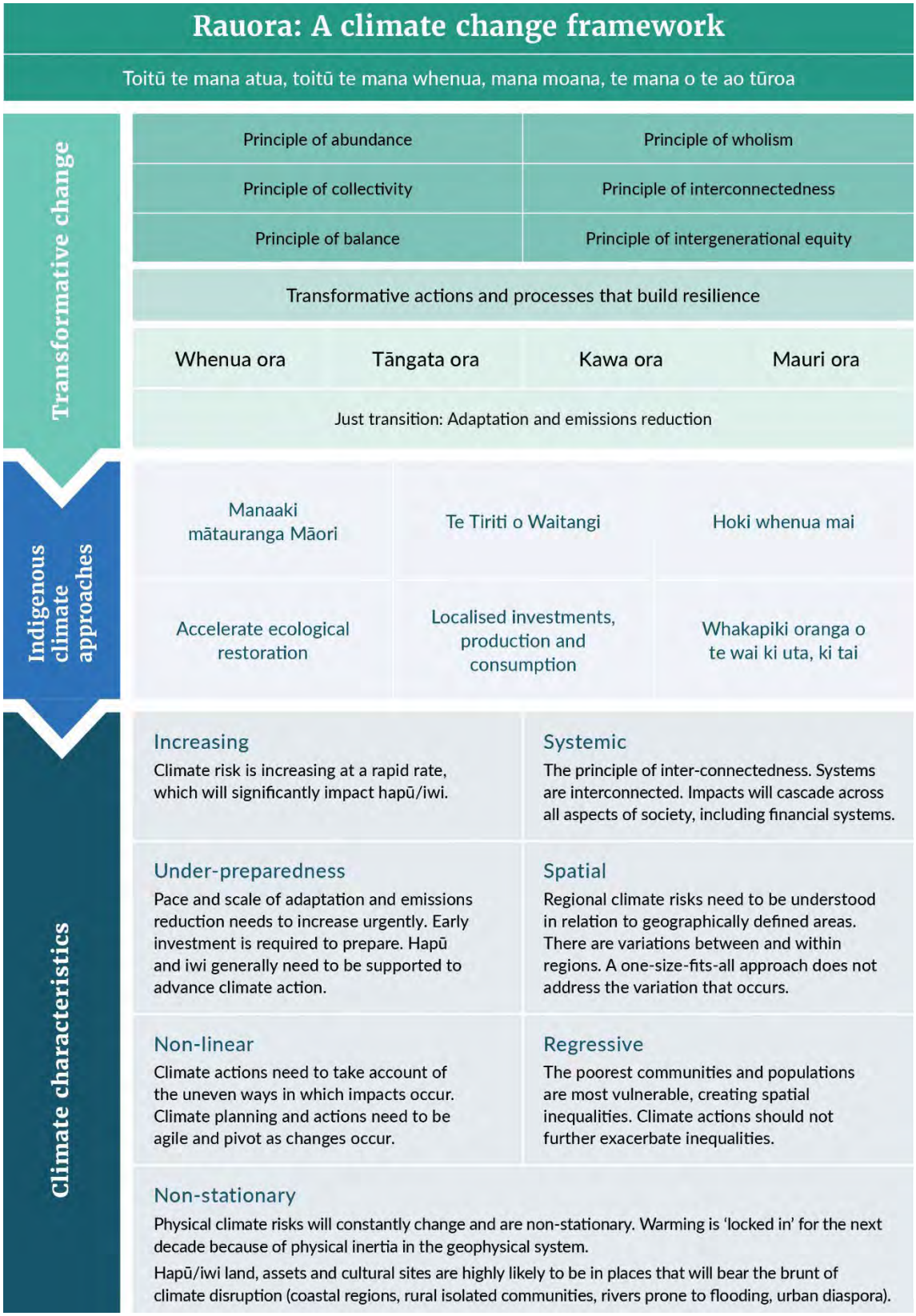


Image: Karina Hunt

CASE STUDY
Ngaa Rauru Kiitahi Climate Change Strategy

Climate action for Ngaa Rauru Kiitahi, a small iwi in south Taranaki, is encapsulated in their recent climate change strategy. The iwi and the Ministry for the Environment co-developed this as a case study in understanding the complexities of climate change for small post-settlement governance entities.

The strategy is entitled *Ka Mate Kaainga Tahi, Ka Ora Kaainga Rua: When a place of abode retires, another as prepared emerges*. This whakatauākī (proverb) refers to values from the iwi's own ancestral pathways – preparedness, agility, resilience and future thinking – that ensure safety and survival.

Preparing a second place of abode sits in a broader context: extreme weather conditions and projected flooding patterns will affect marae, communities, hapū, culturally significant assets and businesses. Climate change is viewed as a phenomenon that will affect every facet of their lives. The strategy is more than an environmental plan; it includes social, economic, ecological and cultural implications.

> "We have a responsibility to whanau, hapuu, marae and the iwi, to ensure that we are still here in 1,000 years' time." (Mike Neho, Tumu Whakarae, iwi chair, Ngaa Rauru Kiitahi)

The strategy is informed by a Ngaa Rauru Kiitahi conceptual framework known as Te Kawa Ora, which promotes a balance between all things. The environment is viewed as an extension of iwi through whakapapa. To this end, relationships within the iwi and externally with others, including the environment, are viewed as fundamental to the approach. The strategy challenges the iwi to reharness their own tikanga (custom), kawa (protocol) and mātauranga-a-iwi (knowledge with an iwi-specific base) to advance climate action.

Developments include their papakāinga, partnerships in the energy sector, land purchases for new businesses, expanding alternative food sources and regenerating local flora and fauna.

Partnerships and alliances, capability and capacity building, and planning, implementation, research and evaluation are the cornerstones of this strategy. All are built on a foundation of Ngaa Raurutanga (the totality of customs, traditions, history and shared knowledge of members of the Ngaa Rauru iwi).

Our adaptation journey must be equitable

No two communities will experience climate change in the same way. Inequity arises through multiple domains, including income, housing, employment and accessibility. Climate change can also increase existing inequities. For example, some groups are more susceptible to harm due to where they live – such as coastal communities. Others may be disproportionately affected by financial impacts or lack the resources to adapt – such as low-income and beneficiary households – or have specific adaptation needs – such as older people and disabled people. Some regions are at risk from coastal erosion and flooding, while others are already dealing with drought. Tangata whenua face the loss of wāhi tapu (sacred sites) and taonga species.

Our adaptation strategy and national adaptation plans must support New Zealanders in ways that recognise their unique needs, values and circumstances.

Some New Zealanders are more vulnerable than others

Māori as tangata whenua are particularly sensitive to climate impacts on the natural environment for social, economic, cultural and spiritual reasons. Many Māori depend on primary industries for their livelihoods. In some places, climate change may alter patterns of use of mahinga kai (food-gathering sites) or rongoā crops (medicinal plants), and coastal impacts could disrupt access to marae or wāhi tapu.

Different groups experience extreme events and disaster responses differently. Older people may be more reluctant to evacuate their homes, because of income and accessibility and/or mobility issues, and may suffer from the loss of cultural and social networks. Ethnic minorities are more vulnerable in disaster responses due to language and integration barriers.

If communities need to shift, low-income groups have less choice about where to relocate and are less able to move elsewhere. Mobility-compromised and disabled people have specific needs that can be overlooked in the planning of new community locations and accessible housing.

Some groups feel the psychological and physical impacts of climate change more than others. Young people and children are more prone to psychological impacts from extreme events, while women are more vulnerable to domestic and sexual violence, which can increase in times of disaster. The mental health of members of farming and rural communities can be affected by the disruptions to livelihoods and loss of social cohesion.

Those with poorer health outcomes, such as Māori and Pacific people, children and older people, may also physically suffer more from increased heat and disease.

New Zealanders are already experiencing the impacts of climate change. As these impacts increase, there is a risk that existing vulnerabilities will deepen.

An equitable transition for all New Zealanders is important. To ensure that our transition is equitable, fair and inclusive, we will need to:

- uphold Te Tiriti o Waitangi, work in partnership with Māori to address climate risk, maximise opportunities and avoid disproportionately affecting Māori or locking in existing inequities
- work inclusively with affected groups to understand their needs
- take opportunities to reduce inequalities and support communities and regions to promote resilience in line with local objectives
- prioritise support to those most affected and least able to adapt, particularly lower-income households
- set clear, stable policies that provide predictability for communities and businesses, allowing them time to plan, respond and seize opportunities
- support workers to adapt by transitioning to quality jobs at lower risk from the effects of climate change
- ensure adaptation decisions balance the need to avoid abrupt and disruptive changes with the need for early action to address near-term risks, reduce costs over time and avoid an inequitable burden on future generations.

Adaptation goals

The Government has identified the following goals that underpin this long-term adaptation strategy:

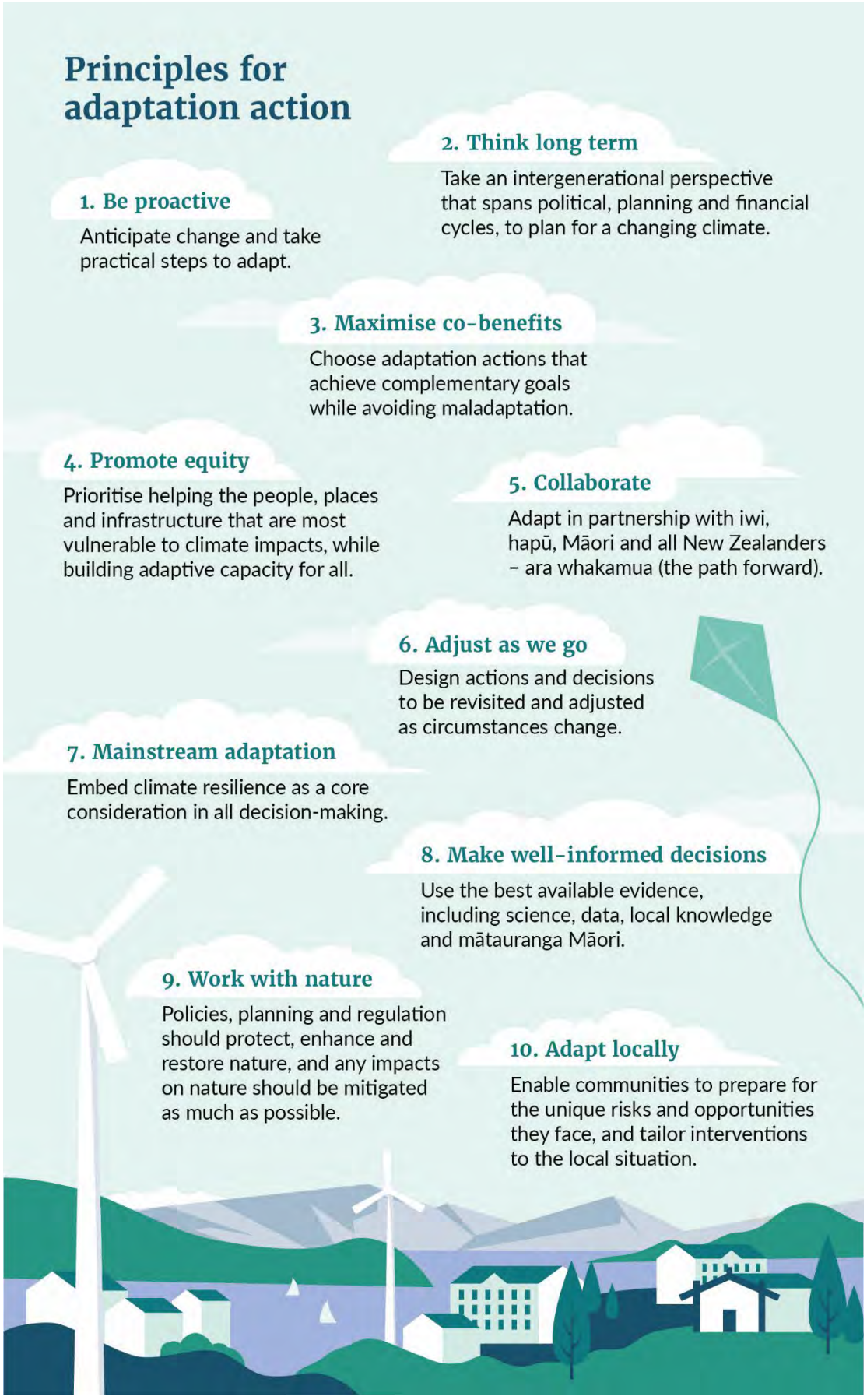
- reduce vulnerability to the impacts of climate change – this means reducing the sensitivity and susceptibility of people and systems to climate impacts
- enhance adaptive capacity and consider climate change in decisions at all levels – this means helping people, institutions and systems to adjust to climate change by building their capacity to respond and embedding climate resilience across and through all levels of government
- strengthen resilience – this means taking action that strengthens the way people and systems cope with immediate climate impacts, as well as building capacity for learning and transformational adaptation.

These goals are consistent with the global goal on adaptation under the Paris Agreement and should be implemented in an interlinked and systemic way.

Aotearoa is also a signatory to several international agreements that support action to reduce vulnerability and enhance resilience. These include the Sendai Framework for Disaster Risk Reduction 2015–2030 and the 2030 Agenda for Sustainable Development, as well as agreements under the United Nations Framework Convention on Climate Change (UNFCCC) process, including the Paris Agreement.

The Government has also identified ten principles that underpin the long-term adaptation strategy (figure 5). These principles reflect the need for our adaptation strategy to be intergenerational, flexible, proactive, responsive, holistic and inclusive – drawing on elements of the Rauora framework. These goals and principles underpin the priorities and adaptation actions in this first national adaptation plan. They will guide the implementation of this plan, and future national adaptation plans.

Figure 5: Principles guiding our adaptation strategy



CHAPTER 2:

Our first national adaptation plan 2022–28

Chapter 2: Our first national adaptation plan 2022–28

Our first national adaptation plan 2022–28
This chapter introduces Aotearoa New Zealand's first national adaptation plan for 2022–28.
This chapter outlines: • the risks Aotearoa New Zealand will face from climate change, including the ten most significant risks across the domains identified in the National Climate Change Risk Assessment 2020 • the structure of this plan, including: – the Government's four priorities for addressing those risks – the five outcome areas in which climate resilience will be embedded across Government – the objectives of the plan – the types of actions contained in the plan.

A Government-led plan for all New Zealanders

This national adaptation plan is the first in a series of national adaptation plans that will be developed every six years in response to national climate change risk assessments prepared by He Pou a Rangi – Climate Change Commission. It is the first step towards meeting the Government's long-term vision and goals for a climate-resilient Aotearoa New Zealand.

This plan is a Government-led plan for all New Zealanders that brings together existing actions and proposed future work into a multi-year work programme. Together, these set out what central government will do over the next six years to enable all levels of government, sectors and communities and all New Zealanders to better understand the risks and take action to address them.

We have a clear picture of the risks for 2020–26

The actions in this plan are strongly guided by the National Climate Change Risk Assessment 2020. This identifies:

- 43 priority risks that Aotearoa faces from climate change
- an urgency profile for each risk, and the responses that would help address each risk
- the ten most significant risks – these are the two most urgent risks in each of the five domains (natural (N), human (H), economy (E), built (B) and governance (G)) – see figure 6.

Figure 6: The ten most significant risks Aotearoa will face from climate change in 2020–26, by domain

Natural

Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events.

Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.

Human

Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts. *

Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts. *

Economy

Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.

Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.

Built

Risks to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise. *

Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise. *

Governance

Risks of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.

Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.

* The risk has disproportionate impacts on Māori.

Structure of the plan

Four priorities to address the risks

The national adaptation plan is required to address the most significant risks identified by the risk assessment. The actions in this plan will help to address all 43 risks, as well as the risk to the telecommunications network.

The plan sets out four priorities for action:

- **Priority 1:** Enabling better risk-informed decisions (chapter 3).
- **Priority 2:** Ensuring our planning and infrastructure investment decisions drive climate-resilient development in the right locations (chapter 4).
- **Priority 3:** Adaptation options including managed retreat (chapter 5).
- **Priority 4:** Embedding climate resilience in all government strategies and policies (chapters 6–10).

Outcome areas

To address specific realms of risk, this plan sets out five 'outcome areas' where targeted action is needed. These broadly align with the domains identified in the risk assessment:

- natural environment (NE)
- homes, buildings and places (HBP)
- infrastructure (INF)
- communities (C)
- economy and financial system (EF).

Objectives

The Government has identified a series of objectives for addressing the risks identified in the risk assessment. These objectives relate to either:

- system-wide issues or
- specific 'outcome areas'.

Table 1: System-wide and outcome area objectives of the plan

Area	Code	Objectives
System-wide	SW1	Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities
	SW2	Robust information about climate risks and adaptation solutions are accessible to all
	SW3	Tools, guidance and methodologies enhance our ability to adapt
	SW4	Unlocking investment in climate resilience
Natural environment	NE1	Ecosystems which are healthy and connected, and where biodiversity is thriving
	NE2	Robust biosecurity reduces the risk of new pests and diseases spreading
	NE3	Support working with nature to build resilience
Homes, buildings and places	HBP1	Homes and buildings are climate resilient, and meet social and cultural needs
	HBP2	New and existing places are planned and managed to minimise risks to communities from climate change
	HBP3	Māori connections to whenua and places of cultural value are strengthened through partnerships
	HBP4	Threats to cultural heritage arising from climate change are understood and impacts minimised
Infrastructure	INF1	Reduce the vulnerability of assets exposed to climate change
	INF2	Ensure all new infrastructure is fit for a changing climate
	INF3	Use renewal programmes to improve adaptive capacity
Communities	C1	Enable communities to adapt
	C2	Support vulnerable people and communities
	C3	Support communities when they are disrupted or displaced
	C4	The health sector is prepared and can support vulnerable communities affected by climate change
Economy and financial system	EF1	Sectors, businesses and regional economies can adapt. Participants can identify risks and opportunities and take action
	EF2	A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks

Actions

The actions throughout this plan are designed to achieve these objectives – and many actions will help us achieve more than one objective. Many actions are system-wide, because climate risks are interconnected and affect the broader systems of our society.

The Table of actions provides a comprehensive list of actions in this plan. The actions are mapped to the relevant risks identified by the National Climate Change Risk Assessment 2020 and the Government's system-wide and outcome area objectives. The Table of actions also identifies the lead agency responsible for the action, the relevant Government portfolio, the status (current or proposed) of the action, timeframe and implementation measures.

Chapters 3–10 identify critical actions, supporting actions and proposed actions.

- Critical actions are the actions that will make the most difference and we must start now.
- Supporting actions are either less urgent, or are dependent on the critical actions.
- Future work programmes are proposed actions that reflect current thinking about what will be needed in future.

All critical and supporting actions are current, which means they have funding and mandate. Future work programmes are proposed, which means whether they go ahead, and in what form, will depend on a range of factors. These include the critical or supporting actions they depend on, the need for those actions, and funding decisions, including future budget decisions.

Adaptation planning requires a flexible approach that can accommodate change but keep us moving in the right direction. Inevitably, actions in the later years of this plan are less clearly defined. Over time, decisions will be made on which proposals to progress and when, and whether new proposals are required. These decisions will be made as the results of earlier actions become clearer.

Many of the actions in this plan are interrelated and will help address multiple risks, priorities and objectives. This reflects the interconnected nature of climate issues. It also underscores the importance of taking a flexible approach to the future work programme.

Chapter 11, the final chapter in this plan, addresses implementation of the plan.

CHAPTER 3:

Enabling better risk-informed decisions

Chapter 3: Enabling better risk-informed decisions

Enabling better risk-informed decisions	
Government agencies with actions in this chapter	• Commerce Commission • Department of Internal Affairs (DIA) • External Reporting Board (XRB) • Financial Markets Authority (FMA) • Ministry for Culture and Heritage (MCH) • Ministry for the Environment (MfE) • Ministry for Primary Industries (MPI) • Ministry of Business, Innovation and Employment (MBIE) • National Emergency Management Agency (NEMA) • National Institute of Water and Atmospheric Research (NIWA) • Standards New Zealand • Stats NZ • Te Puni Kōkiri – Ministry of Māori Development (TPK) • Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development (HUD) • Te Waihanga New Zealand Infrastructure Commission • Te Whatu Ora – Health New Zealand • Toitū Te Whenua Land Information New Zealand (LINZ) • Toka Tū Ake EQC • Treasury (TSY)
Why these actions are important for building resilience	With access to up-to-date and relevant information, tools, methodologies and guidance, all New Zealanders can assess the exposure and vulnerability of their homes, businesses and communities to current and future climate hazards.
Significant risks addressed in this chapter G = Governance	All significant risks are addressed by this chapter, in particular: • G1: Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.
Objectives relevant to critical actions SW = System-wide C = Communities INF = Infrastructure EF = Economy and financial system	• SW1: Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities. • SW2: Robust information about climate risks and adaptation solutions are accessible to all. • SW3: Tools, guidance and methodologies enhance our ability to adapt. • C1: Enable communities to adapt. • INF1: Reduce the vulnerability of assets exposed to climate change • EF2: A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks.
Critical actions relevant to this chapter	• Provide access to the latest climate projections data to give New Zealanders the information they need to assess climate risk. • Design and develop risk and resilience and climate adaptation information portals to provide the public with natural hazard risk information, climate data and information for climate decision-making. • Establish the platform for Māori climate action to enable Māori to actively participate in policy design and tangata Māori climate actions, and support hapū, iwi and Māori to develop strategies and action plans for adaptation and mitigation.

Enabling better risk-informed decisions	
	• Raise awareness of climate hazards to make emergency preparedness a part of everyday life. • Help businesses make decisions that better recognise climate-related risks, realise opportunities and attract more investment, through the climate-related disclosures programme. • Improve natural hazard information on Land Information Memoranda (LIMs) to help people make better-informed decisions about natural hazard risks when buying a property. • Deliver a rolling programme of targeted adaptation guidance to enable decision makers to assess and plan to manage climate-related risks. • Develop guidance to support asset owners to evaluate, understand and manage the impacts and risks of climate change on their physical assets and the services they provide.

Information, guidance, tools and methodologies are needed to enable good decisions

All New Zealanders need to be making decisions that take into account climate change – across all aspects of our lives. The impacts of climate change will affect where we want to live, how we farm, where we invest in infrastructure, how we run our businesses, where we invest our money, where we allow new development, and how we protect our properties and keep ourselves safe. These are but a few examples.

Climate hazards and risks

Climate hazards are the potential occurrence of a climate-related event or evolving trend or gradual physical impact that may cause damage and loss to human and natural systems.

Climate risk is the combination of a climate hazard with the exposure and vulnerability of a human or ecological system to the hazard.

To make good decisions in the face of climate change, we need to be able to assess our climate risk, which means the extent we are exposed to, are sensitive to and are able to respond to climate hazards. We have a significant amount of information on how the climate is expected to change in Aotearoa New Zealand that can be used to assess risk. However, the way that information is collected and managed is inconsistent and it can be hard to find and use. We also need datasets that better respond to iwi, hapū and Māori needs for information.

The National Climate Change Risk Assessment 2020 highlighted that we have limited tools and guidance on how to make decisions under uncertainty that take into account change over long timeframes. The Climate Change Adaptation Technical Working Group identified that, to adapt effectively, we need to: be informed about how the climate is changing and what this means; have the appropriate tools; and take dynamic action to proactively reduce exposure and vulnerability.

In response, this plan provides key information, guidance, tools and methodologies that can help us understand and assess our risk and develop suitable adaptation strategies, policies and solutions. It is the Government's priority to make sure all New Zealanders – Māori, councils, communities, businesses and households – have what they need to make better, risk-informed decisions, despite the uncertainty that climate change brings.

A range of data is needed to assess climate consequences

Climate data include current and expected biophysical changes, such as changes to temperature, sea level and precipitation. With geospatial data, it is possible to map current and projected impacts and build baselines for long-term analysis – such as light detection and ranging (LIDAR), Earth observations, and topographic and geographic data.

When combined, these data can help to generate modelling and scenario-planning tools tailored to the needs of different users. With those tools, users can then assess climate consequences in areas such as health, employment, tourism, businesses and terrestrial and freshwater ecosystems.

CASE STUDY
Wellington's digital twin

A digital twin is a visual representation that looks and behaves like the real world; it can be used to make better decisions. As humans mostly process information visually, the digital twin helps people understand how a location works, how it will fare as the climate changes and what the outcomes of policy decisions will be.

Wellington City Council has developed a digital twin that functions as an interactive, virtual model of the capital. Built from a wide range of data – including GIS maps and city-wide sensors – it can be used to display the past, present and future city.

The council is now using this digital twin to co-design climate change adaptation solutions with Wellingtonians. It will connect mātauranga Māori, city planning data, climate science and community values.

The project will communicate the complexities of climate impacts and adaptation planning in an accessible way. The approach encourages participation, as decision makers and other Wellingtonians will be able to clearly understand local impacts.

Because the technology will be free, the project will empower Wellington's indigenous communities, businesses and organisations to adapt together.

Significant risks

The actions in this chapter help reduce all risks identified by the National Climate Change Risk Assessment 2020. In particular, it addresses a risk related to the governance domain (G):

- G1: Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.

Objectives

The Government has identified a range of objectives relevant to its priority to enable risk-informed decisions. These are:

- system-wide objectives – which are about making sure all New Zealanders have access to information, tools and guidance
- objectives for three outcome areas (see chapter 8: Infrastructure, chapter 9: Communities and chapter 10: Economy and financial system)

Table 2 shows the Government's objectives that guide this priority, across the different systems and outcome areas.

Table 2: Government objectives relating to critical actions to enable risk-informed decisions

Code	Objective	Explanation
SW1	Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities	Use legislation or regulation to: • enable clear, adaptive decision-making • appropriately allocate responsibilities.
SW2	Robust information about climate risks and adaptation solutions are accessible to all	• Combine data into meaningful information for different contexts. • Create datasets that better respond to iwi, hapū and Māori needs.
SW3	Tools, guidance and methodologies enhance our ability to adapt	• Manage risk by making decisions despite uncertainty. • Use the right tools, guidance and methodologies to manage climate risks. • Allow for uncertainty when planning for future risk.
C1	Enable communities to adapt	• Enable communities to provide resources and take action for their unique situation. • Build and share knowledge of local issues in culturally appropriate ways. • Support community engagement in decisions. • Provide information on adaptation options.
INF1	Reduce the vulnerability of assets exposed to climate change	• Understand where infrastructure assets and their services are exposed and vulnerable to climate impacts. • Prioritise the risk management of assets so that services can continue if disruption occurs.
EF2	A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks	• Financial entities can identify, disclose and manage the risks to their business. • Insurance access and affordability is understood and managed.

Actions to enable New Zealanders to make better risk-informed decisions

Adaptation decisions are complex and often taken under conditions of uncertainty. In response, the Government has developed a range of initiatives that will enable New Zealanders to make decisions that will reduce their vulnerability to the impacts of climate change and build resilience in their communities, properties and businesses.

Eight critical actions will provide information, scenarios and guidance. Some actions apply to all New Zealanders while others are targeted at specific sectors and groups.

To provide robust information about climate risks, action 3.2: Design and develop risk and resilience and climate adaptation information portals will collate and deliver the vast range of data, information and knowledge needed to make adaptation decisions for all users. Action 3.1: Provide access to the latest climate projections data will make data to calculate future climate risk available to all New Zealanders, as the most up-to-date regional and local climate projections data are produced from the IPCC's global projections data.

Action 3.3: Establish a platform for Māori on climate action will help define, measure and implement a national Māori climate strategy and action plan. It will activate kaupapa Māori, tangata Māori solutions that build climate resilience.

Action 3.4: Raise awareness of climate hazards and how to prepare will provide public education campaigns and information to help communities make emergency preparedness a part of everyday life.

Through action 3.7: Deliver a rolling programme of targeted adaptation guidance, a range of users will be provided with non-statutory guidance. This guidance will help them use decision-making tools and scenarios, assess risks and prepare adaptation plans.

Action 3.8: Develop guidance for assessing risk and impact on physical assets and the services they provide will ensure infrastructure asset owners are supported to evaluate the risks to their assets. This will reflect leading practice and international standards, and existing sector-specific Aotearoa guidance.

From 2023, about 200 of Aotearoa New Zealand's largest financial market participants will be required to analyse and publicly disclose their climate-related risks and opportunities each year under action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion. This will provide information that enables redirection of funding away from high-risk investments and towards climate-resilient activities.

Action 3.6: Improve natural hazard information on Land Information Memoranda will ensure property owners can assess their exposure to natural hazards when buying a property.

The supporting actions and future work programmes in this chapter will give businesses and communities more specific information, guidance and tools to drive action (eg, see action 3.7.7: Produce guidance for preparing adaptation plans and action 3.7.3: Produce guidance for dynamic adaptive pathways planning). It provides frameworks and guidance for assessing vulnerabilities and resilience for the health and building sector (eg, see action 3.25: Design methodology for risk assessments of public buildings and action 3.28: Assess healthcare service resilience). Programmes are being implemented to develop new knowledge and understanding of climate impacts and consequences (eg, action 3.29: Produce an adaptation professional development programme for key audiences). Support is provided for specific sectors and groups, such as farming, property owners and community housing providers.

Addressing inequity

Climate change will exacerbate existing inequities and create new ones. Understanding where these vulnerabilities exist, and how they may emerge, is key to effective adaptation.

Action 3.2: Design and develop risk and resilience and climate adaptation information portals will consider how the risk and resilience and climate adaptation information portals will collect and make available data and information on social and equity risks and support the assessment of climate vulnerability. This will include the exposure and sensitivity of disproportionately affected groups such as Māori and Pacific peoples, older people and children, disabled people, isolated communities, women and low-income groups.

Action 3.8: Develop guidance for assessing risk and impact on physical assets and the services they provide will consider the needs of groups who may be disproportionally affected or who are least able to adapt. Asset owners assessing impacts on infrastructure will need to consider how emergency services differ for those whose lives will be threatened if they have no power supply.

Critical actions

Action 3.1: Provide access to the latest climate projections data

Timeframe: Years 1–2 (2022–24)
Lead agency: NIWA
Relevant portfolio: Climate Change
Primarily supports: Objective SW2
Status: Current

The National Institute of Water and Atmospheric Research (NIWA) Projections Project is working to make the global climate projections from the most recent Intergovernmental Panel on Climate Change (IPCC) report (AR6 WG1) more applicable to Aotearoa. This will give New Zealanders the regional and local climate projections data they need to assess future climate risk and make adaptation decisions.

By January 2023, national climate projection datasets for Aotearoa are being produced.

Action 3.2: Design and develop risk and resilience and climate adaptation information portals

Timeframe: Years 1–6 (2022–28)
Lead agencies: Toka Tū Ake EQC; MfE
Relevant portfolios: Toka Tū Ake EQC; Climate Change
Primarily supports: Objective SW2
Status: Current

The Ministry for the Environment (MfE) and Toka Tū Ake EQC (EQC) are scoping the development of the risk and resilience and climate adaptation information portals. This will give the public natural hazard risk information, and provide access to climate data and information.

The joint goal is to develop one portal that will be a national 'self-service' information site. It will offer a comprehensive view of Aotearoa New Zealand's climate and natural hazard risks, at the individual community, local regional and national levels.

Separate portals are currently being scoped to meet end-user needs.

The portal(s) will address gaps in Aotearoa New Zealand's ability to use, translate and make hazard risk data, including climate data, easily accessible. This will enable those who access the portal(s) to make risk-informed decisions and as a result improve current and long-term natural hazard risk management and climate adaptation.

The portal(s) will use information, data and modelling capability that Toka Tū Ake EQC owns or funds, and data held by others, including government agencies.

The information needs for adaptation are vast and can be relevant to all groups (eg, climate projections) and specific to different groups.

All New Zealanders must be able to understand and assess their risk and have possible options to reduce it. Information will therefore also include strategies and frameworks to help communities make risk-informed decisions and design their adaptation solutions. The Government will work with users to define information needs and test available tools and guidance.

Toka Tū Ake EQC will be delivering the first phase of the risk and resilience portal by the end of 2022.

By the end of 2023, a design scope and delivery plan for the adaptation information component, or portal, will be complete and user needs defined.

Action 3.3: Establish a platform for Māori climate action

Timeframe: Years 1–2 (2022–24)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW1
Status: Current

The platform for Māori climate action is the key mechanism through which the Government is looking to build a climate response partnership with Māori. It will build Te Tiriti partnership and greater recognition of Māori rights and interests, including Treaty settlement commitments, into the climate response.

The platform will build on three focus areas:

- embed partnership and representation – to uphold Te Tiriti principles, processes and mechanisms will be resourced and designed alongside Māori to help tangata whenua to actively participate in the climate response
- support Māori-led strategy and alignment – to elevate te ao Māori within the climate response, Māori will be supported to define, measure and implement a national Māori climate strategy and action plan
- activate kaupapa Māori, tangata Māori solutions – to enable community action, kaupapa Māori, tangata Māori actions and solutions for the climate emergency will be funded.

The platform will be set up in two phases:

- establish an interim ministerial advisory committee to:
  - support immediate strategic advice and expertise across climate response policy and work programmes that impact Māori
  - advise on a more enduring representative platform to help advance an equitable transition for Māori
- transition the platform to a more enduring form, developed with Māori, to provide a governance presence and strategic advice in emissions reduction plans and national adaptation plans over the longer term.

By the end of 2022, the Interim Ministerial Committee will be established. By 2024, phase two of the platform for Māori climate action will be developed.

Action 3.4: Raise awareness of climate hazards and how to prepare

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective C1
Status: Current

Enable and work with communities, including rural communities, iwi and Māori, organisations and others to make emergency preparedness a part of everyday life through public awareness and advice. Examples are public education campaigns and resources, such as GetReady.govt.nz, and tailored information for those who face additional challenges. This will help communities to understand the hazards and support them to take action before, and during, an emergency.

By the end of March 2024, a public education strategy will be developed for natural hazards, and there will be increased availability of information on preparedness for extreme weather events.

Action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion

Timeframe: Years 1–6 (2022–28)
Lead agencies: MfE and MBIE, supported by the XRB and FMA
Relevant portfolios: Climate Change; Commerce and Consumer Affairs
Primarily supports: Objective EF2
Status: Current

The Financial Sector (Climate-related Disclosures and Other Matters) Amendment Act 2021 requires about 200 of Aotearoa New Zealand's largest financial market participants to analyse and publicly disclose their climate-related risks and opportunities each year. The purpose is to ensure the effects of climate change are routinely considered in decisions for business, investment, lending and insurance. As the risks and opportunities are more accurately factored into pricing and become more transparent, we expect this will shift investment away from high-risk areas, and towards a sustainable, low-emissions and financially stable economy.

We will also explore extending the mandatory disclosures regime to cover a broader range of activities – for example, public entities at the national and local level.

Key actions to support implementation are led by the Ministry for the Environment (MfE) and the External Reporting Board (XRB). They include promoting industry-led, sector-level climate scenario analysis; facilitating access to climate data; and working with international organisations to support clear, comparable and consistent climate disclosures.

The Financial Markets Authority (FMA) will be responsible for independent monitoring and enforcement of the disclosures regime. The FMA will also provide guidance about compliance expectations, and reporting on monitoring activities and findings.

The Government will decide whether to extend mandatory disclosure requirements to public entities by 2024.

Action 3.6: Improve natural hazard information on Land Information Memoranda

Timeframe: Years 1–4 (2022–26)
Lead agency: DIA
Relevant portfolio: Local Government
Primarily supports: Objective C1
Status: Current

Changes to legal requirements for Land Information Memoranda (LIMs) will help people make better-informed decisions about natural hazard risk when buying a property. It will give councils greater certainty about what hazard information to include on the LIM. This will link to the suite of information and data portals that communities will have about the risks.

By end of 2023, legislative changes will likely have been made to the Local Government Official Information and Meetings Act 1987 to provide for improved natural hazard disclosure in LIMs.

Action 3.7: Deliver a rolling programme of targeted adaptation guidance

Timeframe: Years 1–6 (2022–28)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW3
Status: Current/proposed

The Government will roll out a programme of non-statutory guidance for decision makers to assess and manage climate risks. This could also support regulatory requirements to be developed through the National Planning Framework.

3.7.1: Promote the use of the Aotearoa New Zealand Climate Change Projections guidance

Timeframe: Years 1–2

An update for Aotearoa that highlights changes from the 2021 AR6 IPCC.12 report. The update will enable stakeholders to quickly assess where they may need to adapt their risk management plans to account for the latest science.

3.7.2: Produce adaptation guidance for central government policy makers

Timeframe: Years 1–2

A methodology for central government to ensure it considers adaptation in new policy and services. This will avoid increased exposure or vulnerability to climate impacts.

3.7.3: Produce guidance for dynamic adaptive pathways planning (DAPP)

Timeframe: Years 1–2

A guide for central and local government on how to plan for adaptation in a context of uncertain climate futures.

3.7.4: Produce guidance on using different socio-economic scenarios for adaptation planning

Timeframe: Years 1–2

Assists central and local government and businesses to consider future socio-economic scenarios when assessing climate risks, and planning how to manage them.

3.7.5: Regularly update adaptation guidance for local government

Timeframe: Years 1–4

Supports local government to consider adaptation in planning and decisions. This will include guidance on communicating scientific and technical information to communities, and on making climate decisions.

3.7.6: Produce guidance on integrating mātauranga Māori into adaptive planning and working with mana whenua

Timeframe: Years 3–4

Helps central and local government effectively engage with hapū, iwi and Māori when managing risk and planning for adaptation.

3.7.7: Produce guidance for preparing adaptation plans

Timeframe: Years 1–4

Enables communities and different audiences, sectors and levels of government to produce their own adaptation plans, using a standard approach under conditions of uncertainty in climate projections. This could include interpreting downscaled projections.

3.7.8: Regularly update the guide to local climate change risk assessments

Timeframe: Years 5–6

Sets out a step-by-step process for local risk assessments. It will be updated on a six-yearly cycle after the release of each national climate change risk assessment. It supports local government to conduct their own assessments, to better understand the risks their regions face.

Action 3.8: Develop guidance for assessing risk and impact on physical assets and the services they provide

Timeframe: Years 2–3 (2023–24)
Lead agency: Te Waihanga
Relevant portfolio: Infrastructure
Primarily supports: Objective INF1
Status: Current

Te Waihanga will scope and deliver guidance for asset owners to evaluate risks to their physical assets and the services they provide. This will help them understand, and subsequently manage, the impacts of climate change on existing and new assets.

The guidance will be process-based, and therefore apply to all infrastructure assets, in all geographies. It may include steps to:

- identify the stresses and shocks that could affect assets over time, and their potential impact on asset operation
- determine the critical components of the asset, or resources required for operation, to prioritise impact assessment and resilience planning
- determine what impacts mean for planned emergency levels of service, and how these might affect critical customers and vulnerable communities.

The guidance will be designed to integrate into enterprise risk management systems, so climate risks become increasingly assessed alongside other natural and systemic risks. It will also purposefully reflect the obligations of lifeline utilities under the Civil Defence Emergency Management Act 2002, so climate risk and impact assessment does not become an additional administrative burden.

The methodology will consider the needs of all groups who may be disproportionally affected, or are least able to adapt, including Māori, people of lower socio-economic status, disabled people, women, older people, youth and migrant communities.

The guidance will reflect leading practice, and leverage international standards and guidance, and sector-specific Aotearoa guidance, where this exists.

By 2026, the guidance will be published.

Supporting actions

Action 3.9: Complete the Data Investment Plan project

Timeframe: Years 1–6 (2022–28)
Lead agency: Stats NZ
Relevant portfolio: Statistics
Primarily supports: Objective SW2
Status: Current

The Data Investment Plan project recently completed a stocktake of essential datasets across central government and prioritised data gaps for investment. The data gaps may be filled by acquiring new data or making existing data fit for purpose.

Action 3.10: Assess socio-economic and climate vulnerability for Māori

Timeframe: Year 1 (2022/23)
Lead agency: TPK
Relevant portfolio: Māori Development
Primarily supports: Objective C2
Status: Current

This action will collect and analyse social data against climate data to determine where support for resilience is most needed. This will enable the Government to better understand what support is needed to strengthen resilience for Māori communities.

Action 3.11: Implement the National Disaster Resilience Strategy

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective SW1
Status: Current

The National Emergency Management Agency (NEMA) will design a pathway to give effect to the National Disaster Resilience Strategy's vision, goals and objectives. The vision is for a disaster-resilient nation that acts proactively to manage risks and to build resilience in a way that contributes to the wellbeing and prosperity of all.

Action 3.12: Improve how science, data and knowledge are used to inform emergency management

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective SW2
Status: Current

The National Emergency Management Agency's 2021 Science Strategy will be used to create a framework for scientific engagement, promotion and influence for risk reduction, readiness, response and recovery. Research, data, mātauranga Māori, local knowledge and technical expertise will inform strategic decisions on emergency management, and explore practical interventions to improve disaster resilience.

Action 3.13: Provide a forestry planning and advisory service

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Forestry
Primarily supports: Objective NE1
Status: Current

The forestry planning and advisory service will help to reduce climate risks by providing data-informed advice and planning tools. Advice will be on both harvest and non-harvest forestry – for example, to help decision makers consider where land is available for new forestry; where restoration, regeneration and reversion may be needed; and where unsuitable land may need to be retired from forestry, including conversion from plantation to indigenous forestry.

The advisory service will support vulnerable groups such as rural communities, producers and Māori with land management, economic development and job creation.

Action 3.14: Deliver the Integrated Farm Planning Programme

Timeframe: Years 1–3 (2022–25)
Lead agency: MPI
Relevant portfolio: Agriculture
Primarily supports: Objective NE1
Status: Current

The Integrated Farm Planning Programme will provide a framework for farmers and growers to incorporate all their key farming areas, including greenhouse gases, into their farm planning. The goal is to enable a farmer or grower, using their preferred data-collection tool, platform or system, to meet all regulatory and business needs within a single framework.

The programme funds a career pathways scheme, providing more advisors skilled in whole-of-farm planning. This includes climate change advice, and a fund for industry, catchment and similar initiatives to increase the uptake of integrated farm planning.

The programme brings together many broader work programmes, including greenhouse gas farm planning, a biodiversity planning module, upskilling for primary industry advisors, planning for adverse events and resilience, and increased data sharing in the primary sector. These programmes will underpin adaptation across the sectors. The new Ministry for Primary Industries (MPI) On Farm Support services will also guide integrated farm planning, including how to use greenhouse gas calculators and other tools.

Action 3.15: Design and implement the Farm Monitoring Programme

Timeframe: Years 1–2 (2022–24)
Lead agency: MPI
Relevant portfolio: Agriculture
Primarily supports: Objective EF1
Status: Current

The Farm Monitoring Programme collects farm-level information from up to 2,000 dairy, sheep and beef, deer, arable and horticulture farms/orchards. Detailed information on physical, production, financial and environmental aspects from each farm is collected to determine how the farm is performing. Farm Environmental Plans and nutrient budgets are created for each farm.

Quality data will inform decision-making to enable improved farm management decisions and profitability, while considering compliance and regulations to assist greenhouse gas reductions. This data helps farmers adapt to climate change by determining optimal stocking rates, diversifying crop rotations, improving soil quality, reducing off-farm flows of nutrients, and implementing more efficient farm practices to improve performance.

Action 3.16: Improve consumer understanding of property insurance pricing and risks

Timeframe: Year 1 (2022/23)
Lead agency: Treasury
Relevant portfolio: Finance
Primarily supports: Objective EF2
Status: Current

Information sheets will help consumers identify, manage or even reduce their climate risks. This links to the work on Land Information Memoranda (LIMs), as greater disclosure can help people make better decisions on where to buy and build property.

Action 3.17: Support and promote the integration of climate adaptation and mitigation in new and revised standards commissioned by third parties

Timeframe: Years 2–6 (2023–28)
Lead agency: Standards NZ
Relevant portfolio: Infrastructure
Primarily supports: Objective INF3
Status: Current

At the beginning of each relevant project, Standards NZ may bring adaptation and mitigation to the attention of the committee members of a standard it has commissioned. This may help improve resilience in existing and new assets, by guiding industry practice in asset design and operation.

Action 3.18: Review electricity and gas networks' management of climate risk and resilience

Timeframe: Years 1–6 (2022–28)
Lead agency: Commerce Commission
Relevant portfolio: Commerce and Consumer Affairs
Primarily supports: Objective INF3
Status: Current

The Commerce Commission reviews many of the aspects of regulated electricity and gas networks' performance. The Commission is currently consulting on amending the asset management plan requirements for electricity distributors so that sector stakeholders can better understand distributors' risk management, including managing network resilience challenges posed by climate change. From time to time, the Commission will publish reviews of aspects of regulated networks' plans, to support them to improve their approach to managing risk and building adaptive capacity, and to provide more confidence that their related expenditure forecasts are robust.

Action 3.19: Develop Te Ara Paerangi – Future Pathways programme for the research, science and innovation system

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Research, Science and Innovation
Primarily supports: Objective SW2
Status: Current

Te Ara Paerangi – Future Pathways programme for the research, science and innovation system will position the system for the future. This includes focusing resources on national goals, such as climate change, and addressing other issues facing the research system, such as how best to honour Tiriti obligations, system funding and incentives, workforce and institutional design.

Action 3.20: Continue prioritising research and investment in climate-related science

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Research, Science and Innovation
Primarily supports: Objective EF1
Status: Current

The Government has a range of science funding programmes that support innovative adaptation by pushing the boundaries of knowledge and transferring this knowledge. These include:

- Vision Mātauranga Capability Fund, which aims to unlock the science and innovation potential of Māori knowledge, resources and people
- the Endeavour Fund for scientific research, run by the Ministry for Business, Innovation and Employment (MBIE). For example, in 2020 the Endeavour Fund awarded the National Institute of Water and Atmospheric Research (NIWA) $15 million over five years to produce Aotearoa New Zealand's first consistent national flood hazard and risk assessment (Mā te Haumaru ō Nga Puna Wai ō Rākaihautū Ka Ora Mo Ake Tonu: Increasing Flood Resilience Across Aotearoa). This will identify risks and help communities and sectors take early action to reduce costs over time by showing where flooding is likely, and by identifying the vulnerability of communities and assets
- the STRAND project, an interdisciplinary Royal Society of New Zealand Marsden Fund project led by the University of Otago. This is exploring climate risks to residential property values across space and time, and the implications for financial stability
- the Whakahaura Extreme Events and the Emergence of Climate Change programme is studying extreme weather in climate and weather systems, in hydrological, biological and economic systems
- Strategic Science Investment Funds. Examples include:
  - the Antarctic Science Platform, which improves scientific understanding of pressing issues such as climate change and ecosystem resilience
  - the Enhancing Land Use Platform, which supports research that enables New Zealanders to better measure and manage their land resources, reduce greenhouse gas emissions and manage the environmental impacts of land use
  - the Weather and Climate Hazards Platform, which improves understanding of large-scale weather and climate systems through numerical prediction techniques, monitoring and advanced measurement (eg, predicting extreme weather events and impacts and assessing climate adaptation and mitigation)
  - the Deep South National Science Challenge. This 10-year research programme, finishing in 2024, aims to improve understanding of Aotearoa New Zealand's changing climate. It will aid timely decisions on adaptation by building Aotearoa's evidence base and providing sectors and communities with insights and information. This is part of addressing gaps in our knowledge and building our monitoring capabilities. There are key inputs to decisions at all levels of society on how to adapt.

In addition, there are other climate-related science funding programmes across government, such as MPI's Sustainable Land Management and Climate Change and Greenhouse Gas Inventory research programmes (see action 10.6: Continue delivering the Sustainable Land Management and Climate Change and Greenhouse Gas Inventory research programme).

Future proposed work programmes

Action 3.21: Develop mātauranga Māori indicators of climate impacts on the natural environment

Timeframe: Years 1–2 (2022–24)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective NE1
Status: Proposed

Mātauranga Māori indicators will enable monitoring and evaluation of impacts on biodiversity, mahinga kai, flora, fauna and human health. This will create data baselines that centralise indigenous knowledge and values, and can be used in environmental assessments.

Action 3.22: Work with community housing providers to enable effective climate hazard response

Timeframe: Years 2–4 (2023–26)
Lead agency: HUD
Relevant portfolio: Public Housing
Primarily supports: Objective HBP1
Status: Proposed

This will provide better data and information on the exposure of community housing providers to climate risks. An action programme will increase the resilience of community housing by supporting strategies for emergency management and long-term adaptation. In turn, this will reduce exposure of community housing tenants to climate risks. The scheme will also focus on working with Māori and Pacific providers. It will help increase resilience in ways that are culturally appropriate, and respond to the needs of Māori and Pacific recipients.

Action 3.23: Develop 3D coastal mapping

Timeframe: Years 1–6 (2022–28)
Lead agency: LINZ
Relevant portfolio: Land Information
Primarily supports: Objective SW2
Status: Proposed

Coastal mapping comprises detailed 3D mapping of the coastal zone and the upgrade and addition of Global Navigation Satellite System (GNSS) sites in the coastal zone. The purpose is to assess the impacts of sea-level rise and model the impacts of tsunami and storm surges on communities, infrastructure and biodiversity.

Action 3.24: Produce new tools and guidance specific to mātauranga Māori and mātauranga indicators

Timeframe: Years 3–4 (2024–26)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW2
Status: Proposed

These resources will be developed in partnership with hapū, iwi and Māori, to help them take action in their communities and to inform decisions. This action will provide targeted guidance on planning in uncertain conditions.

Action 3.25: Design methodology for risk assessments of public buildings

Timeframe: Years 3–4 (2024–26)
Lead agency: MBIE
Relevant portfolio: Building and Construction
Primarily supports: Objective HBP1
Status: Proposed

Developing a methodology for risk assessment based on the property resilience research (see action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings), to address matters such as cultural and heritage values and seismic hazard risks, will support decision-making.

This will help owners of public buildings assess and understand climate risks and implement adaptation strategies.

Action 3.26: Produce guidance for disaster risk management for cultural heritage

Timeframe: Years 2–5 (2023–27)
Lead agency: MCH
Relevant portfolio: Culture and Heritage
Primarily supports: Objective HBP4
Status: Proposed

This action will improve disaster risk management for cultural heritage through guidance on reducing risks before, during and after disasters.

Action 3.27: Develop a framework for assessing exposure and vulnerability of taonga/cultural assets to climate change

Timeframe: Years 1–4 (2022–26)
Lead agency: MCH
Relevant portfolio: Culture and Heritage
Primarily supports: Objective HBP4
Status: Proposed

Working with partners (including iwi), the Ministry for Culture and Heritage (MCH) will identify national and local information on taonga/cultural assets, both tangible and intangible. It will identify gaps in knowledge, information needs and governance. It will develop a framework to identify valued cultural heritage and the actual and potential exposure and vulnerability of cultural heritage to climate change. The framework will take a broad and inclusive approach, recognising the ways in which different communities identify, access and participate in what is culturally important to them.

Action 3.28: Assess healthcare service resilience

Timeframe: Years 1–2 (2022–24)
Lead agency: Te Whatu Ora – Health New Zealand
Relevant portfolio: Health
Primarily supports: Objective C4
Status: Current

The aim of this action is to understand the healthcare service's vulnerability to climate events, and consider physical risks to infrastructure, and changes in illness patterns and vulnerability. This will help to ensure communities can continue to access the healthcare services they need, even in the face of climate change adversity.

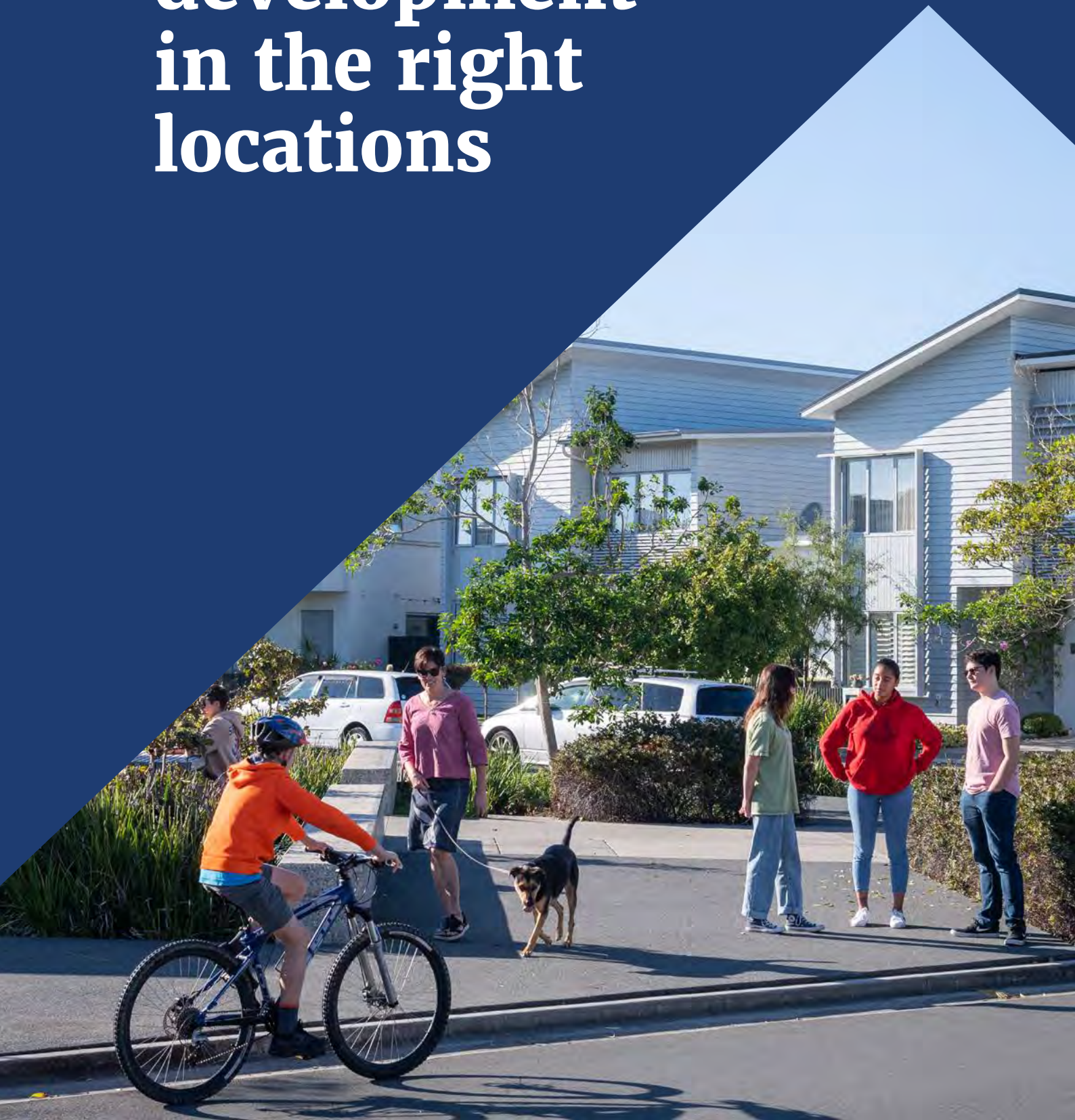
Action 3.29: Produce an adaptation professional development programme for key audiences

Timeframe: Years 4–5 (2025–27)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW2
Status: Proposed

This will target building capability and help circulate new tools and guidance among different audiences. It will encourage uptake and effective use by practitioners and others working on climate adaptation.

CHAPTER 4:

Driving climate-resilient development in the right locations



Chapter 4: Driving climate-resilient development in the right locations

Driving climate-resilient development in the right locations	
Government agencies with actions in this chapter	• Department of Internal Affairs (DIA) • Kāinga Ora • Ministry for the Environment (MfE) • Te Manatū Waka Ministry of Transport (MOT) • Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development (HUD) • Treasury (TSY) • Waka Kotahi NZ Transport Agency
Why these actions are important for building resilience	The built environment has a long lifespan. Therefore, decisions about how and where we develop new buildings, infrastructure and communities matter now. The actions in this chapter will ensure our decision-making frameworks for planning and infrastructure investment guide climate-resilient development in the right locations and account for changing risks – such as exposure to sea-level rise, flooding, heat stress, coastal inundation and wildfire.
Significant risks addressed in this chapter B= Built G = Governance	• B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise. • B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise. • G1: Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes. • G2: Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation. Institutional arrangements include legislative and decision-making frameworks, coordination within and across levels of government and funding mechanisms.
Objectives relevant to critical actions SW = System-wide NE = Natural environment HBP = Homes, buildings, places INF = Infrastructure	• SW1: Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities. • NE1: Ecosystems which are healthy and connected, and where biodiversity is thriving. • HBP1: Homes and buildings are climate resilient, and meet social and cultural needs. • HBP2: New and existing places are planned and managed to minimise risks to communities from climate change. • INF2: Ensure all new infrastructure is fit for a changing climate. • INF3: Use renewal programmes to improve adaptive capacity.
Critical actions relevant to this chapter	• Reform the resource management system to support resilient homes, buildings and places, and encourage future growth and development in the right locations (not prone to climate hazards). • Set direction on natural hazard risk management and climate adaptation through the National Planning Framework. • Establish an initiative for resilient public housing.

Driving climate-resilient development in the right locations	
	• Ensure funding decisions for housing and urban development, including Māori housing, consider climate hazards. • Reform institutional arrangements for water services to deliver better health and wellbeing outcomes for our communities and protect our environment for generations to come. • Integrate adaptation into Treasury decisions on infrastructure, to ensure decision-making for new assets and across major renewal or upgrade programmes considers climate risks. • Integrate adaptation into Waka Kotahi decision-making.

Planning and infrastructure investment decisions drive climate-resilient development

The National Climate Change Risk Assessment 2020 identified that our regulatory frameworks and institutions do not always account for changing risks. The Climate Change Adaptation Technical Working Group identified that Aotearoa needs a planned approach and clear roles and responsibilities for adaptation. We need to make sure our decision-making frameworks for planning and infrastructure investment are updated now so that they drive climate-resilient development in the right locations.

The way we design and grow our places today will affect our ability to withstand the impacts of climate change over the coming decades – and influence patterns of exposure and vulnerability. New development provides opportunities to transform our built environment and ensure our communities and infrastructure are resilient, well located and use best-practice adaptive design. This will substantially reduce the costs of retrofitting in the future and increase our adaptive capacity to live, and thrive, despite the challenges of a changing climate. Development includes both new homes and infrastructure, as well as retrofitting existing buildings, redeveloping public spaces and maintaining and renewing existing infrastructure.

How and where we build needs to be considered on a case-by-case basis. We can be proactive and choose to direct development away from areas that are susceptible to extreme hazards such as sea-level rise, flooding, coastal inundation and wildfire. However, avoidance is not always possible and the benefits of development now may outweigh the benefits of avoiding future climate risk. Regardless of where we develop, there will be some level of climate risk. The right adaptation strategies can reduce risk to a tolerable level (see Chapter 5: Adaptation options including managed retreat).

Adapting early can deliver co-benefits that we can begin to take advantage of – improved health and wellbeing, more affordable and accessible infrastructure services, warmer and drier homes and the opportunity to address existing inequities. The Rauora framework reinforces this approach, calling for a sustainable and responsible ecosystem-based approach within the limits required to restore abundance and ensure intergenerational equity.

Our planning and investment systems are critical in supporting this transformation and building our adaptive capacity. They will guide how we use our land and resources, including the form, location and type of development.

For example:

- our planning system can guide risk-informed decisions, including enabling development in the best locations and considering adaptive responses
- regulations can create standards for climate-resilient buildings and infrastructure
- investment decisions should support the delivery of climate-resilient development.

How and where we develop has long-term impacts due to the lifespan of the built environment. The buildings and infrastructure assets we have now will be the same ones we have as the impacts of climate change are felt across the motu. We have the opportunity to understand likely impacts and begin to adapt now – for example, with infrastructure that strengthens climate resilience.

Significant risks

This chapter addresses the following significant risks identified by the National Climate Change Risk Assessment 2020:

- in the built environment domain (B):
  - B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise
  - B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise.
- in the governance domain (G):
  - G1: Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes
  - G2: Risk that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation. Institutional arrangements include legislative and decision-making frameworks, coordination within and across levels of government and funding mechanisms.

Objectives

The Government has identified a range of objectives for its priority to deliver a climate-resilient built environment. These are:

- system-wide objectives – enabling the right decisions to be made
- objectives for two outcome areas (see Chapter 7: Homes, buildings and places and Chapter 8: Infrastructure).

Table 3 shows the Government's objectives that guide this priority, across the different systems and outcome areas.

Table 3: Government objectives relevant to critical actions to deliver a climate-resilient built environment

Code	Objective	Explanation
SW1	Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities	• Use legislation or regulation to: – enable clear, adaptive decision-making – appropriately allocate responsibilities.
HBP1	Homes and buildings are climate resilient, and meet social and cultural needs	• Reduce exposure to climate hazards and support businesses and communities to understand and respond to climate risks. • Improve homes and buildings so they can withstand the expected range of temperatures, rainfall and wind, and to improve energy and water efficiency. • Conserve valued cultural heritage.
HBP2	New and existing places are planned and managed to minimise risks to communities from climate change	• Improve resilience through effective planning, urban design and management. • Avoid development in places that may be more exposed to climate hazards. • Support existing places to adapt. • Relocate people and assets where risks are too high to manage otherwise.
INF1	Reduce the vulnerability of assets exposed to climate change	• Understand where infrastructure assets and their services are exposed and vulnerable to climate impacts. • Prioritise the risk management of assets so that services can continue if disruption occurs.
INF2	Ensure all new infrastructure is fit for a changing climate	• Consider long-term climate impacts when we design and invest in infrastructure, so the right infrastructure is in the right places. • Understand future adaptation options and finance them, as part of the investment in new infrastructure to build capacity to adapt.
INF3	Use renewal programmes to improve adaptive capacity	• Consider long-term climate impacts when making decisions to maintain, upgrade, repair or replace existing infrastructure.

Local government should act now to drive climate-resilient development in the right locations

The effects of climate change are being felt now. During the transition to the new system, councils need to avoid locking in inappropriate land use or closing off adaptation pathways before the new resource management system takes full effect.

Councils have existing functions and powers that can be used to avoid, mitigate or manage the impacts of natural hazards. These functions can support climate-resilient development in the right locations.

In particular, councils must recognise and provide for the management of significant risks from natural hazards as a matter of national importance in exercising their functions and powers under the Resource Management Act 1991 (RMA). Both regional and territorial authorities have functions under the RMA that relate to avoiding or mitigating natural hazards.

The National Policy Statement on Urban Development (NPS-UD) also supports climate-resilient development. For example, under the NPS-UD, some councils are required to, and others may, prepare future development strategies (FDS).[1] FDS can help drive climate-resilient development in the right locations. FDS spatially identify where long-term urban growth should happen, considering other inputs like constraints on development. RMA planning documents must have regard to an FDS, and must give effect to the NPS-UD.

The Urban Development Act 2020 (UDA) sets up a framework for delivering comprehensive large-scale urban development. The powers provided by the UDA allow multiple aspects of the urban environment to be changed with greater certainty, integration and speed which would support enabling adaptation to the effects of climate change. Under this Act, Kāinga Ora can determine whether to initiate a specified development project process, or can be directed to do so by Ministers. However, any party can propose a development project to Kāinga Ora. Councils are able to work with Kāinga Ora to identify opportunities for climate-resilient development using the UDA as a tool.

Further, regional and territorial authorities must give effect to the New Zealand Coastal Policy Statement (NZCPS) 2010, which provides strong direction to avoid new development, redevelopment or changes in land use that would increase the risk of harm or adverse effects from coastal hazards.

However, clear direction about how to guide development in response to climate change outside of coastal areas has not yet been developed. Further, councils face significant pressure to enable further development to meet housing requirements. Through consultation on this plan, councils have asked central government to give them a stronger mandate for assessing and managing climate risk, and to support them to make decisions informed by that risk during the transition to a new resource management system.

To assist local government make good decisions about where and how to develop in the face of climate risk, the Government published interim guidance on the use of new sea-level rise projections in July 2022. The interim guidance updates the *Coastal hazards and climate change: Guidance for local government* (coastal hazards guidance). A full update to the coastal hazards guidance will be published in 2023.

The interim guidance is non-statutory. However, from 30 November 2022, councils will be required to 'have regard to' this plan when making or changing regional policy statements or regional or district plans. For that reason, this plan directs councils as follows.

When making or changing policy statements or plans under the RMA, including to give effect to the provisions of the NZCPS, councils should use the recommended climate change scenarios outlined below, as a minimum:

[1] Councils listed as Tier 1 or 2 local authorities in the Appendix to the NPS-UD must prepare a future development strategy (3.12(1) NPS-UD). Councils not listed in the Appendix may choose to prepare future development strategies (3.12(4) NPS-UD).

- to screen for hazards and risks in coastal areas, use the Shared Socioeconomic Pathway scenario for fossil fuel intensive development (SSP5-8.5) where available, or the Representative Concentration Pathway RCP8.5,[2] to 2130
- for detailed hazard and risk assessments in coastal and non-coastal areas, use both the middle-of-the-road scenario (SSP2-4.5) and the fossil fuel intensive development scenario (SSP5-8.5) where available, RCP4.5 and RCP8.5, to 2130, for areas at high risk of being affected, adding the relevant rate of vertical land movement locally. Where SSP2-4.5 and SSP5-8.5 are not available, use RCP4.5 and RCP8.5 to 2130, adding the relevant rate of vertical land movement locally
- for all other climate hazards and risks, use the most recent downscaled climate projections for Aotearoa.

In addition, councils should stress test plans, policies and strategies using a range of scenarios as recommended in the interim guidance and the National Climate Change Risk Assessment Framework, as relevant to the circumstance.

These recommended climate scenarios reflect the latest global climate projections released in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6 WG1) (2021) and NZSeaRise.

Actions to drive climate-resilient development in the right locations

Our planning and investment systems shape how decisions are made on the form and location of our built environment, and how infrastructure is funded, financed and used. When investment and planning decisions are made in an integrated way and informed by national objectives, they can help us achieve well-functioning, resilient places. Reforming the planning system is an opportunity to provide a framework and process that respond to climate challenges and support risk-informed decision-making.

This plan outlines the steps the Government will take over the next six years to align its investment strategies with resilience and low-emissions objectives. The Government will reform legislation, institutions, guidance and practices to ensure central and local government, along with private individuals, developers and investors, make better decisions about where to locate new or intensified development.

Action 4.1: Reform the resource management system will be a main driver of the location and form of development. A key objective of the reform is to better prepare for adapting to climate change and risks from natural hazards. The resource management system as a whole will deliver this objective, with each part contributing to improve resilience in a different way.

The Natural and Built Environments Act will provide a foundation for decisions that will reduce climate risk. The National Planning Framework will provide further detail about how to achieve those outcomes – for example, planning for natural hazards and considering future climate risks when identifying areas for development.

[2] Representative Concentration Pathways should be used only where climate data is otherwise not reported under Shared Socioeconomic Pathways – for example, downscaled regional climate projections reported in Climate Change Projections for New Zealand.

The Spatial Planning Act will include requirements for developing Regional Spatial Strategies. These will identify hazard zones and guide development to the most appropriate locations. They could also identify opportunities to increase adaptive capacity – for example, catchment-scale measures to reduce the impact of flooding on the built environment. These reforms will also guide private investment in development to appropriate locations.

Access to the best available climate information is key to effective consideration of climate risk and balancing competing demands in the planning system. Actions in chapter 3: Enabling better risk-informed decisions will ensure that central and local government, along with developers, asset owners and private individuals, have the information, tools and guidance they need to make decisions about the most appropriate location, form and design of new developments and enable confident long-term investments.

Addressing inequity

Action 4.5: Reform institutional arrangements for water services will establish new water entities that will work with councils and communities to deliver better health and wellbeing outcomes for communities. The reform will require entities to establish a consumer forum(s) to assist with effective and meaningful consumer and community engagement. The forum(s) will enable the Government to understand consumer needs, including the needs of communities disproportionately impacted by a reduction of water quality and quantity. These include small and rural communities; hapū, iwi and Māori; households that depend on rainwater tanks; and children, older New Zealanders and disabled people who are more vulnerable to the health impacts of poor water quality.

Occupants of public and Māori housing can be more susceptible to other impacts of climate change. The Government will also support the resilience of Māori and public housing. For example, action 4.3: Establish an initiative for resilient public housing and action 4.4: Embed adaptation in funding models for housing and urban development, including Māori housing, will help reduce the vulnerability of public housing tenants and Māori to climate hazards by adapting existing buildings and ensuring new dwellings are well designed and well located.

Critical actions

Action 4.1: Reform the resource management system

Timeframe: Year 1 (2022/23)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective SW1
Status: Current

In early 2021, the Government announced its intention to repeal the Resource Management Act 1991 and replace it with a Natural and Built Environments Act, a Spatial Planning Act and a Climate Adaptation Act.

The Government's objectives for the reform include better preparation for adaptation and risks from natural hazards, and better mitigation of emissions contributing to climate change.

Resource management reform will be essential to supporting the resilience of homes, buildings and places. It will encourage planning for future growth and development in the right locations, and not in areas prone to climate hazards. The changes will require local government; central government; hapū, iwi and Māori; and communities to plan together how areas will adapt. The reform will provide tools to stop increasing exposure in areas of high or increasing risk, and facilitate the retreat of communities, homes and infrastructure where risks are intolerable.

Among the changes to enable long-term adaptation are:

- a National Planning Framework providing strategic direction and guidance on how to achieve the climate outcomes in the Natural and Built Environments Act
- clear signalling or initiation of adaptation responses, including retreat, through Regional Spatial Strategies that identify hazard zones and areas where adaptation may be necessary
- powers and processes to address ownership of property that is retreated from in the Climate Adaptation Act (or Natural and Built Environments Act)
- more comprehensive support for implementation.

In 2023, the Natural and Built Environments Act and the Spatial Planning Act are expected to be passed.

Action 4.2: Set national direction on natural hazard risk management and climate adaptation through the National Planning Framework

Timeframe: Years 1–6 (2022–28)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective SW1
Status: Current

The National Planning Framework will set clear direction for local authorities on how to achieve the climate resilience outcomes in the Natural and Built Environments Act. It will set out methods and requirements for planning for natural hazards and considering future climate risks. The first iteration of the National Planning Framework will contain hazard risk assessment methodologies and direction. This will aid the development of Regional Spatial Strategies (the first products developed as part of a sequential roll out of the new resource management system). This direction will be integrated with direction on other outcomes across the natural and built domains.

The draft National Planning Framework will be released for consultation shortly after the Natural and Built Environments Act is passed.

Action 4.3: Establish an initiative for resilient public housing

Timeframe: Years 1–2 (2022–24)
Lead agency: Kāinga Ora
Relevant portfolio: Housing
Primarily supports: Objective HBP1
Status: Current

A framework for public housing assets will be developed to determine the actions to adapt new and existing assets. This will help reduce exposure of public housing tenants to climate hazards.

The action will also increase the resilience of public housing. It will identify where retrofitting is needed, and ensure dwellings are well located. It will promote effective planning and the design of resilient infrastructure as part of public housing work.

Kāinga Ora is assessing risk exposure and increasing understanding of the assumptions and limitations of the data used in this assessment.

By 2024, a decision-making framework will be in use to determine adaptation actions for both new and existing assets.

Action 4.4: Embed adaptation in funding models for housing and urban development, including Māori housing

Timeframe: Years 1–4 (2022–26)
Lead agency: HUD
Relevant portfolio: Housing
Primarily supports: Objectives HBP1 and HBP2
Status: Current

Existing funding programmes for urban development and housing, including Māori housing, will be updated to consider the costs of existing and future climate hazards. New funding programmes may be created if there are gaps.

This will help ensure funding for urban growth considers climate hazards (eg, new infrastructure is well located and designed to perform under changing climatic conditions). This action will also result in reviewing funding for new development so that government-funded housing, including Māori housing, can cope with extreme events and the changing climate.

By 2024, the Ministry of Housing and Urban Development (HUD) will have begun reviewing funding programmes it administers and amending them to appropriately consider climate-related risk.

Action 4.5: Reform institutional arrangements for water services

Timeframe: Years 1–2 (2022–24)
Lead agency: DIA
Relevant portfolio: Local Government
Primarily supports: Objective SW1
Status: Current

The Government will create new water entities that will work with councils and communities to improve health and wellbeing outcomes for our communities and protect our environment for generations to come. The National Climate Change Risk Assessment 2020 identified risk to potable water as the most urgent risk from climate change. The Government is considering how the proposed new entities will manage climate risk. The reforms will bring a more consistent approach and more certainty about who makes decisions.

The Water Services Entities Bill includes provisions relevant to how the new water services entities will manage climate risk.

If the Bill is enacted in its current form, one of the statutory objectives of the new entities will be to "deliver water services in a sustainable and resilient manner that seeks to mitigate the effects of climate change and natural hazards".

The Bill will also enable the responsible minister to issue a government policy statement on water services. This document may set out expectations about the contribution of water services entities to the outcomes sought by the Government in a number of areas, including climate change mitigation and adaptation, and water security. The entities will be required to give effect to any government policy statements when performing their functions.

By 2024, legislation to establish water services entities will be enacted (to enable them to become operational from 1 July 2024).

Action 4.6: Integrate adaptation into Treasury decisions on infrastructure

Timeframe: Years 1–5 (2022–27)
Lead agency: Treasury
Relevant portfolio: Infrastructure
Primarily supports: Objective INF2
Status: Current

The Treasury publishes a range of guidance for central government departments and other entities on investment management and state sector performance. It will integrate consideration of climate risks and future adaptation into this guidance. This will help ensure that planning for new assets, renewals and major upgrades will:

- include climate risks in the strategic case, and early assessment of the options
- include options to build adaptive capacity (eg, nature-based solutions)
- incorporate the full cost of adaptation over the life of an asset into decision-making
- set up durable investment management systems to respond to, fund and finance climate action.

The changes to process, and the development of tools, will leverage the system-wide and infrastructure-specific data, tools and guidance being developed as part of the national adaptation plan.

By 2024, advice on the best way forward, and any associated budget bid or Cabinet decisions, will be complete and future implementation measures defined.

Action 4.7: Integrate adaptation into Waka Kotahi decision-making

Timeframe: Years 1–6 (2022–28)
Lead agencies: Waka Kotahi; MOT
Relevant portfolio: Transport
Primarily supports: Objective INF3
Status: Current

Waka Kotahi will incorporate adaptation in the Investment Decision Making Framework, its structured approach to decisions on investment in land transport. This will include business case development and risk assessment. Also embedded will be an intervention hierarchy, which considers integrated planning, demand management, and the best use of existing networks before developing new infrastructure.

By 2024, Waka Kotahi will integrate adaptation into planning, investment and decision-making for the National Land Transport Programme.

Supporting actions

Action 4.8: Amend the Environmental Reporting Act 2015 to allow better measurement of environmental change

Timeframe: Years 1–2 (2022–24)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective NE1
Status: Current

This work seeks to improve how the Ministry for the Environment (MfE) monitors, manages, accesses and reports on the environment. The amendments will extend the Environmental Reporting Act's functionality and breadth so that environmental reports have more impact.

CHAPTER 5:

Adaptation options including managed retreat

Chapter 5: Adaptation options including managed retreat

Adaptation options including managed retreat	
Government agencies with actions in this chapter	• Department of Conservation (DOC) • Department of Internal Affairs (DIA) • Ministry for Culture and Heritage (MCH) • Ministry for the Environment (MfE) • Ministry of Business, Innovation and Employment (MBIE) • National Emergency Management Agency (NEMA) • Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development (HUD) • Te Waihanga New Zealand Infrastructure Commission • Transpower • Treasury (TSY)
Why these actions are important for building resilience	Many of our communities are already experiencing natural hazard events such as flooding, and these are expected to increase over time. The actions in this chapter will support councils, communities, businesses and individuals to consider and understand the range of adaptation options available in their area. These include building resilience at a local property level, as well as managed retreat, where necessary.
Significant risks addressed in this chapter H = Human B = Built G = Governance	• H1: Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts. • B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise. • B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise. • G1**:** Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes. • G2: Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation. Institutional arrangements include legislative and decision-making frameworks, coordination within and across levels of government and funding mechanisms.
Objectives relevant to critical actions SW = System-wide HBP = Homes, buildings, places INF = Infrastructure EF = Economy and financial system	• SW1: Legislation and institutional arrangements are fit for purpose and provide clear roles and responsibilities. • SW2: Robust information about climate risks and adaptation solutions are accessible to all. • SW4: Unlocking investment in climate resilience. • NE3: Support working with nature to build resilience. • HBP1: Homes and buildings are climate resilient, and meet social and cultural needs. • HBP3: Māori connections to whenua and places of cultural value are strengthened through partnerships. • HBP4: Threats to cultural heritage arising from climate change are understood and impacts minimised. • INF1: Reduce the vulnerability of assets exposed to climate change

Adaptation options including managed retreat	
	• INF3: Use renewal programmes to improve adaptive capacity. • EF2: A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks.
Critical actions relevant to this chapter	• Pass legislation to support managed retreat to enable relocation of assets from at-risk areas. • Review the future for local government to ensure the system is equipped for agile, sustainable and anticipatory decision-making. • Complete a case study to explore co-investment for flood resilience with the West Coast Regional Council, Buller District Council and local iwi. • Develop options for home flood insurance to support community resilience to the consequences of extreme weather events and facilitate recovery. • Publish the programme of work on how Aotearoa meets the costs of climate change and invests in resilience. • Scope a resilience standard or code for infrastructure to encourage risk reduction and resilience planning in existing and new assets. • Help building owners, renters and new home builders reduce and manage the impacts of climate hazards on homes and buildings. • Support kaitiaki communities to adapt and conserve taonga/cultural assets. • Prioritise nature-based solutions in our planning and regulatory systems to address the climate and biodiversity crises together.

Existing development faces increasing risk

Although the appropriate location, form and design of new development in the right places will help future-proof our communities, many communities are already under threat from natural hazard events – which will increase over time. Successful adaptation to the impacts of natural hazards and climate change will be vital to the future health and wellbeing of our communities.

In our existing places, people can work together to reduce risk through social networks, nature-based and hard-engineering solutions, through upgrades to existing buildings and infrastructure to withstand more extreme climatic conditions, and by being better prepared. Councils and communities should consider the full range of adaptation options for areas under threat.

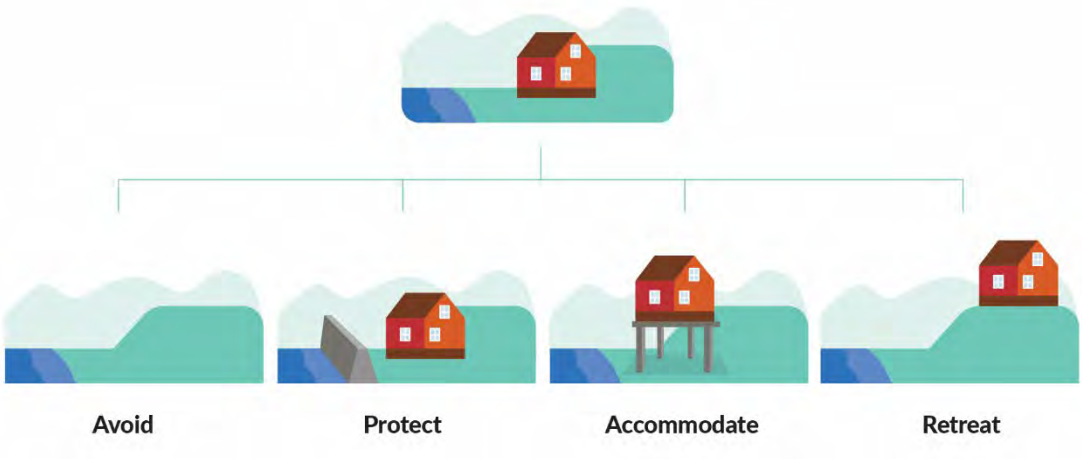
These include:

- avoiding risk – for example, by locating development away from areas prone to hazard
- protecting assets from risk – for example, by building protective structures such as sea walls
- accommodating risk – for example, by incorporating adaptation options into the design of developments
- retreating from risk – for example, by relocating existing development away from high-risk areas.

Figure 7 illustrates these options. Avoiding risk is primarily covered by Chapter 4: Driving climate-resilient development in the right locations.

A hybrid approach that uses different adaptation options may be appropriate, and the suite of adaptation options used may change over time. The most appropriate adaptation options will be different for every community or project. A place-based and risk-based approach should ensure the options adopted will meet the specific needs and circumstances of the community. Working with communities to assess these options means that decisions made as to which options will be adopted for a particular community are robust and are well supported and understood by that community.

Figure 7: Adaptation options – avoid, protect, accommodate, retreat



Councils and communities can consider a range of planning options that can either avoid or delay the need for relocation. Restricting further development or particular uses of land through planning rules – for example, zoning – can prevent further exposure to risk. This approach can also signal that an area may not be viable for development in the longer term. Standards can be set – through rules and consent conditions – to improve the resilience of development in areas exposed to risk. Examples of these types of standards could include minimum floor heights and flood-proofing requirements.

In some highly exposed areas, the risk from natural hazard and climate impacts may become intolerable. Inundation of buildings and infrastructure will start to occur, leading to direct damage and loss of some facilities like roads or other lifeline services, and public open space. In some cases, the risks may reach a threshold where relocation will need to be considered.

Managed retreat

Managed retreat is an approach to reduce or eliminate exposure to intolerable risk. It enables people to relocate assets, activities and sites of cultural significance (to Māori and non-Māori), away from areas at risk from climate change and natural hazards.

For communities in areas of high risk, managed retreat is an adaptation option. It is usually not considered in isolation from other options, especially when planning for future rather than current impacts of climate change. In some cases, retreat may be a last resort, and in all cases the costs and benefits will need to be carefully weighed.

See action 5.1: Pass legislation to support managed retreat.

Significant risks

This chapter addresses the following significant risks identified by the National Climate Change Risk Assessment 2020:

- in the human domain (H):
  - H1: Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts.
- in the built domain (B):
  - B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise
  - B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise
- in the governance domain (G):
  - G1: Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes
  - G2: Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation. Institutional arrangements include legislative and decision-making frameworks, coordination within and across levels of government and funding mechanisms.

Objectives

The Government has identified a range of objectives for laying the foundations for adaptation, including managed retreat. These are:

- system-wide objectives – laying the foundations for the right decisions
- objectives for four outcome areas (see chapter 6: Natural environment, chapter 7: Homes, buildings and places, chapter 8: Infrastructure and chapter 10: Economy and financial system).

Table 4 sets out the objectives that guide this priority area, across the different systems and outcome areas.

Table 4: Government objectives relevant to critical actions for laying the foundations for adaptation options including managed retreat

Code	Objective	Explanation
SW1	Legislation and institutions are fit for purpose and provide clear roles and responsibilities	• Use legislation or regulation to: – enable clear, adaptive decision-making – appropriately allocate responsibilities.
SW2	Robust information about climate risks and adaptation solutions are accessible to all	• Combine data into meaningful information for different contexts. • Create datasets that better respond to iwi, hapū and Māori needs.

Code	Objective	Explanation
SW4	Unlocking investment in climate resilience	• Ensure that investment from public and private sources is available to respond to growing risks from climate change. • Encourage early investment to help reduce overall costs in the long term.
NE3	Support working with nature to build resilience	• Restoring and protecting indigenous ecosystems, identifying sites that need buffers against climate risks and supporting communities in understanding nature-based solutions as a choice for adaptation.
HBP1	Homes and buildings are climate resilient, and meet social and cultural needs	• Reduce exposure of existing homes and buildings to climate hazards and support businesses and communities to understand and respond to climate risks. • Improve homes and buildings so they can withstand the expected range of temperatures, rainfall and wind, and to improve energy and water efficiency. • Conserve valued cultural heritage.
HBP3	Māori connections to whenua and places of cultural value are strengthened through partnerships	• Support initiatives that identify and respond to climate risks specific to iwi, hapū and Māori. • Work in partnership with hapū, iwi and Māori on Māori-led adaptation solutions. • Identify and embed Māori knowledge, identity and values in urban design and construction to manage climate hazards. • Increase the resilience of cultural heritage, to strengthen the ties between whānau, hapū and iwi and their whenua.
HBP4	Threats to cultural heritage arising from climate change are understood and impacts minimised	• Understand where cultural heritage sites are, their values, who they are important to and how climate change could affect them. • Understand how the loss of cultural heritage can affect social, cultural, spiritual and economic wellbeing, including for Māori, and the positive role of cultural heritage in adaptation and wellbeing. • Improve disaster management for cultural heritage. • Enable communities to maintain and protect their taonga and assets. • Protect and conserve cultural heritage through appropriate regulation.
INF1	Reduce the vulnerability of assets exposed to climate change	• Understand where infrastructure assets and their services are exposed and vulnerable to climate impacts. • Prioritise the risk management of assets so that services can continue if disruption occurs.
INF3	Use renewal programmes to improve adaptive capacity	• Prioritise the risk management of existing assets so that services can continue if disruption occurs. • Consider long-term climate impacts when making decisions to maintain, upgrade, repair or replace existing infrastructure.
EF2	A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks	• Financial entities can identify, disclose and manage the risks to their business. • Insurance access and affordability is understood and managed.

Actions to provide new tools and powers to respond to existing risk

The Government is rolling out a number of major reforms and processes to help New Zealanders respond to existing climate risks, and consider the full range of adaptation options. The resource management reforms are at the centre of that programme of work. These will:

- require local and central government; hapū, iwi and Māori; and communities to plan together how their areas will adapt
- provide planning tools to halt increasing exposure in high-risk areas and facilitate the retreat of communities, homes and infrastructure where risks are intolerable
- support adaptation decision-making by setting out methods and requirements for councils when planning for natural hazards and considering future climate risks through the National Planning Framework
- increase integration between land-use planning and investment decisions. This means that decisions around zoning or other planning mechanisms can occur at the same time as investment and infrastructure planning.

Action 5.1: Pass legislation to support managed retreat will help to implement decisions to retreat once these have been made. This legislation will be developed in partnership with hapū, iwi and Māori and in collaboration with a range of stakeholders that will use it.

Local government is on the front line in preparing for and dealing with climate impacts and risks. To help local government respond to climate risk, action 5.2: The Future for Local Government review will consider changes to local government funding and financing to ensure viability and sustainability, fairness and equity, and maximum wellbeing. The review will also consider when local authority funding should be shared across local government, or with other partners, and when central government co-funding might be justified.

The Government has heard from New Zealanders, and particularly local government, that they are interested in how the new tools and powers being developed might change where costs fall and how costs can be met. To provide greater clarity, the Government will publish the programme of ongoing work across government, which will inform how Aotearoa meets the costs of climate change and invests in resilience (see action 5.5: Publish the programme of work on how Aotearoa meets the costs of climate change and invests in resilience).

Other actions in this plan will also send signals about risk and opportunities, to help manage risks and redirect investment towards resilient projects and products. These include action 3.1: Provide access to the latest climate projections data and action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion. These signals will impact on how adaptation costs will be met and can help to unlock investment.

Action 5.1: Pass legislation to support managed retreat will help to implement decisions to retreat once these have been made. This legislation will be developed in collaboration with a range of stakeholders who will use it, and in partnership with hapū, iwi and Māori, who have particular considerations in relation to whenua Māori and Tiriti considerations.

Addressing inequity

Legislation for managed retreat will need to consider how to minimise risks to social cohesion, which can be worsened when communities need to relocate. It must consider unique challenges for low-income groups and mobility-compromised and disabled people when faced with having to shift. One way of doing this is to provide certainty about the process and the opportunities for people and communities to engage.

The Government will work with stakeholders and partners to draw lessons from existing situations of high risk. This will make sure the managed retreat legislation delivers what is needed for councils and communities to deal with issues on the ground. While developing the legislation, the Government will consider how current tools can support managed retreat before new legislation (for managed retreat and resource management reform) comes into force.

Critical actions

Action 5.1: Pass legislation to support managed retreat

Timeframe: Years 1–2 (2022–24)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW1
Status: Current

The Government will develop legislation to address the complex technical, legal and financial issues associated with managed retreat as described by the Resource Management Review Panel. This legislation is being progressed through the development of the Climate Adaptation Act.

It will draw lessons from existing situations of high risk to make sure it delivers what is needed for councils and communities dealing with issues on the ground. There will be consideration of how current tools and mechanisms can support managed retreat in advance of new legislation – both for managed retreat and for resource management reform more generally – coming into force.

By the end of 2023, the Government is expecting to introduce the Climate Adaptation Bill, setting out the managed retreat framework.

Action 5.2: The Future for Local Government review

Timeframe: Year 1 (2022/23)
Lead agency: DIA
Relevant portfolio: Local Government
Primarily supports: Objective SW1
Status: Current

In 2021, the Minister of Local Government started an independent review of the future for local government.

Adaptation will bring new challenges and opportunities to local governance. The system must be equipped for agile, sustainable and proactive decision-making and implementation. The review is likely to include recommendations on what local government does, how it does it and how it pays for it. This will include what should change in funding and financing to ensure viability and sustainability, fairness and equity, and maximum wellbeing. The review will look at when local authority funding obligations should be shared across local government or with other partners, and when central government co-funding might be justified – as is recommended by the Productivity Commission and He Pou a Rangi – Climate Change Commission for large challenges or shocks, and local services with national benefits.

In mid-2023, the Local Government Review Panel will provide the Minister of Local Government with its final report and recommendations for improving the local governance system. Following this, the Government will decide how to respond to the panel's recommendations.

Image: Hawke's Bay Regional Council

CASE STUDY
Clifton to Tangoio Coastal Hazards Strategy 2120

Coastal communities around Aotearoa are increasingly affected by hazards like coastal inundation (flooding by the sea) and coastal erosion. The Hawke's Bay region is considered to have one of the highest levels of coastal risk exposure. Natural disasters, storms, coastal erosion and inundation along the region's 353-kilometre coastline continue to damage property and threaten people's safety and wellbeing.

In developing the Clifton to Tangoio Coastal Hazards Strategy 2120, the Hawke's Bay Regional Council, Hastings District Council and Napier City Council have worked with local iwi and coastal community representatives to take a proactive, locally led approach to identifying and responding to coastal hazards over the next 100 years. It has been an opportunity for councils to work together on a complex cross-boundary issue to address community concerns.

The strategy identifies coastline areas that may be affected by coastal hazards over the short to long term, and the risks to public and private property, cultural sites and areas, recreation and infrastructure services. It uses the dynamic adaptive pathways planning (DAPP) framework, which presents adaptation solutions as options in a series of future pathways.

Further work is needed to answer questions about how to share the costs of adaptation solutions, and where to allocate the roles and responsibilities for implementing the strategy.

Action 5.3: Complete case study to explore co-investment for flood resilience

Timeframe: Year 1 (2022)
Lead agency: DIA
Relevant portfolio: Local Government
Primarily supports: Objective SW2
Status: Current

The Department of Internal Affairs (DIA) is working with the National Emergency Management Agency (NEMA), the West Coast Regional Council, the Buller District Council and local iwi to explore options to increase flood resilience in Westport. This case study will focus on the challenges facing small local authorities and vulnerable communities in funding flood risk management. It will also highlight the challenges of repeat flooding and climate impacts on an existing community that is located on a flood plain with limited flood defences in place. The case study below describes the current situation in Westport.

In June 2022, ministers will receive a strategic business case from the Buller District Council and West Coast Regional Council on a package of flood resilience options to reduce flood risk in Westport.

Action 5.4: Develop options for home flood insurance

Timeframe: Years 1–2 (2022–23)
Lead agency: Treasury
Relevant portfolios: Finance; Toka Tū Ake EQC
Primarily supports: Objective EF2
Status: Current

Insurance supports New Zealanders' resilience to extreme weather events by facilitating recovery. It does so by paying out for losses and reducing the risk that the Government has to design ad hoc, post-event interventions to help communities recover. Home insurance could also bring other benefits, including signalling risk through underwriting and pricing, and giving homeowners peace of mind.

Work is underway to increase understanding of the scale and timing of changes to the insurance market arising from greater use of risk-based pricing by insurers and flooding exacerbated by climate change. This work includes exploring options to support access and affordability of flood insurance. The Government intends to develop options that ensure home flood insurance continues to play an appropriate role in supporting community resilience.

How effectively flood risks are managed in Aotearoa, including adapting to the changing climate, will influence the scale and timing of any insurance issues. This work has important links with other risk management and adaptation initiatives to keep communities safe. These initiatives reduce communities' exposure to flooding by giving them a better understanding of the risk they face, avoiding development in flood-prone locations, and increasing investment in flood protection.

By the end of 2022, the Government will have received advice on flood insurance options and agreed to next steps. Further implementation measures will depend on the Government's decisions on options.

Image: Nomad Audio & Video

CASE STUDY

Adapting to flood risk in Westport

The Westport community is facing significant challenges in adapting to the effects of flooding and climate change. Severe floods in July 2021 and February 2022 caused widespread damage to homes and infrastructure, and the Buller District Council required central government funding to help with the recovery.

The July 2021 event was the largest direct measurement of a river flow ever recorded in Aotearoa. It flooded over 400 houses, incurred insurance costs of around $56 million, and made it necessary to create a temporary housing area for those who could not return to their homes.

Modelling suggests the Westport community is at high risk of more floods, with climate change expected to increase their frequency and severity. Repeated flooding has heightened community concerns about reducing the risk and protecting assets and livelihoods.

Investment in resilience

An important adaptation action is investing more in flood risk reduction; every $1 invested in flood protection schemes results in a $6 return on investment. A number of risk reduction initiatives are underway locally: the West Coast Regional Council is developing a flood protection scheme; the combined district plan (Te Tai o Poutini Plan) proposes rezoning land to residential in less flood-prone areas together with minimum floor heights; and a local-level climate risk assessment and climate adaptation plan for the Buller District has been initiated.

Financial challenges

Adaptation is complex and can be expensive. Local ability to fund adaptation and flood protection is likely to be a challenge, as many among the population have very low incomes as measured by the socio-economic deprivation index. Meeting these costs may be beyond the financial capacity of the ratepayers and councils.

More equitable funding

Central government (through the Department of Internal Affairs and the National Emergency Management Agency) is partnering with local councils and iwi to explore new funding and financing models for co-investing in flood risk reduction and climate adaptation for Westport. This includes looking at how costs could be more equitably shared between central and local government, and between the community, private sector and other asset owners.

THE IMPORTANCE OF CASE STUDIES

Adaptation case studies and pilot projects can:

- provide significant lessons and benefits for other communities and councils facing similar challenges
- bring the challenges to life by showing what rising sea levels and more frequent and intense floods mean for existing settlements
- show the need for a spectrum of risk reduction options, to consider and refine according to locally agreed criteria – some options might not be technically feasible and others might not be affordable or acceptable
- highlight that some actions can be short term and that others (eg, relocation or retreat) require longer-term solutions
- offer the chance to engage with communities to better understand climate impacts and when these will happen, identify mitigation actions and estimated costs, and work through the funding challenges
- highlight how government initiatives and reforms will play out locally.

Action 5.5: Publish the programme of work on how Aotearoa meets the costs of climate change and invests in resilience

Timeframe: Year 1 (2022)
Lead agencies: MfE; Treasury
Relevant portfolios: Climate Change; Finance
Primarily supports: Objective SW4
Status: Current

New Zealanders share in the costs of managing natural hazard risk, through their own investment decisions, insurance, rates and taxes. Additional investment from public and private sources must also be facilitated where necessary to respond to the growing risks from climate change.

There are many processes underway that could change how New Zealanders currently share the costs of climate change. These include action 4.5: Reform institutional arrangements for water services, action 5.2: The Future of Local Government review and action 5.4: Develop options for home flood insurance.

The Government is also considering adaptation criteria for the Climate Emergency Response Fund (CERF) and is launching its Sovereign Green Bond programme (see action 5.15: Public investment in climate change initiatives). In addition, it continues to explore other options to encourage climate-positive, resilient investment. This will build on existing action 3.2: Design and develop risk and resilience and climate adaptation information portals, and action 3.5: support high-quality implementation of climate-related disclosures and explore expansion. It will communicate how this range of work is progressing across government in one place. A dedicated webpage will be kept up to date as work evolves and new actions are developed.

By the end of 2022, a dedicated webpage will be established to provide an update in one place on the range of work progressing across government.

Action 5.6: Scope a resilience standard or code for infrastructure

Timeframe: Years 1–3 (2022–24)
Lead agency: Te Waihanga
Relevant portfolio: Infrastructure
Primarily supports: Objective INF3
Status: Current

Te Waihanga will scope the impact (including of costs, benefits and regulations) of a standard or code for resilient infrastructure.

This action will focus on:

- how a standard or code would encourage risk reduction and resilience planning in existing and new assets
- how to integrate resilience planning into the asset-management cycle, to maximise uptake and impact
- the role of resilience standards in enabling communities to better match their own planning and strategies to the resilience of the networks they rely on, reviewing the costs and benefits of this being a mandatory or voluntary standard.

If a standard or code proceeds, it would draw on international leading practice, the guidance for assessing impacts on physical assets and the services they provide (Action 3.8), and the general data, tools and guidance that will be part of the system-wide actions.

By 2024, stakeholder feedback on a resilience standard or code will have been received.

Action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings

Timeframe: Years 1–4 (2022–26)
Lead agencies: HUD; MBIE
Relevant portfolios: Housing; Building and Construction
Primarily supports: Objective HBP1
Status: Current

This action includes five components that build off one another and are necessary to inform regulatory change and other actions in this chapter. These five components are:

- collate existing information to help people adapt their homes and buildings
- carry out research to understand the impacts of climate hazards on various housing typologies, and the costs and benefits of adaptation at the property level
- develop property-level guidance based on updated climate data to inform homeowners and renters about climate impacts and their options to respond to risks
- develop an assessment framework to help building owners, developers and new home builders identify relevant climate hazards and understand their building's adaptation requirements
- investigate incentives that could help building owners to increase their building's resilience.

Work will start immediately on providing existing information to help people understand adaptation for homes and building. By August 2024, enough data will be available to inform the development of an assessment framework in years 3–4 (2024–26) and regulatory updates.

By 2024, initial research stages will have been scoped and funded and will be underway. Sufficient data will be available to inform the development of an assessment framework in years 3–4 (2024–26).

Action 5.8: Support kaitiaki communities to adapt and conserve taonga/cultural assets

Timeframe: Years 1–6 (2022–28)
Lead agency: MCH
Relevant portfolio: Culture and Heritage
Primarily supports: Objectives HBP3 and HBP4
Status: Current

Work across government to ensure hapū, iwi and Māori and communities have access to information so they can plan for a changing climate and adapt their cultural assets. Support includes advice, wānanga (conferences, forums, seminars), expert assistance, information sharing and funding advice for kaitiaki to self-determine adaptation pathways.

This action will be a coordinated cross-government approach, partnering with hapū, iwi and Māori to understand the threats to cultural heritage and to support initiatives to reduce the impact.

This action will also help achieve objective HBP1 (Homes and buildings are climate resilient, and meet social and cultural needs) by adapting and conserving physical structures of cultural value. It also contributes to objective HBP4 (Threats to cultural heritage arising from climate change are understood and impacts minimised) through its focus on taonga of significant value to hapū, iwi and Māori.

By 2024, the Ministry for Culture and Heritage (MCH) will have started working with relevant partners on how improvements can be made to support and access to information on cultural assets to assist kaitiaki to self-determine adaptation pathways.

Action 5.9: Prioritise nature-based solutions

Timeframe: Years 1–6 (2022–28)
Lead agencies: DOC; MfE
Relevant portfolios: Environment; Conservation
Primarily supports: Objective NE3
Status: Current

To address the climate and biodiversity crises together, the Government will prioritise nature-based solutions in planning and regulations, where possible, for both carbon removals and climate change adaptation. It will also investigate how to best ensure that climate change policy and planning use a biodiversity lens to prioritise nature-based solutions.

By 2024, a framework will be developed, and prioritising of nature-based solutions in regulations and planning will be underway and future implementation measures confirmed.

Supporting actions

Action 5.10: Develop and implement the Transpower Adaptation Plan

Timeframe: Years 1–5 (2022–27)
Lead agency: Transpower
Relevant portfolio: Energy and Resources
Primarily supports: Objective INF3
Status: Current

The Transpower Adaptation Plan will outline how Transpower will adapt to climate change through the design, delivery and operation of the national grid. It will address exposed assets and new investment in infrastructure, and consider adaptation in maintenance and development programmes.

Transpower will consider multiple risks to the national grid from climate hazards, including coastal inundation, increased frequency of high-impact flood and wind events, and accelerated erosion.

Action 5.11: Encourage and support the evaluation of climate risks to landfills and contaminated sites

Timeframe: Years 1–2 (2022–24)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective INF1
Status: Current

Coastal inundation and flooding could be a significant risk to existing and closed landfills and contaminated sites across the country. At least 110 closed landfills are vulnerable to sea-level rise.

The Ministry for the Environment (MfE) has helped councils develop a tool to evaluate climate risks for landfills and contaminated sites. This may make it easier for local government to evaluate these risks and support planning to address them.

Action 5.12: Explore funding options to support the investigation and remediation of contaminated sites and landfills vulnerable to the effects of climate change

Timeframe: Years 4–6 (2025–28)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective INF1
Status: Current

The liability of legacy landfill remediation generally sits with territorial authorities, which have variable ability to pay, particularly in smaller local government areas. Considering this, the Government has agreed to consider how best to support the funding of remediation.

Access to funding will help to turn risk assessment into risk reduction, and ensure remediation occurs before inundation risks become a reality. The scope of the current Contaminated Sites Remediation Fund does not cover climate impacts.

Action 5.13: Connect communities to wider response and recovery support

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective C3
Status: Current

This action will continue work with central and local government, communities (including rural communities), iwi, organisations and others to support effective, integrated disaster response and recovery. Communities affected by disasters will be assisted by networks that are locally led, regionally coordinated and nationally supported.

Action 5.14: Support the development of definitional tools to encourage greater investment in 'green' projects

Timeframe: Years 1–3 (2022–25)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW2
Status: Current

This will support the development of a 'green' taxonomy to identify a common definition of climate and nature-positive investments. This could help guide businesses that are investing in both adaptation and mitigation to protect against greenwashing. If aligned with best practice, it could support greater international investment in Aotearoa New Zealand's climate-resilient projects, including nature-based solutions.

Action 5.15: Public investment in climate change initiatives

Timeframe: Years 1–6 (2022–28)
Lead agency: Treasury
Relevant portfolio: Finance
Primarily supports: Objective SW3
Status: Current

The Government is supporting climate change objectives through its approach to the public finance system. This includes the establishment of the Climate Emergency Response Fund (CERF) and the Sovereign Green Bond (Green Bond) programme.

In 2021, the Government established the CERF with an initial $4.5 billion down payment, funded with cash proceeds from the New Zealand Emissions Trading Scheme (NZ ETS).

Government agencies can submit bids to the CERF, primarily through the annual Budget process, to access funding to support climate change initiatives.

In Budget 2022, the CERF was focused on the emissions reduction plan. However, for future Budgets the Government will consider extending the scope of the CERF to fund measures to support climate change adaptation.

In November 2021, the Government announced plans to issue Sovereign Green Bonds (Green Bonds) from 2022 onwards. Green Bonds provide financing for low-emission or environmental projects. Money raised from the Green Bonds will be used to support projects that help reach our climate objectives. Subject to market conditions and progress of establishment activity, final details of the Green Bond programme will be announced mid-2022 and then Green Bonds will be issued in late 2022.

Action 5.16: Identify options to increase the integration of nature-based solutions into urban form

Timeframe: Years 1–2 (2022–24)
Lead agency: HUD
Relevant portfolio: Housing
Primarily supports: Objective HBP2
Status: Proposed

This work will build on indigenous knowledge and new research to produce new data and insights on nature-based solutions such as vegetation (eg, street trees and green roofs) and water elements (eg, open canals and waterways). This includes understanding barriers and identifying ways to accelerate nature-based solutions through changes to urban form and development. Findings will be progressed through action 4.1 Reform the resource management system and action 7.5: Update housing and urban settings. Given the already inequitable distribution of nature-based solutions such as trees and green spaces in our cities, this action will also carefully consider impacts on equity.

This action will help reduce the impact of climate events, such as flooding and heatwaves, in our urban areas to improve outcomes for people, communities and biodiversity. It will also help to ground urban adaptation in mātauranga Māori, and recognise that its outcomes already draw on fundamental Māori values.

CHAPTER 6:

Natural environment

Chapter 6: Natural environment

Natural environment	
Government agencies with actions in this chapter	• Department of Conservation (DOC) • Ministry for Primary Industries (MPI) • Ministry for the Environment (MfE) • New Zealand Customs Service (NZ Customs)
Why these actions are important for building resilience	A healthy and diverse natural environment will withstand climate change impacts. We can make this happen by reducing human-induced pressures, reducing predator and browser activities, and restoring ecosystems. When ecosystems are healthy, they buffer us from the impacts and contribute to our social, economic and cultural wellbeing.
Significant risks addressed in this chapter N = Natural	• N1: Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events. • N2: Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.
Objectives relevant to critical actions NE = Natural environment	• NE1: Ecosystems which are healthy and connected, and where biodiversity is thriving. • NE2: Robust biosecurity reduces the risk of new pests and diseases spreading. • NE3: Support working with nature to build resilience.
Critical actions relevant to this chapter	• Implement the Department of Conservation (DOC) Climate Change Adaptation Action Plan (CCAAP) to assess ecosystem and species vulnerability to climate impacts, and the adaptation actions to enhance their resilience. • Engage with councils on how climate impacts on coastal ecosystems can be reduced by implementing the New Zealand Coastal Policy Statement. • Implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy to ensure the protection, restoration and sustainable use of biodiversity in Aotearoa. • Implement the proposed National Policy Statement on Indigenous Biodiversity to protect, maintain and restore indigenous biodiversity. • Deliver climate, biodiversity and wider environmental outcomes through an integrated work programme. • Implement key freshwater management programmes to ensure water availability, security and healthy waterways. • Implement the National Policy Statement on Freshwater Management 2020 to ensure the healthy functioning of freshwater ecosystems and reduce negative impacts from land use. • Deliver biosecurity actions to protect our indigenous ecosystems and economy from invasive species.

Why we need to take action

A resilient natural environment can buffer the impacts of climate change for human and natural systems.

The natural environment encompasses indigenous and non-indigenous species in natural and modified terrestrial, freshwater and marine environments. It includes all ecosystems in environments from mountains to the sea (ki uta ki tai).

Due to our geographical isolation, many of Aotearoa New Zealand's indigenous plants and wildlife exist nowhere else on Earth: we have a unique diversity of species.

Our taonga species and ecosystems[1] make a significant contribution to global biodiversity and underpin the way we are seen worldwide. Internationally, the biodiversity crisis and the climate crisis are acknowledged to be closely linked.

All aspects of life in Aotearoa rely on a thriving natural environment. It is essential for our physical and mental health, water security, culture and economy. The natural environment contributes to climate resilience by buffering climate impacts, improving wellbeing and sequestering carbon. These linkages are acknowledged in Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020.[2]

From the perspective of te ao Māori, the natural environment is interconnected through genealogical links to all facets of the environment, including Papatūānuku (earth mother), Ranginui (sky father), Tāne mahuta (forests) and Tangaroa (sea). When the environment is unwell, this affects our health and wellbeing.

A thriving natural environment is more resilient to climate change because it can recover from, and absorb, disturbances and has the capacity to reorganise into similar ecosystems. Addressing climatic and human-induced pressures on the environment is key to a thriving and resilient natural system.

Pressure on coastal ecosystems

Aotearoa New Zealand's coastal ecosystems and species are vulnerable to gradual and extreme changes in climate. Sea-level rise puts pressure on coastal ecosystems and forces them to move inland where possible, or submerges them where landward migration is not possible.

Subdivisions and urban development reduce the availability of sites for landward migration by ecosystems and species as sea levels rise, and reduce bird habitat.

Although coastal ecosystems tend to adapt well to natural hazards, the increase in frequency and intensity of climate events gives them less time to recover.

Reducing human pressures and planning for ecosystem corridors are the best ways to enable coastal ecosystems to respond to climate change.

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1 Endemic to New Zealand are unique species of bat, frog and insect, ancient tuatara, flightless birds and beech forests.

2 Department of Conservation. 2020. *Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020.* Wellington.

Spread of pests and diseases

Our natural systems are already under pressure from exotic pests and diseases, which threaten indigenous biodiversity and species crucial to trade. Climate change increases the chance of established pests spreading further, reproducing faster and having greater adverse impacts on biodiversity. It also increases the risk of new invasive pests and diseases becoming established.

By strengthening our border biosecurity system and supporting pest management programmes, we will be able to identify and manage the risks from new and established pests early. Identifying areas and species vulnerable to shifts in pest distribution will also help manage this risk.

Impacts on hapū, iwi and Māori

Te ao Māori principles and way of life are likely to be compromised by changes in the natural environment due to climate change. Whakapapa is the intergenerational obligation of caring for the environment, empowering Māori to actively care for and preserve the natural world, ensuring that it is used sustainably by present and future generations.

Climate risks in the natural environment affect Māori cultural, economic and spiritual wellbeing. Climate change will affect culture and customs relating to mahinga kai (food-gathering sites) and urupā (burial grounds), as well as economic opportunities through cascading impacts on tourism and agriculture. The loss of vulnerable species and ecosystems will disturb relationships Māori have with these living taonga.

Image: Ministry for Primary Industries

CASE STUDY
Queensland fruit fly

In future, climate change is likely to create conditions that enable the Queensland fruit fly (Q-fly) to establish in Aotearoa. This insect pest can cause serious harm, making over 100 types of fruits and vegetables inedible. It is seen as one of the most significant biosecurity threats to our horticultural industries.

In 2015, the first breeding population of Q-fly was detected in Auckland. The response to this detection resulted in the disposal of more than 530 tonnes of fresh produce, and the cost of the operation amounted to approximately $13.6 million. The ongoing national surveillance trap network (since 1986) has proven effective in detecting Q-fly early in Aotearoa, enabling a quick and immediate response to minimise the impacts on our environment and trade. About 7,900 traps in the national surveillance network have been placed throughout the country, in locations where there is a high risk that Q-fly will enter and become established. This initiative has helped prevent the establishment of a Q-fly population to date.

Ongoing research is essential in providing information on how to run surveillance programmes (including climate considerations) to inform future decisions.

Significant risks

The actions in this chapter are designed to address the 12 natural environment risks in the National Climate Change Risk Assessment 2020. They address the following significant risks:

- N1: Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events
- N2: Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.

Objectives

When ecosystems are healthy and diverse, they can adjust more effectively to climate threats.

The natural environment has high ecological integrity because human-induced pressure has eased and restoration efforts have been successful. Ecological corridors protect our biodiversity and enable species and ecosystems to move across landscapes as the climate changes. By understanding the impacts of these changes and reducing pressures, we give ecosystems more time to adjust to new climate threats.

Nature-based solutions buffer against climate impacts, while also fostering wellbeing, sequestering carbon and increasing biodiversity.

The Government has identified three objectives to support a resilient natural environment, which in turn will support resilient communities.

Table 5: Government objectives to support a resilient natural environment

Code	Objective	Explanation
NE1	Ecosystems that are healthy and connected, and where biodiversity is thriving	• Biodiversity, ecosystems and dynamic land and sea environments are strengthened. • Ecosystem health improves, ecosystems and species have room to move, and human pressures lessen. • The natural environment can best respond to climate impacts if it is intact and connected. Its natural diversity, and ecological and physical processes, are supported and enhanced.
NE2	Robust biosecurity reduces the risk of new pests and diseases spreading	• Plants and animals are more resilient through the control of invasive pests and diseases, and the risk of these establishing and spreading is reduced.
NE3	Support working with nature to build resilience	• Indigenous ecosystems are restored and protected, sites that need buffers against climate risks are identified and communities are supported in understanding nature-based solutions as a choice for adaptation.

Actions to support a thriving natural environment

Critical actions to support a natural environment that is healthy and diverse, and that can adjust more effectively to climate threats are set out below and also in chapter 3: Enabling better risk-informed decisions, chapter 4: Driving climate-resilient development in the right locations and chapter 5: Adaptation options including managed retreat.

These actions include:

- providing advice to landowners about restoration and regeneration of indigenous forest (action 3.13: Provide a forestry planning and advisory service)
- helping farmers plan to support biodiversity (action 3.14: Deliver the Integrated Farm Planning Programme)

- developing mātauranga Māori indicators of climate impacts on the natural environment, which will facilitate baseline datasets for monitoring climate impacts on the natural environment. These in turn will be used for environmental assessments and will centralise indigenous knowledge and values in adaptation monitoring and assessment (action 3.21: develop mātauranga Māori indicators of climate impacts on the natural environment)
- prioritising nature-based solutions, which will ensure such solutions for climate adaptation will be considered in the Government's planning and regulatory systems where possible (action 5.9: Prioritise nature-based solutions)
- prioritising the health of water bodies and freshwater in Aotearoa to ensure these ecosystems have the capacity to adapt to climate impacts (action 6.7: Implement the National Policy Statement for Freshwater Management 2020).

Addressing inequity

Programmes targeted at water security and biosecurity will make the natural environment more resilient and support Māori, food and fibre producers and rural communities.

Actions across this chapter will help to protect the natural environment for future generations, while enabling disproportionately impacted people and communities to adapt to changes and build resilience.

The spread of new pests and diseases could affect the wellbeing, customary practices, cultural identity and social cohesion of Māori communities and may threaten indigenous biodiversity. Action 6.8: Deliver a collection of actions run by Biosecurity New Zealand will help protect taonga species and support the wellbeing and cultural identity of Māori.

Climate change can create new habitats for tree species and make existing habitats unsuitable. Māori may be disproportionately affected because they own 40 per cent of the commercial forest. Action 3.13: Provide a forestry planning and advisory service and action 6.12: Implement the Sustainable Land Management Hill Country Erosion Programme will support Māori to meet aspirations for their land and help them make good adaptation decisions.

Landowners, food and fibre businesses and rural communities are especially vulnerable to both acute climate events and more gradual climate change impacts that affect water availability and security. These effects also limit options for landowners to implement climate-resilient land uses, including owners of underdeveloped land (much of which is Māori-owned). Action 6.6: Implement the Water Availability and Security programme will help food and fibre sectors and rural communities have appropriate access to water, and support tangata whenua aspirations. The programme will enable the transition to a sustainable food and fibre sector, and support the resilience of rural communities and the welfare of animals.

Critical actions

Action 6.1: Implement the Department of Conservation Climate Change Adaptation Action Plan

Timeframe: Years 1–4 (2022–25)
Lead agency: DOC
Relevant portfolio: Conservation
Primarily supports: Objective NE1
Status: Current

The Department of Conservation (DOC) Climate Change Adaptation Action Plan (CCAAP) is a medium-term plan, which applies to public conservation land and waters managed by DOC, as well as threatened native species and systems.

The plan aims to assess ecosystem and species vulnerability to climate impacts, and the adaptation actions to enhance their resilience. Possible actions include translocating climate-vulnerable species, and pest control to improve the resilience of native ecosystems.

By 2024, a reporting framework on the implementation of the CCAAP will be in place. DOC adaptation work progress will be reported against the framework.

Action 6.2: Engage with councils to implement the New Zealand Coastal Policy Statement

Timeframe: Years 1–6 (2022–28)
Lead agency: DOC
Relevant portfolios: Conservation; Local Government
Primarily supports: Objective NE1
Status: Current

Regional policy statements, regional plans and district plans must give effect to the New Zealand Coastal Policy Statement 2010 (NZCPS). However, most councils have not yet implemented the NZCPS.

The NZCPS provides the policy mechanism for protecting indigenous biodiversity in the coastal environment, and for managing risks to coastal ecosystems (policies 11, and 24–27 NZCPS). The NZCPS's coastal hazard management mechanisms include managed retreat and nature-based solutions.

The NZCPS emphasises integrated and strategic planning for current and future activities and cumulative effects, irrespective of jurisdictional boundaries and responsibilities (policies 4 and 7 NZCPS).

By 2024, DOC will review progress on NZCPS implementation by councils.

Action 6.3: Implement Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020

Timeframe: Years 1–6 (2022–28)
Lead agency: DOC
Relevant portfolio: Conservation
Primarily supports: Objective NE1
Status: Current

Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 (ANZBS) is a strategic document for the protection, restoration and sustainable use of biodiversity in Aotearoa from 2020 to 2050. It guides all those who work with, or have an impact on, biodiversity, including whānau, hapū, iwi, central and local government, industry, non-government organisations, scientists, landowners and individuals.

A priority of ANZBS is to ensure efforts to tackle biodiversity loss and climate change are reciprocal. Climate-specific goals come under objective 13: Biodiversity provides nature-based solutions to climate change and is resilient to its effects. Objective 11 also responds to climate risk: Biological threats and pressures are reduced through management. There are goals relating to predator control, browser management, coastal habitat protection and restoration, as well as getting the system right and empowering action across the sector.

The first iteration of the plan was launched in April 2022 and includes actions by agencies and local government.

By 2024, the collaborative structures and channels into the biodiversity sector will be established and the second implementation plan will be launched.

Action 6.4: Implement the proposed National Policy Statement on Indigenous Biodiversity

Timeframe: Years 1–6 (2022–28)
Lead agencies: MfE; DOC
Relevant portfolios: Environment; Conservation
Primarily supports: Objective NE1
Status: Current

The regulatory arm of Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020 is the National Policy Statement for Indigenous Biodiversity (NPS-IB), currently under development. The objective of the NPS-IB is to protect, maintain and restore indigenous biodiversity.

The NPS-IB plays a part in building the resilience of biodiversity to climate change through its role in protecting, maintaining and restoring biodiversity, including requiring councils and landowners to consider creating ecological corridors.

Protections for indigenous biodiversity will be transitioned into the resource management reform in 2023. This will be a new opportunity to bring in specific adaptation policies for biodiversity and ecosystem conservation across Aotearoa.

By 2024, the NPS-IB will be in force and implementation will have begun.

Action 6.5: Establish an integrated work programme to deliver climate, biodiversity and wider environmental outcomes

Timeframe: Years 1–4 (2022–26)
Lead agencies: DOC; MfE
Relevant portfolios: Conservation; Environment
Primarily supports: Objective NE3
Status: Current

The Government will establish an integrated work programme to address climate change and biodiversity loss together. This initiative will address key barriers to regenerating and protecting native ecosystems – such as the higher costs of investing in native ecosystems and lack of Aotearoa-specific evidence on non-forest carbon sequestration – and create better incentives for restoring native ecosystems. It will also investigate how private and public money intended for offsetting hard-to-reduce emissions could support both climate and biodiversity outcomes. The programme will focus on the following areas.

- Supporting restoration and protection of indigenous forests. This includes:
  - reducing the costs of native plants
  - establishing a long-term work programme to support native afforestation and restoration.
- Improving knowledge about nature-friendly carbon removals. The Government is supporting research into the carbon removal and storage potential of native ecosystems. This includes research to scope:
  - improving Aotearoa-specific estimates of organic soil emissions (undertaken by Manaaki Whenua – Landcare Research and the University of Waikato)
  - the impacts of management interventions on carbon sequestration and storage.
- Supporting native afforestation and restoration through the Carbon Neutral Government Programme. By 2025, emissions that cannot be reduced under the Carbon Neutral Government Programme must be offset. The work programme will investigate how offsetting those emissions could also promote biodiversity and wider environmental outcomes.
- Investigating incentives for public and private investment in biodiversity. This work will investigate how:
  - to remove barriers landowners face in accessing funding and information
  - investments in biodiversity can protect and enhance carbon stocks and support climate resilience.

By 2024, all actions in the work programme will be underway.

Action 6.6: Implement the Water Availability and Security programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI (MfE support)
Relevant portfolio: Agriculture
Primarily supports: Objective NE1
Status: Current

Climate change increases natural water variability, affecting access to freshwater across the country.

The Water Availability and Security programme will help food and fibre businesses and rural communities adapt to increasingly variable natural water availability through a range of complementary activities to both reduce demand and make best use of available water. It will help restore and maintain the health of waterways, taking its lead from the National Policy Statement on Freshwater Management.

By 2024, the Ministry for Primary Industries (MPI) will form a permanent team to address water availability and security in the food and fibre sectors and rural communities. This work will include partnering with Māori, rural communities and other sectors to find solutions.

Action 6.7: Implement the National Policy Statement on Freshwater Management 2020

Timeframe: Years 1–6 (2022–28)
Lead agency: MfE
Relevant portfolio: Environment
Primarily supports: Objective NE1
Status: Current

Adaptation action for freshwater bodies will be achieved through local councils devising suitable plan provisions (eg, rules) to achieve a range of outcomes, and must ensure the ability to use resources (eg, land use, discharges, etc) is matched to the assimilative capacity of freshwater.

The National Policy Statement on Freshwater Management 2020 (NPS-FM 2020) applies to all freshwater, including groundwater, and will require management of freshwater in both rural and urban areas. It requires councils to give effect to Te Mana o te Wai, which prioritises the health and wellbeing of water bodies and freshwater ecosystems. Water users will adapt land-use practices in response to these and as the climate impacts become apparent. These actions will ensure the healthy functioning of freshwater ecosystems and mitigate negative impacts from land use.

By 2024, regional councils will notify plans implementing the NPS-FM 2020.

Action 6.8: Deliver a collection of actions run by Biosecurity New Zealand

The following actions address risks to indigenous ecosystems and species that result from the greater spread, survival and establishment of invasive species. They also help build climate resilience of ecosystems generally.

Action 6.8.1: Implement an on-farm biosecurity programme

Timeframe: Years 1–2 (2022–24)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

This programme aims to improve biosecurity on dairy and sheep and beef farms and create a more resilient biosecurity system. It is responsible for developing and implementing an action plan to overcome barriers and increase voluntary on-farm biosecurity practices.

By mid-2023, changes will have been measured in the four core behaviours (talk about biosecurity, show leadership, be curious to understand the risks, and make choices – recognition and reinforcement) to track programme impact against objectives.

Action 6.8.2: Invest in strengthening border biosecurity

Timeframe: Years 1–6 (2022–2028)
Lead agencies: MPI; NZ Customs
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

Two significant projects (Sea Cargo Programme and Mail Pathways Project) delivered by Biosecurity New Zealand will improve how we address the biosecurity risk from mail and sea cargo pathways. They will also protect biodiversity by identifying pest species that arrive through our international borders.

Action 6.8.3: Continue the Freshwater Biosecurity Partnership Programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

The Ministry for Primary Industries (MPI) leads the Freshwater Biosecurity Partnership Programme in partnership with the Department of Conservation (DOC), Fish and Game New Zealand, specific Māori entities, regional councils, Land Information New Zealand and various industry groups, including Genesis Energy and Meridian Energy. The programme's vision is to take collaborative action to protect Aotearoa New Zealand's freshwater from the impacts of freshwater pests. A changing climate could make more waterways vulnerable to freshwater pest establishment. The programme includes the Check Clean Dry campaign, a national social marketing campaign aimed at preventing the spread of freshwater pests.

The programme will include a focus on supporting the development of effective early-detection and control tools. It will also improve access to information about the distribution of freshwater pests, enabling the Check Clean Dry campaign to be targeted to the highest-risk locations, activities and distribution pathways.

By 2024, development and implementation of an updated Freshwater Biosecurity Partnership Programme strategy will be completed, which includes more support for collaboration on developing new or improved detection and control tools.

Action 6.8.4: Reduce the spread and impacts of marine pest species through the Clean Hull programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

This involves implementing a behaviour change programme to address the risks of marine pest spread via domestic vessel movements. This will build on existing marine biosecurity partnerships in the upper North Island, upper South Island and Fiordland.

By 2024, the Clean Hull programme will be designed, and a baseline established of awareness of risks from vessel movements and current behaviours of vessel owners.

Action 6.8.5: Prevent the spread of wilding conifers, and contain or eradicate established areas of wilding conifers by 2030

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

Established in 2016, this programme ensures a collaborative, coordinated and effective national approach to wilding conifer control. This reduces fire risk, improves water availability (including for hydropower generation), prevents the loss of productive land and preserves the biodiversity of indigenous ecosystems.

By 2024, the programme will protect 4 million hectares of land that is significantly vulnerable to invasion by controlling wilding conifer infestations.

Action 6.8.6: Continue the National Interest Pest Responses programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

Nine harmful weeds are managed under the National Interest Pest Responses (NIPR) programme, with the aim of eradicating them or significantly reducing infestations. These weeds could cause serious harm to Aotearoa's environment and economy if allowed to spread.

By 2024, a technical review of each of the National Interest Pest Responses species control programmes will be completed.

Action 6.8.7: Invest in plant health and environmental capability facility

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

Significant investment in Ministry for Primary Industry (MPI) plant health and environment work (currently in Tāmaki, Auckland) will support growth and development in the arable, forestry and horticulture sectors. It will speed up access to high-value plant varieties and cultivars, to support commercialisation of new products. Faster access to genetic material can support innovation and bring benefits such as higher yields and resilience to pests and diseases.

In November 2022, a detailed business case is submitted for Cabinet approval.

Action 6.8.8: Use the Animal Health Laboratory and Plant Health and Environment Laboratory

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Biosecurity
Primarily supports: Objective NE2
Status: Current

The Animal Health Laboratory (AHL) and Plant Health Environment Laboratory (PHEL) are national reference laboratories that identify and validate suspected exotic and endemic pests and diseases affecting farm and aquatic animals. AHL diagnoses, researches and helps control wildlife diseases and PHEL identifies pests and diseases affecting plants and the environment, as well as exotic and invasive plants. They bring a better understanding of new and emerging pests and diseases that are likely to establish in a changing climate.

By January 2024, the diagnostic capabilities to manage new and suspected exotic pests and diseases through an operational research programme and collaboration with internal and international organisations will be enhanced.

Supporting actions

Action 6.9: Deliver Jobs for Nature to restore indigenous ecosystems

Timeframe: Years 1–6 (2022–28; some projects ongoing)
Lead agencies: MfE; DOC; MPI
Relevant portfolios: Environment; Conservation
Primarily supports: Objective NE1
Status: Current

This action supports more than 200 projects to restore ecosystems, control pests and mobilise community action across the country. Biodiversity can be strengthened by restoring ecosystems and reducing pests.

Action 6.10: Implement *Revitalising the Gulf: Government action on the Sea Change Plan*

Timeframe: Years 1–2 (2022–24)
Lead agencies: DOC; MPI
Relevant portfolios: Conservation; Oceans and Fisheries
Primarily supports: Objective NE1
Status: Current

This initiative includes establishing 19 new areas of marine protection and an area-based fisheries plan in the Hauraki Gulf Marine Park. Other elements include restricting trawling to specified trawl corridors, protected species initiatives, active habitat restoration, marine biosecurity, aquaculture and Ahu Moana (local marine management by mana whenua and communities).

Research, monitoring and reporting will inform an adaptive management approach. Together, these actions will enhance the health of the marine ecosystem in the Hauraki Gulf / Tīkapa Moana (and therefore its resilience).

Action 6.11: Implement the South-east Marine Protection Initiative

Timeframe: Years 1–2 (2022–24)
Lead agencies: DOC; MPI
Relevant portfolio: Conservation; Oceans and Fisheries
Primarily supports: Objective NE1
Status: Current

This initiative may result in 12 new areas of marine protection in the southeast waters of the South Island, co-managed by the Crown and Ngāi Tahu. It will improve the health of the marine ecosystem (and therefore its resilience) by managing impacts, and will inform future management through science, mātauranga Māori and monitoring.

Action 6.12: Implement the Sustainable Land Management Hill Country Erosion Programme

Timeframe: Year 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Forestry
Primarily supports: Objective NE1
Status: Current

The Sustainable Land Management Hill Country Erosion Programme will support regional planning for, and treatment of, erosion-prone land and, in turn, contribute to afforestation.

Afforestation can reduce soil loss and other effects from the increasing scale and magnitude of storms. It also mitigates downstream damage to infrastructure. The programme reduces the impacts of erosion and sediment deposition most acutely felt by farmers and rural communities during heavy weather events, such as the high-rainfall event on the East Coast in March 2022.

Other actions across this plan will contribute to a resilient natural environment

Actions in other chapters that will support a resilient natural environment include:

- action 5.16: Identify options to increase the integration of nature-based solutions into urban form, which will increase biodiversity and natural areas in urban spaces
- action 8.7: Embed nature-based solutions as part of the response to reducing transport emissions and improving climate adaptation and biodiversity outcomes
- action 10.2: Strengthen fisheries rules, which includes catch limits that will enable stocks to replenish
- action 10.6: Continue delivering the Sustainable Land Management and Climate Change and the Greenhouse Gas Inventory research programmes, which will fund research and develop tools to support the farming sector and mitigate land-use impacts on freshwater.
- action 10.13: Support the implementation of Aotearoa Circle Seafood Sector Adaptation Strategy, which has a goal to enhance the resilience of the marine environment.

CHAPTER 7:

Homes, buildings and places

Chapter 7: Homes, buildings and places

Homes, buildings and places	
Government agencies with actions in this chapter	• Ministry for Culture and Heritage (MCH) • Ministry of Business, Innovation and Employment (MBIE) • Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development (HUD)
Why these actions are important for building resilience	Our homes, buildings and places are at the centre of our lives. They play a vital role in our health, wellbeing and quality of life. Many homes and buildings are in areas at risk of flooding and sea-level rise, and impacts of climate change can reduce their durability. The potential costs are high. How and where we build can help our communities adapt.
Significant risks addressed in this chapter B = Built	B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise.
Objectives relevant to critical actions HBP = Homes, buildings, places	• HBP1: Homes and buildings are climate resilient, and meet social and cultural needs. • HBP2: New and existing places are planned and managed to minimise risks to communities from climate change. • HBP3: Māori connections to whenua and places of cultural value are strengthened through partnerships. • HBP4: Threats to cultural heritage arising from climate change are understood and impacts minimised.
Critical actions relevant to this chapter	• Help building owners, renters and new home builders reduce and manage the impacts of climate hazards on homes and buildings. • Reduce the exposure of public housing tenants to climate hazards through a framework for adaptation options for public housing. • Ensure funding decisions for urban development and housing, including Māori housing, consider climate hazards. • Support kaitiaki communities to adapt and conserve taonga/cultural assets.

Why we need to take action

Climate change affects our homes, buildings and places, but where and how we build can help us adapt.

Homes, buildings and places[1] are the foundation of our communities. They include the physical environment around us, the people in that environment and the interaction between the two.

The form, design and characteristics of our homes, buildings and places play a vital role in our health, wellbeing and quality of life.

[1] In the context of this outcome area, 'places' refers to urban or rural areas, ranging from neighbourhoods to towns and regions. Adaptation must address both the physical elements of a place (eg, homes, buildings, infrastructure and spaces around them) and the social elements (eg, the identity of people and communities, cultural value).

Significant risks

The actions in this chapter address the following significant risk identified in the National Climate Change Risk Assessment 2020:

- B2: Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise.

These actions also address:

- H5: Risks to Māori social, cultural, spiritual and economic wellbeing from loss and degradation of lands and waters, as well as cultural assets such as marae, due to ongoing sea-level rise, changes in rainfall and drought
- H8: Risks to Māori and European cultural heritage sites due to projected ongoing sea-level rise, extreme weather events and increasing fire weather.

Most of our existing homes and buildings were located without ongoing climate change in mind and built to perform under climate conditions at the time. However, as the climate changes, an increasing number of those homes and buildings are at risk of becoming less liveable or being damaged or destroyed.

For example, a warmer, wetter climate may affect the durability of building materials and the lifespan of homes and buildings. This could include an increased risk of damage due to coastal erosion, or of subsidence during intense rainfall and coastal storm surges.

Damage to existing housing stock from climate change could have knock-on effects for the country's housing supply. It could further reduce the supply and affordability of housing, weaken social cohesion and prevent communities from growing. It could also reduce access to good-quality housing for tenants, individuals (particularly women) and whānau experiencing or at risk of homelessness.

The potential impact on our communities is high

About 675,000 (or one in seven) people across Aotearoa live in areas that are prone to flooding, which amounts to over $100 billion worth of residential buildings. Over 72,000 people live in areas at risk of storm surges. The number of people exposed to these hazards will increase as rainfall increases, storms become more frequent and sea levels rise.

A threat to our cultural heritage

Climate change presents risks to culture, cultural heritage, traditional knowledge and ways of life. Cultural heritage includes historic sites, structures, places and areas; archaeological sites; sites of significance to Māori, including wāhi tapu; and cultural landscapes. Many communities will face challenges in activities such as documenting and conserving their cultural heritage and managing their cultural infrastructure.

Stresses on Māori, iwi and hapū

Climate hazards can affect homes and buildings on whenua Māori, and threaten the unique cultural and spiritual connection Māori have to whenua.

Whenua Māori and land returned through the Treaty settlement process is often on coastal fringes and lowland areas exposed to flooding, erosion and sedimentation.

Many significant cultural sites, such as marae, urupā, ancient gardens and healing places, are also along coastlines or near flood-prone rivers.

Image: Kāinga Ora

CASE STUDY
Reducing the impact of urban heat islands

The effects of heatwaves are felt more in urban areas because they absorb, produce and retain more heat. Vehicles and buildings generate heat, and the dark, paved surfaces that typically cover urban areas absorb heat. These surfaces also allow fewer plants to grow. This reduces the cooling effects of shading and evaporation, and worsens air pollution.

The resulting urban heat-island effect can increase temperatures in cities relative to their surrounding areas. Heat absorbed throughout the day is then released in the evening, raising night-time temperatures and worsening the effects of heatwaves.

Why the heat-island effect is an issue for people

Being exposed to extreme heat for prolonged periods puts stress on the body and can worsen health conditions. Heatwaves have widespread negative impacts on health, wellbeing and levels of comfort, especially for older people and those who may not be able to pay to cool their homes. Extreme heat caused by climate change is likely to intensify Māori and Pasifika health inequities. It can also increase prenatal health issues.

Current and future actions

Building design, materials and urban planning can mitigate the heat-island effect. Planting more trees and using nature-based solutions for infrastructure help to cool urban areas. These simple and effective solutions are used around the world. They also have other benefits, such as:

- reducing greenhouse gas emissions
- enhancing mauri of land and water
- enhancing biodiversity
- improving human health and wellbeing.

Over time, these strategies and other actions in the national adaptation plan will help to reduce the heat-island effect.

Urban Ngahere scheme

Kāinga Ora's Urban Ngahere scheme is a large-scale urban development in Māngere, which has relatively low canopy coverage* (only 8 per cent). Kāinga Ora is partnering with the community, mana whenua and Auckland Council to increase the coverage, reduce inequality and uplift the mauri of the Māngere whenua and people.

Auckland Council's Urban Ngahere Strategy also aims to increase canopy coverage across Auckland more generally to 30 per cent.

*Canopy coverage is the total area of tree crowns projected onto the ground.

Objectives

Resilient homes, buildings and places allow us to thrive.

The Government has identified four objectives to help make our homes, buildings and places resilient to the changing climate and support people and communities to thrive.

Table 6: Government objectives to build resilient homes, buildings and places

Code	Objective	Explanation
HBP1	Homes and buildings are climate resilient, and meet social and cultural needs	• Reduce exposure to climate hazards and support businesses and communities to understand and respond to climate risks. • Improve homes and buildings so they can withstand the expected range of temperatures, rainfall and wind and to improve energy and water efficiency. • Conserve valued cultural heritage.
HBP2	New and existing places are planned and managed to minimise risks to communities from climate change	• Improve resilience through effective planning, urban design and management. • Avoid development in places that may be more exposed to climate hazards. • Support existing places to adapt. • Relocate people and assets where risks are too high to manage otherwise.
HBP3	Māori connections to whenua and places of cultural value are strengthened through partnerships	• Support initiatives that identify and respond to climate risks specific to iwi and Māori. • Work in partnership with hapū, iwi and Māori on Māori-led adaptation solutions. • Identify and embed Māori knowledge, identity and values in urban design and construction to manage climate hazards. • Increase the resilience of cultural heritage, to strengthen the ties between whānau, hapū and iwi and their whenua.
HBP4	Threats to cultural heritage arising from climate change are understood and impacts minimised	• Understand where cultural heritage sites are, their values, who they are important to and how climate change could affect them. • Understand how the loss of cultural heritage can affect social, cultural, spiritual and economic wellbeing, including for Māori, and the positive role of cultural heritage in adaptation and wellbeing.

Code	Objective	Explanation
		• Improve disaster management for cultural heritage. • Enable communities to maintain and protect their taonga and assets. • Protect and conserve cultural heritage through appropriate regulation.

Actions to increase the resilience of homes, buildings and places

As shown in table 7 below, the actions critical to achieving the objectives relating to homes, buildings and places are set out in chapter 3: Enabling better risk-informed decisions, chapter 4: Driving climate-resilient development in the right locations and chapter 5: Adaptation options including managed retreat. These the actions work together to increase the resilience of our homes, buildings and places.

Table 7: Actions related to homes, buildings and places are located throughout the national adaptation plan

HOMES, BUILDINGS AND PLACES ARE RESILIENT TO A CHANGING CLIMATE, SO THAT PEOPLE AND COMMUNITIES CAN THRIVE			
HBP1 **Homes and buildings are climate resilient, and meet social and cultural needs**	**HBP2** **New and existing places are planned and managed to minimise risks to communities from climate change**	**HBP3** **Māori connections to whenua and places of cultural value are strengthened through partnerships**	**HBP4** **Threats to cultural heritage arising from climate change are understood and impacts minimised**
CRITICAL ACTIONS			
Action 4.4: Embed adaptation in funding models for housing and urban development, including Māori housing		**Action 5.8:** Support kaitiaki communities to adapt and conserve taonga/cultural assets	
Action 4.3: Establish an initiative for resilient public housing **Action 5.7:** Reduce and manage the impacts of climate hazards on homes and buildings			
ACTIONS THAT SUPPORT HOMES, BUILDINGS AND PLACES OBJECTIVES			
Action 4.1: Reform the resource management system			
	Action 5.16: Identify options to increase the integration of nature-based solutions into urban form		
FUTURE PROPOSED WORK PROGRAMMES RELEVANT TO HOMES, BUILDINGS AND PLACES OBJECTIVES			
Action 3.22: Work with community housing providers to enable effective climate hazard response **Action 3.25:** Design methodology for risk assessments of public buildings **Action 7.4:** Update regulatory requirements to ensure buildings are designed and constructed to withstand more extreme climate hazards **Action 7.6:** Manage potential impacts of adaptation related to regulatory change	**Action 7.5:** Update housing and urban settings	**Action 7.2:** Partner with Māori landowners to increase the resilience of Māori-owned land, homes and cultural sites **Action 7.3:** Partner with Māori to support Māori-led approaches to adaptation planning	**Action 3.26:** Produce guidance for disaster risk management for cultural heritage **Action 3.27:** Develop a framework for assessing exposure and vulnerability of taonga/cultural assets to climate change **Action 7.1:** Research how cultural heritage contributes to community wellbeing and climate change adaptation

For example, action 4.1: Resource management reform is a critical enabling action to ensure our objectives for homes, buildings and places are met. It will:

- support effective spatial planning by directing growth to the most appropriate locations
- provide an opportunity to ensure planning decisions are informed by hazard risk assessments, and that our planning decisions do not continue to increase the exposure of homes and buildings to climate-related hazards
- set out a framework to manage retreat and relocate communities, homes and buildings where risks are seen as intolerable.

Action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings is critical because it will provide the information, research and guidance needed to inform New Zealanders about risks to the property they own or rent. This will also inform other actions:

- action 3.22: Work with community housing providers to enable effective climate hazard response
- action 3.25: Design methodology for risk assessments of public buildings
- action 7.4: Updates to regulatory requirements to ensure buildings are designed and constructed to withstand more extreme climate conditions
- action 7.5: Update housing and urban settings, which will help ensure the built environment is designed to cope with a changing climate.

The Government will ensure funding and investment decisions for housing and urban development consider climate-related hazards through the following actions:

- action 4.3: Establish an initiative for resilient public housing
- action 4.4: Embed adaptation in funding models for housing and urban development, including Māori housing
- action 5.16: Identify options to increase the integration of nature-based solutions into urban form.

It will also support kaitiaki communities to adapt and conserve taonga and cultural assets (action 5.8), which will work alongside the following actions:

- action 3.26: Produce guidance for disaster risk management for cultural heritage
- action 3.27: Develop a framework for assessing exposure and vulnerability of taonga/cultural assets to climate change
- action 7.1: Research how cultural heritage contributes to community wellbeing and climate change adaptation.

The Government will partner with Māori to increase the resilience of Māori-owned land, homes and cultural sites (action 7.2), and to support Māori-led approaches to adaptation planning (action 7.3).

Existing work programmes that support these actions

Work is underway to ensure the Government's interventions to increase housing supply, affordability and quality are taking climate change into account. For example, the Government Policy Statement on Housing and Urban Development signals the strategic direction for adaptation.

The Government has recently amended its objectives for the Urban Growth Agenda to sharpen the focus on climate impacts and responses. The National Māori Housing Strategy, MAIHI Ka Ora, also stresses the importance of maintaining a connection to whenua and includes sustainability as a pou (priority area).

Other work in progress is helping to initiate and support adaptation for the building and construction sector. For example, the Building for Climate Change work programme will support actions in the national adaptation plan to increase adaptation and resilience. It is also connected to the work on emissions reduction and seismic resilience.

The building and construction sector will be supported in the transition to resilient homes and buildings. The Government's emissions reduction plan has committed to support workforce transition to ensure the sector can build for climate change (emissions reduction plan action 12.5.4). Key initiatives under this action include:

- coordinate and facilitate building and construction workforce planning and sector education across government
- explore support or training for workers who may need to meet new requirements
- explore direct supports, such as targeted funding, behaviour change and site-based opportunities, to grow skills and attract people to the workforce.

This action will also ensure adaptation is reflected in workforce support to develop more resilient homes and buildings, and provide the opportunity to partner with business, industry professionals and workers.

Addressing inequity

Resilient homes, buildings and places for vulnerable communities.

Well-performing homes and buildings are essential to the social, economic and cultural wellbeing of New Zealanders. The impact of climate hazards on homes, buildings and places can be devastating for those affected. Climate hazards can cause injuries, loss of life, loss of possessions and disruption to businesses and services. Individuals, businesses and communities can incur costs related to moving out of homes and buildings and of cleaning up or repairing damage. These impacts can have a long-term effect on wellbeing. They will be especially difficult for disadvantaged communities to overcome, and there is a risk that existing inequities will be exacerbated if that difficulty is not addressed.

For this reason, it is critical that adapting our homes and buildings to be resilient, be fair, equitable and inclusive and helps our most vulnerable communities thrive.

The actions outlined in this chapter aim to ensure we can support New Zealanders to continue to enjoy healthy, safe and well-functioning places to live, work and come together as a community. This means focusing on supporting already vulnerable communities, such as public and community housing tenants.

Actions will also ensure we do not lock in or exacerbate future impacts on communities, such as accessibility issues, and that we manage potential impacts of regulatory change. The Government is committed to working in partnership with Māori to support adaptation for Māori, by Māori.

Future proposed work programmes

Action 7.1: Research how cultural heritage contributes to community wellbeing and climate change adaptation

Timeframe: Years 1–4 (2022–26)
Lead agency: MCH
Relevant portfolio: Culture and Heritage
Primarily supports: Objective HBP4
Status: Proposed

This research will look at the value of cultural heritage in building and sustaining communities, and how this links to community resilience and wellbeing.

Action 7.2: Partner with Māori landowners to increase the resilience of Māori-owned land, homes and cultural sites

Timeframe: Years 1–4 (2022–26)
Lead agency: HUD
Relevant portfolio: Māori Housing
Primarily supports: Objective HBP3
Status: Proposed

This work will be progressed in partnership with Māori landowners to produce resources and tools to improve understanding of climate-related risks and increase the resilience of housing on Māori land. It will promote mātauranga Māori and increase the resilience of Māori-owned land, homes and cultural sites. As this work progresses, it may link to action 4.1: Reform the resource management system.

Action 7.3: Partner with Māori to support Māori-led approaches to adaptation planning

Timeframe: Years 3–4 (2024–26)
Lead agency: HUD
Relevant portfolio: Māori Housing
Primarily supports: Objective HBP3
Status: Proposed

This work will be progressed in partnership with Māori to support Māori-led adaptation planning – for example, in the new resource management system. This will support Māori-led adaptation solutions and the use of mātauranga Māori and Māori urban design principles in response to climate hazards. It will also promote Māori-led planning and support the adaptation of places managed by whānau, hapū and iwi.

Action 7.4: Update regulatory requirements to ensure buildings are designed and constructed to withstand more extreme climate hazards

Timeframe: Years 3–6 (2024–28)
Lead agency: MBIE
Relevant portfolio: Building and Construction
Primarily supports: HBP1
Status: Proposed

Updated forward-looking climate data and modelling (action 3.2: Design and develop risk and resilience and climate adaptation information portals) will be used to:

- update Building Code performance requirements
- identify and add climate hazards not currently in the Building Code
- produce guidance and tools to help people meet new performance requirements.

This action will improve the quality of buildings and make them more resilient to future climate impacts. It will also consider costs and distributional impacts, and explore regulatory changes that could support the adaptation of existing buildings. Action 7.6 Manage potential impacts of adaption related to regulatory change will support those communities that are most impacted by this regulatory change.

Action 7.5: Update housing and urban settings

Timeframe: Years 3–6 (2024–28)
Lead agency: HUD
Relevant portfolio: Housing
Primarily supports: Objective HBP2
Status: Proposed

Current strategies, programmes and regulations will be reviewed to ensure housing and urban environments are fit for the changing climate. For example, this could lead to updated requirements for homeowners and landlords, or for public and community housing. This will be informed by later actions to reduce and manage the impacts of climate hazards on homes and buildings (action 5.7), and identify options to increase the integration of nature-based solutions into urban form (action 5.16).

This action will help ensure the built environment is designed and planned to cope with extreme events and the changing climate. It will also help ensure rules about the quality of private and public housing and tenancies consider climate change and remain fit for purpose.

Action 7.6: Manage potential impacts of adaptation related to regulatory change

Timeframe: Years 5–6 (2026–28)
Lead agency: MBIE
Relevant portfolio: Building and Construction
Primarily supports: Objective HBP1
Status: Proposed

Vulnerable communities, such as those living along the coast or those with low incomes, may require additional support to adapt their homes and buildings. The Government will monitor the effects of action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings and action 7.4: Update regulatory requirements to ensure buildings are designed and

constructed to withstand more extreme climate hazards to identify who these regulatory changes may adversely affect.

Future actions could include advice or guidance to support local initiatives, and offering incentives. These actions will also consider the distributional impacts from emissions reductions.

This action will address negative impacts of regulatory changes for buildings, and manage barriers to adaptation by the public.

Other actions across this plan will contribute to resilient homes, buildings and places

A range of other actions will support the resilience of homes, buildings and places, including the following.

- System-wide reforms will encourage a long-term and proactive view to account for climate change. Actions that improve data and information and provide tools and guidance will inform and incorporate data and information about reducing and managing the impacts of climate hazards on homes and buildings (action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings).
- Natural environment actions (chapter 6) to strengthen ecosystems and promote indigenous knowledge will complement actions to increase the resilience of homes, buildings and places that are alongside the natural environment or include natural sites.
- Infrastructure (chapter 8) plays a key role by connecting communities and places and allowing for goods and services to be distributed. It also supports new development and housing, and helps communities to thrive. For example, action 3.8: Develop guidance for assessing risk and impact on physical assets and the services they provide will support the adaptation of transport and energy networks. That, in turn, will complement the design methodology for risk assessments of public buildings, which includes a focus on social infrastructure, such as schools, hospitals and other public assets.
- A number of actions for communities (chapter 9: Communities) will increase social cohesion. This will help communities to identify climate hazards, including those relevant to homes, buildings and places. For example, action 3.6: Improve natural hazard information on Land Information Memoranda (LIMs) will raise awareness of climate hazards at the property level.
- The actions on insurance availability and affordability (see chapter 10: Economy and financial system) will consider options to keep insurance for homes and buildings available and affordable. This will support recovery after extreme weather events.

CHAPTER 8:

Infrastructure

Chapter 8: Infrastructure

Infrastructure	
Government agencies with actions in this chapter	• Commerce Commission • Ministry of Business Innovation and Employment (MBIE) • Te Manatū Waka Ministry of Transport (MOT) • Te Waihanga New Zealand Infrastructure Commission • Waka Kotahi NZ Transport Agency
Why these actions are important for building resilience	Infrastructure provides the services New Zealanders need for all areas of life. The actions in this chapter will help ensure these services remain resilient in the face of climate change. Resilient infrastructure supports adaptation in communities and businesses and protects the wellbeing of future generations.
Significant risks addressed in this chapter B = Built	B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.
Objectives relevant to critical actions INF: Infrastructure	• INF1: Reduce the vulnerability of assets exposed to climate change. • INF2: Ensure all new infrastructure is fit for a changing climate. • INF3: Use renewal programmes to improve adaptive capacity.
Critical actions relevant to this chapter	• Develop guidance to support asset owners to evaluate, understand and manage the impacts and risks of climate change on their physical assets and the services they provide. • Scope a resilience standard or code for infrastructure to encourage risk reduction and resilience planning in existing and new assets. • Integrate adaptation into Treasury decisions on infrastructure to ensure decision-making for new assets and across major renewal or upgrade programmes considers climate risks. • Develop and implement the Waka Kotahi Climate Adaptation Plan to enable climate-resilient transport networks and journeys, connecting people, products and services for a thriving Aotearoa.

Why we need to take action

Infrastructure underpins our society. It provides the services we depend on to live, work, learn and play.

These services include:

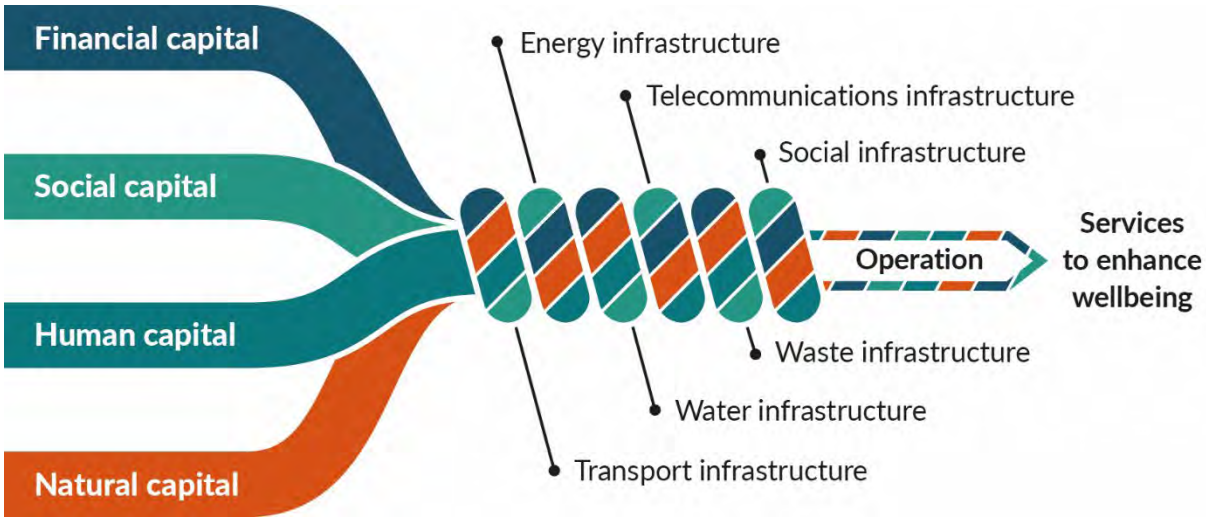
- **energy** – energy generation and distribution networks, including electricity, and liquid and gaseous fuels
- **telecommunications** – communication networks, including voice and data transfer and storage
- **transport** – land transport networks, ports and airports
- **water** – wastewater, stormwater, drinking water and irrigation networks, including sources of water (eg, dams, rivers, reservoirs and groundwater), and water bodies into which stormwater and wastewater are discharged
- **waste** – resource recovery and landfill assets for managing waste

- **social** – education and training facilities; health and aged care facilities; community assets such as libraries, stadiums and community centres; the Defence estate; justice assets such as courts, prisons and remand centres; and social housing (figure 8).

For Māori, cultural infrastructure is important and is represented in social and cultural systems such as iwi, hapū and whānau. Associated physical and spiritual structures such as marae and urupā are also important.

Just as physical infrastructures of roads, telecommunication systems and energy systems must be resilient, so must cultural infrastructure for Māori.

Figure 8: Types of infrastructure



Source: Adapted from Te Waihanga. 2020. Infrastructure under one roof: Standardising how we think about the shared services around us – Discussion Document. Wellington. New Zealand Infrastructure Commissions Te Waihanga.

Significant risks

Climate change will affect all of our infrastructure, directly and indirectly, including supply chain disruptions, physical impacts and changes in demand.

The actions for infrastructure in this plan are designed to achieve the three infrastructure objectives outlined in table 8 and address the built environment risks in the National Climate Change Risk Assessment 2020. In particular, they begin to address:

- B1: Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise.

Objectives

Resilient infrastructure protects and enhances the wellbeing of all New Zealanders.

The Government has identified three objectives for the infrastructure sector.

Table 8: Government objectives to build resilient infrastructure

Code	Objective	Explanation
INF1	Reduce the vulnerability of assets exposed to climate change	• Understand where infrastructure assets and their services are exposed and vulnerable to climate impacts. • Prioritise the risk management of assets so that services can continue if disruption occurs.
INF2	Ensure all new infrastructure is fit for a changing climate	• Consider long-term climate impacts when we design and invest in infrastructure, so the right infrastructure is in the right places. • Understand future adaptation options and finance them as part of the investment in new infrastructure to build capacity to adapt.
INF3	Use renewal programmes to improve adaptive capacity	• Consider long-term climate impacts when making decisions to maintain, upgrade, repair or replace existing infrastructure.

Infrastructure asset owners are best placed to manage climate risk

Infrastructure asset owners include central and local government and the private sector, onshore and offshore (table 9). This means there is a range of drivers underpinning the sectors' collective response to climate change.

Important drivers for action in the private sector include board fiduciary duty, NZX rules, and investor sentiment on corporate responsibility and non-financial risk management. For Crown entities, government priorities and policy, as well as board fiduciary duty, will help direct responses. Local government decisions reflect long-term plans and will be influenced by the ability and willingness of ratepayers to pay.

Many asset owners have existing duties as lifeline utilities (table 9) under the Civil Defence Emergency Management Act 2002 to "function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency" (s. 60 (a)).[1] Many asset owners may be beginning to consider climate-related risks as part of fulfilling their responsibilities as lifeline utilities.

[1] New Zealand Government. 2002. *Civil Defence Emergency Management Act 2002*. Wellington.

Table 9: Infrastructure governance

Infrastructure type	Governance	Lifeline utility[2]
Road transport	Crown entity, central and local government	Yes
Rail transport	Crown entity, central and local government	Yes
Ports	Local government and central[3] government	Yes
Airports	Private sector, central and local government	Yes
Energy[4]	Private sector	Yes
Water	Local government	Yes
Telecommunications and digital	Public and private sector	Yes[5]
Waste and resource recovery	Private sector, local government	No

[2] The Civil Defence Emergency Management Act 2002 identifies the entities and sectors that represent lifeline utilities, which include many of the infrastructure classes that this section seeks to influence.

[3] Defence land and infrastructure includes Defence Force camps, bases, training areas, airfields and ports.

[4] Includes energy generation and energy distribution.

[5] Radio New Zealand and Television New Zealand, and telecommunications network providers.

CASE STUDY
RiverLink, Lower Hutt

The RiverLink project will transform Lower Hutt through transport improvements, upgraded flood protection and urban development. The result will be a more resilient, connected and vibrant city.

The project is a partnership between Waka Kotahi NZ Transport Agency, Greater Wellington Regional Council, Hutt City Council and mana whenua Ngāti Toa Rangatira and Taranaki Whānui ki Te Upoko o Te Ika.

Improvements include:

- a new interchange at Melling (with a local road going over State Highway 2) and a river bridge, connecting to the Lower Hutt central business district
- a new pedestrian and cycle bridge linking directly to Melling Station
- new intersections and road realignments that integrate with the local network
- enhanced pedestrian and cycle routes, plus cycle storage, bus hub and park–ride facilities.

Flood protection upgrades will include:

- lowering and widening Te Awa Kairangi Hutt River, giving it more room to flow naturally and allowing more water to pass down the river during floods, as well as enabling more fish habitats to be established
- raising and upgrading the stop banks.

New spaces by the river include:

- a waterfront promenade to support the development of new cafes, restaurants and apartments
- pedestrian and cycling paths
- recreational and grass areas.

These works are also expected to lead to social and economic growth, and turn Lower Hutt into a true river-facing city.

Actions to support climate-resilient infrastructure

All asset owners must begin the process of understanding and actively managing climate risk. Collectively, actions across this plan will support this process and help deliver on our objectives for the sector.

Chapter 7: Homes, buildings and places deals with many of the buildings and places defined as social and cultural infrastructure (figure 8), and that are included in other infrastructure types, eg, terminals and stations. Chapter 9: Communities contains adaptation of the health sector, including its built environment and the services it provides (social infrastructure).

Chapter 3: Enabling better risk-informed decisions, chapter 4: Driving climate-resilient development in the right locations and chapter 5: Adaptation options including managed retreat all include critical actions for infrastructure, as well as a number of supporting actions.

These include actions:

- that have been developed to support action at the system level, across all asset classes and geographies
- to develop adaptation plans by significant government infrastructure asset owners
- that support funding resilience activities in particular infrastructure sectors.

Additional critical and supporting actions for infrastructure are provided in this chapter. Table 10 illustrates how actions supporting the three infrastructure objectives are distributed throughout this plan.

Table 10: Actions related to infrastructure are located throughout the national adaptation plan

<table>
<tr><th colspan="3">OUR INFRASTRUCTURE IS RESILIENT TO A CHANGING CLIMATE, SO THAT IT PROTECTS OR ENHANCES THE WELLBEING OF ALL NEW ZEALANDERS</th></tr>
<tr><th>INF1
Reduce the vulnerability of assets exposed to climate change</th><th>INF2
Ensure all new infrastructure is fit for a changing climate</th><th>INF3
Use renewal programmes to improve adaptive capacity</th></tr>
<tr><td colspan="3">CRITICAL ACTIONS</td></tr>
<tr><td colspan="3">Action 3.8: Develop guidance for assessing risk and impact on physical assets and the services they provide</td></tr>
<tr><td colspan="3">Action 5.6: Scope a resilience standard or code for infrastructure</td></tr>
<tr><td></td><td colspan="2">Action 4.6: Integrate adaptation into Treasury decisions on infrastructure</td></tr>
<tr><td></td><td colspan="2">Action 8.1: Develop and implement the Waka Kotahi Climate Change Adaptation Plan</td></tr>
<tr><td colspan="3">ACTIONS THAT SUPPORT INFRASTRUCTURE OBJECTIVES</td></tr>
<tr><td colspan="2">Action 8.2: Develop the National Energy Strategy</td><td></td></tr>
<tr><td colspan="2">Action 8.3: Manage dry-year risk through the New Zealand Battery Project</td><td></td></tr>
<tr><td>Action 3.18: Review electricity and gas networks' management of climate risk and resilience

Action 5.11: Encourage and support the evaluation of climate risks to landfills and contaminated sites

Action 5.12: Explore funding options to support the investigation and remediation of contaminated sites and landfills vulnerable to the effects of climate change

Action 8.4: Provide for regulated network revenues to reflect the prudent and efficient costs of resilience</td><td colspan="2">Action 3.17: Support and promote the integration of climate adaptation and mitigation in new and revised standards commissioned by third parties

Action 4.7: Integrate adaptation into Waka Kotahi decision-making

Action 5.10: Develop and implement the Transpower Adaptation Plan

Action 8.5: Progress the Rail Network Investment Programme

Action 8.6: Invest in public transport and active transport

Action 8.7: Embed nature-based solutions as part of the response to reducing transport emissions and improving climate adaptation and biodiversity outcomes</td></tr>
<tr><td colspan="3">Action 8.8: Support knowledge sharing and the implementation of adaptation actions across the sector</td></tr>
<tr><td colspan="3">SYSTEM-WIDE ACTIONS RELEVANT TO INFRASTRUCTURE OBJECTIVES</td></tr>
<tr><td colspan="3">Action 3.1: Provide access to the latest climate projections data

Action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion

Action 4.5: Reform institutional arrangements for water services

Action 9.1: Modernise the emergency management system</td></tr>
<tr><td></td><td>Action 6.6: Implement the Water Availability and Security programme

Action 10.1: Deliver the New Zealand Freight and Supply Chain strategy</td><td></td></tr>
<tr><td></td><td colspan="2">Action 4.1: Reform the resource management system</td></tr>
</table>

Addressing inequity

Understanding and managing risk at the asset level can result in a range of benefits, in addition to resilience – for example, making infrastructure services more reliable, providing better value for money and improving social cohesion.

Actions in this outcome area have the potential to reduce inequity and improve affordability of, and access to, infrastructure services – for example, investment in public and active transport, and consideration of future energy needs through the National Energy Strategy.

Development of system-level guidance, tools and methodologies, and adaptation plans, provides the opportunity to specifically consider the needs of all groups who may be disproportionally impacted by climate change, or who are least able to adapt. These include Māori, people of lower socio-economic status, disabled people, women, older people, youth and migrant communities. The guidance for assessing risk and impacts on physical assets and the services they provide will specifically include these considerations to encourage asset owners to undertake this analysis as part of their adaptation planning.

Consideration of disproportionate impacts of climate change on infrastructure services, and the implementation of actions to create resilience and build adaptive capacity, can also support giving effect to the principles of Te Tiriti o Waitangi. In addition, there is the potential for system-level guidance, tools and methodologies, and adaptation plans, to create space for mātauranga Māori to be integrated and expressed as part of adaptation planning.

Critical actions

Action 8.1: Develop and implement the Waka Kotahi Climate Adaptation Plan

Timeframe: Years 1–6 (2022–28)
Lead agency: Waka Kotahi
Relevant portfolio: Transport
Primarily supports: Objective INF3
Status: Current

In 2022, Waka Kotahi will publish and begin applying an adaptation plan. This will outline how Waka Kotahi will adapt to climate change through the design, delivery, operation and use of the land transport system.

The plan will address exposed existing assets and new investment in infrastructure. It will also explore adaptation in maintenance programmes of the roading network, including renewals.

Waka Kotahi will consider multiple risks to the land transport system from climate hazards, including sea-level rise, flooding and landslides. It will lead, collaborate on and support land transport adaptation to enable climate-resilient transport networks and journeys, connecting people, products and services for a thriving Aotearoa.

By 2024, a reporting framework on the implementation of the adaptation plan will be developed.

Supporting actions

Action 8.2: Develop the National Energy Strategy

Timeframe: Years 1–3 (2022–24)
Lead agency: MBIE
Relevant portfolio: Energy and Resources
Primarily supports: Objective INF2
Status: Current

The Government has committed to developing an energy strategy by the end of 2024, fully collaborating and engaging with Māori and working with energy system stakeholders. The vision is for a net-zero economy in 2050, where energy is accessible and affordable, secure and reliable, and supports New Zealanders' wellbeing. The strategy addresses challenges in the energy sector and signals pathways away from fossil fuels.

Action 8.3: Manage dry-year risk through the New Zealand Battery Project

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Energy and Resources
Primarily supports: Objective INF1
Status: Current

The New Zealand Battery Project will assess the options for managing dry-year risk in a highly renewable electricity system. The current focus is on the feasibility of pumped hydroelectricity at Lake Onslow. The feasibility study will be completed by the end of 2022. The aim is to increase the resilience of the electricity system when hydro lakes have low inflows for long periods.

Action 8.4: Provide for regulated network revenues to reflect the prudent and efficient costs of resilience

Timeframe: Years 1–6 (2022–28)
Lead agency: Commerce Commission
Relevant portfolio: Commerce and Consumer Affairs
Primarily supports: Objective INF1
Status: Current

In the Commerce Commission's next reviews of regulated price-quality paths – from 2025 for electricity networks and from 2026 for gas networks – it will consider the extent to which revenue limits should provide for different expenditure levels from the current period. This will include if expenditure levels need to change due to any increased costs of resilience to climate change, where these are based on robust forecasts. Regulated suppliers can also apply for changes to their revenue limits to better meet their particular circumstances, which could potentially include the prudent and efficient costs of resilience initiatives.

Action 8.5: Progress the Rail Network Investment Programme

Timeframe: Years 1–6 (2022–28)
Lead agencies: MOT; Waka Kotahi
Relevant portfolio: Transport
Primarily supports: Objective INF2
Status: Current

KiwiRail's Rail Network Investment Programme (RNIP) is a 10-year programme of investment in Aotearoa New Zealand's rail network, to restore it to a resilient and reliable state. Mitigating climate change is a key focus within the RNIP when considering resilience projects for investment. Restoration of the national rail network to a reliable and resilient state will also reduce its vulnerability to climate hazards and provide a platform for future investment to support growth. In addition, mode neutrality (using a range of transport modes) supports resilience within the national supply chain.

Action 8.6: Invest in public transport and active transport

Timeframe: Years 1–6 (2022–28)
Lead agency: MOT; Waka Kotahi
Relevant portfolio: Transport
Primarily supports: Objective INF3
Status: Current

Investment in multi-modal infrastructure can increase the resilience of the transport system and help manage the vulnerability of existing assets. More use of public transport and active modes will help reduce reliance on private vehicles. It will increase system redundancy, improve equity and support sustainable growth. Safe and attractive alternatives to driving create a more resilient transport system, support sustainable growth and reduce emissions.

Action 8.7: Embed nature-based solutions as part of the response to reducing transport emissions and improving climate adaptation and biodiversity outcomes

Timeframe: Years 1–3 (2022–25)
Lead agency: MOT
Relevant portfolio: Transport
Primarily supports: Objective INF2
Status: Current

Nature-based solutions involve sustainable management and natural features and processes to tackle socio-environmental challenges such as climate change. At a local, regional and national scale these measures can reduce transport emissions and improve climate adaptation as well as biodiversity. Key initiatives include:

- considering the role of nature-based solutions in reducing transport emissions and contributing to other benefits
- ensuring transport policy and investment encourage nature-based solutions, including protecting existing carbon sinks and supporting new long-term carbon sequestration opportunities.

Action 8.8: Support knowledge sharing and the implementation of adaptation actions across the sector

Timeframe: Years 1–6 (2022–28)
Lead agency: Te Waihanga
Relevant portfolio: Infrastructure
Primarily supports: Objective INF1
Status: Current

Te Waihanga will convene a regular event for local government, central government and private sector asset owners to share information on the implementation of actions in the national adaptation plan and to support alignment across the sector.

Initially, the focus may be on the scope and content of the actions on adaptation guidance that Te Waihanga has committed to in the national adaptation plan, but may also provide a forum for updates on other policy matters relevant to infrastructure asset owners.

Other actions across this plan will contribute to resilient infrastructure

Many government work programmes will help build the resilience and adaptive capacity of new and existing infrastructure assets, and include the following actions.

- **Action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion** This may require or encourage infrastructure asset owners to understand the risks and develop a management response, including decisions on where, when and how investment in new assets takes place. Currently scenarios are in development for the energy, transport and telecommunications sectors.
- **Action 4.1: Reform the resource management system** In particular, the National Planning Framework will contain climate action measures for infrastructure. This will influence the development of new assets, as well as maintenance, upgrades and major works on existing assets, in the new resource management system.
- **Action 4.5: Reform institutional arrangements for water services** Over the next 30 to 40 years, an estimated $120 billion to $185 billion upgrade of water assets will be required to meet drinking water and environmental standards, and the needs of future population distribution and land-use choices. The aim is to significantly improve the safety, quality, resilience, accessibility and performance of the three waters services in a way that is efficient and affordable for New Zealanders.
- **Action 6.6: Implement the Water Availability and Security programme** This also has implications for infrastructure planning and development. Taking a strategic approach to supply and demand at the catchment level will raise understanding of future water supply and distribution needs, and expose vulnerabilities. This will help water services decide where, when and how they deliver new assets, as well as reinforce when demand management will become critical.
- **Action 9.1: Modernise the emergency management system** Legislative work may include strengthening the duties and obligations of lifeline utilities to support continuity of services before, during and after emergencies, and may therefore influence where, when and how asset owners invest in new assets. Guidance to support understanding and managing risk (action 3.8) will support lifelines utilities to meet their obligations under the Civil Defence Emergency Management Act, as well as create adaptive capacity.
- **Action 10.1: Deliver the New Zealand Freight and Supply Chain strategy** This will present a long-term and system-wide view of the freight system that also considers climate adaptation. It will inform the Government, councils and private sector players when investing in freight infrastructure.

CHAPTER 9:

Communities

Chapter 9: Communities

Communities	
Government agencies with actions in this chapter	• Manatū Hauora – Ministry of Health (MOH) • Ministry for the Environment (MfE) • Ministry of Business, Innovation and Employment (MBIE) • Ministry of Defence (MOD) • Ministry of Education (MoE) • Ministry of Foreign Affairs and Trade (MFAT) • Ministry of Social Development (MSD) • National Emergency Management Agency (NEMA) • New Zealand Defence Force (NZDF) • Te Puni Kōkiri – Ministry of Māori Development (TPK)
Why these actions are important for building resilience	Communities are diverse, and experience the impacts of climate change in various ways. Building and maintaining strong communities will equip New Zealanders with the right tools to adapt and mitigate these impacts. Communities that are resilient in the face of climate change will be empowered to respond to risks and work together to support social, economic, and cultural wellbeing.
Significant risks addressed in this chapter H = Human	• H1: Risks to social cohesion and community wellbeing from the displacement of individuals, families and communities due to climate change impacts. • H2: Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts.
Objectives relevant to critical actions SW = System-wide C = Communities	• SW1: Legislation and institutions are fit for purpose and provide clear roles and responsibilities • C1: Enable communities to adapt. • C2: Support vulnerable people and communities. • C3: Support communities when they are disrupted or displaced. • C4: The health sector is prepared and can support vulnerable communities affected by climate change.
Critical actions relevant to this chapter	• Modernise the emergency management system to improve the regulatory framework which underpins emergency management in Aotearoa. • Develop the Health National Adaptation Plan to prepare the health sector to meet the needs of communities in a changing climate. • Raise awareness of climate hazards to make emergency preparedness a part of everyday life.

Why we need to take action

A planned response is essential for individuals and communities to adapt.

Climate change is already affecting how we live. The impacts we face will increase, so it is vital we are prepared. We will meet challenges. Individuals and communities may need to move away from high-risk areas.

We may need to think differently about property and land rights if some places become too risky to live in. We may also need to welcome people from smaller Pacific nations who have been displaced by the impacts of climate change.

Some individuals and communities are more exposed because of where they live. For example, many Māori communities are in rural areas along coastlines and near major rivers. Rural communities, including farming communities, will be disproportionately affected.

Vulnerable community members include those experiencing poverty, Pacific peoples, refugees, migrants, women, older people, disabled people and people with existing health issues. These groups will also require support to adapt.

Communities vary greatly in their connections and ability to adapt. In some areas, communities have strong connections and can withstand many external challenges and adapt. Others are more disconnected and under-resourced.

The effects of climate change will make us more reliant on one another for our practical needs, and for our emotional and spiritual wellbeing.

For this plan, **community** is defined geographically as a group of people living in the same town, suburb, area or marae/hapū. It also includes the broader meaning of social and cultural groups, such as Pacific communities, ethnic communities and minorities, older people, disabled and mobility-compromised people, low-income groups, women, rural communities, rainbow and LGBTQI+ communities, children and youth, and those experiencing deprivation, ill health or isolation. Aotearoa is home to diverse communities with different needs, interests and backgrounds.

Significant risks

The actions in this chapter are designed to achieve these objectives and address the human domain risks in the National Climate Change Risk Assessment 2020. In particular:

- H1: Risks to social cohesion and community wellbeing from the displacement of individuals, families and communities due to climate change impacts
- H2: Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts.

Local government: Helping communities to adapt

Local government is the system of locally elected members that represent communities and make decisions about their issues, such as managing climate impacts.

Local authorities have a responsibility to help and work with communities to prepare for, and adapt to, the physical effects of climate change.

In enabling the communities they represent to adapt, these authorities have three main roles:

- as owners of infrastructure that communities rely on for their wellbeing
- as planners and regulators of development
- as agencies closest to exposed communities.

Around Aotearoa, many councils are now working in partnership with communities and hapū, iwi and Māori. Some are also setting up dynamic adaptive pathways to engage their communities and work towards long-term solutions for highest-risk areas.

As owners of infrastructure that communities rely on for their wellbeing

Local authorities own much of the infrastructure that communities rely on for their day-to-day lives and livelihoods. However, many of these assets are directly at risk from sea-level rise and adverse weather events (eg, more frequent and intense storms and floods).

Authorities will need to carefully manage this infrastructure and design it with higher levels of protection, so their communities can thrive into the future. This includes three waters, local roads and other assets, such as buildings and community amenities, parks, sports fields and airports. Nature-based solutions – such as wetlands, rain gardens and swales, and green roofs and walls – can be effective against flood risk.

As planners and regulators of development

Local authorities have primary responsibility for managing natural hazard risk and adaptation. In particular, they are responsible for planning and regulating development.[1] Directing development away from high-risk areas will be critical to reducing the future exposure to climate risks and minimising the long-term costs of adaptation. In urban development planning, councils will need to consider both adaptation and mitigation for communities. This includes:

- achieving compact urban form that is well linked to public transport and jobs, and in areas with less exposure to climate impacts
- directing development away from areas exposed to flooding or wildfire
- requiring additional water storage in urban and rural areas as part of adapting to drought.

Local planning documents inform communities about natural hazard and climate risks via hazard maps and viewers. They also identify and can protect areas of cultural significance to hapū, iwi and Māori and communities that might be affected.

District councils also operate the Land Information Memoranda (LIM) system. This provides information to people looking to buy a property about the natural hazard or climate risks that might be associated with it.

As agencies closest to exposed communities

Local authorities help communities respond to climate emergencies such as flooding. Now and in future, councils will need to engage communities in reducing risk and adapting to a changing climate. They will need to lead the discussion about which actions are the best way to support the wellbeing of exposed communities.

This may require tough conversations. Options that will reduce long-run costs to communities may be unpopular among some residents in the short term. For example, a council might need to turn down requests for bigger and stronger protection structures when rising sea levels make these increasingly expensive and ineffective.

Local authorities will need to lead discussions about when and how to protect, accommodate or manage the retreat of communities from climate impacts. Some councils are already holding online conversations and in-person events to address this. Many councils have their own climate change plans, work programmes and advisors, and some have declared climate emergencies to drive action.

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1 The Resource Management Act 1991 requires local government to consider the effects of a changing climate on communities, and incorporate climate change into its frameworks, plans, projects and decision-making. All of local government is charged with meeting the current and future needs of communities for infrastructure, local public services and regulatory functions (Local Government Act 2002, section 10(1)(b)).

Image: Otago Regional Council

CASE STUDY

Adapting at the head of Lake Wakatipu: A changing landscape

The communities on Lake Wakatipu live with a range of natural hazards that arise from the alpine environment, nearby water bodies and the geological setting.

Natural hazards, particularly flooding, will likely become more severe in future. Flooding poses a substantial threat to the settlement of Glenorchy, which has been flooded many times (significantly in November 1999 and February 2020). Projected natural changes (growth of the nearby river deltas, rising riverbed levels and the likely re-routing of the Rees River) are expected to increase these risks.

The Otago Regional Council is working with the Queenstown Lakes District Council, the local community, iwi and stakeholders on a sustainable long-term response.

Community adaptation pathways

The Otago Regional Council is using 'adaptation pathways' to develop long-term solutions to natural hazards. The Ministry for the Environment developed this approach to support community-led projects.

Adaptation pathways account for change and complexity and follow a 10-step decision cycle: assessment (steps 1 to 4), development and implementation of an adaptation strategy (steps 5 to 8) and monitoring and review (steps 9 and 10). Community engagement is central to the cycle.

So far, the project team has carried out surveys, investigated the natural hazards and assessed cultural values. The Otago Regional Council has also engaged with the community to enable them to understand the issues, contribute to the adaptation and decide on future adaptation.

Supporting change

From this process, the Otago Regional Council will develop an adaptation strategy for the communities. This will allow for planning with more certainty in the face of ongoing change and increasing hazard risks. The pathways approach is relatively new and has mostly been used for coastal hazards rather than in an alpine area or place with many hazards. The lessons from this project will be useful for other communities facing similar risks.

Objectives

Communities with high adaptive capacity are resilient to climate impacts.

The Government is putting in place initiatives to support resilient communities. This means:

- communities can make decisions and put resources into suitable adaptive actions
- government work programmes focus on ensuring no one is left behind
- communities, hapū and our Tiriti partners are engaged
- local knowledge, including mātauranga Māori, is valued
- decision-making is transparent and builds and maintains trust
- decisions support and balance rangatiratanga (self-determination) of Māori with kāwanatanga (the Government's right to govern)
- vulnerable people and communities are supported.

The Government has identified four objectives for resilient communities.

Table 11: Government objectives for resilient communities

Code	Objective	Explanation
C1	Enable communities to adapt	• Enable communities to provide resources and take action relevant to their unique situation; build and share knowledge of local issues in culturally appropriate ways; support community engagement and participation in decisions and provide information on adaptation options.
C2	Support vulnerable people and communities	• Understand where our most vulnerable people are and what they need and value, and provide them with support, knowledge and resources.
C3	Support communities when they are disrupted or displaced	• Support communities facing climate-related disruption and disasters so response and recovery can improve their wellbeing and social cohesion.
C4	The health sector is prepared and can support vulnerable communities affected by climate change	• Understand future climate-related health risks and take steps early to ensure the healthcare system is ready for these shifting demands. This includes meeting the mental and social wellbeing needs of whānau and communities in emergencies, and supporting them to recover, adapt and thrive.

Actions to support resilient communities

This chapter focuses on new actions to support resilient communities. However, a number of existing work programmes across central government can support the resilience of communities, including Whānau Ora projects, and funding and work programmes such as Rural Assistance Payments and Oranga Marae. Critical and supporting actions to support resilient communities are also set out in chapter 3: Enabling better risk-informed decisions, and chapter 5: Adaptation options including managed retreat. They include:

- Action 3.4: Raise awareness of climate hazards and how to prepare
- Action 3.6: Improve natural hazard information on Land Information Memoranda
- Action 3.10: Assess socio-economic and climate vulnerability for Māori
- Action 3.28: Assess healthcare service resilience
- Action 5.13: Connect communities to wider response and recovery support.

Addressing inequity

Actions must recognise and support the unique needs, values and circumstances of our communities.

Aotearoa is home to a range of diverse communities with different needs, interests and backgrounds. Some may be disproportionately affected by climate change, such as rural communities; those suffering from poverty; hapū, iwi and Māori; Pacific peoples; migrants; women; older people; and disabled people.

Examples of actions that will help mitigate disproportionate effects on these groups include:

- Action 3.10: Assess socio-economic and climate vulnerability for Māori
- Action 9.4: Implement the Climate Migration Action Plan
- Action 9.5: Continue with the reform of the health and disability system
- Action 9.8: Continue to overhaul the welfare system.

Critical actions

Action 9.1: Modernise the emergency management system

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective SW1
Status: Current

The National Emergency Management Agency (NEMA) plans to modernise emergency management, including through legislative reforms, working with communities and organisations, clearer roles and responsibilities, and a strengthened partnership with Māori. This work seeks to improve the regulatory framework that underpins emergency management in Aotearoa. It will also sharpen the focus on disproportionately affected groups by strengthening community resilience.

By 2024, new emergency management legislation will be adopted, and a national emergency management plan and improved guidance will be provided across the emergency management system.

Action 9.2: Develop the Health National Adaptation Plan

Timeframe: Year 1 (2022/23)
Lead agency: MOH
Relevant portfolio: Health
Primarily supports: Objective C4
Status: Current

The Health National Adaptation Plan (HNAP) will complement the national adaptation plan and be supported by regional climate health action plans developed by the health sector. The aim of the HNAP is to prepare the health sector to meet the needs of communities in terms of the effects of climate change, including physical, mental and cultural health and wellbeing.

A key part of adaptation planning in the health sector is identifying vulnerable groups.

Vulnerability can be affected by many factors, including geography, demographics, socio-economic status, physical and mental health status, and family and community support. Vulnerability will be considered alongside risk in adaptation planning.

By the end of 2022, the HNAP is expected to be completed. From 2023, regional climate health action plans will be developed.

Supporting actions

Action 9.3: Develop the emergency management workforce

Timeframe: Years 1–6 (2022–28)
Lead agency: NEMA
Relevant portfolio: Emergency Management
Primarily supports: Objective SW1
Status: Current

Work is ongoing to expand the operational capacity and capability of the emergency management workforce at the national, regional and local levels. This will position Aotearoa better to address the increased frequency and severity of natural hazards and support all people in response and recovery.

Action: 9.4: Implement the Climate Migration Action Plan

Timeframe: Years 1–2 (2022–24)
Lead agency: MFAT
Relevant portfolio: Foreign Affairs
Primarily supports: Objective C3
Status: Current

Key values of the Climate Migration Action Plan include retaining social and cultural identity for Pacific communities, and supporting Pacific peoples to live in their own countries where possible. This work aims to support these communities to grow and thrive despite the challenges of climate-related displacement and migration. This must be done in collaboration with Pacific communities and value their cultural and local knowledge.

One of the key actions is commissioning research to improve understanding of Pacific climate migration trends and the impact on communities in the Pacific and Aotearoa. The other main actions focus on using international development cooperation funds for Pacific Island countries. This will support a Pacific regional approach to climate mobility, and advance Aotearoa and Pacific interests in the international context.

Action 9.5: Continue with the reform of the health and disability system

Timeframe: Years 1–3 (2022–25)
Lead agency: MOH
Relevant portfolio: Health
Primarily supports: Objective C4
Status: Current

The structure of the health and disability system and the delivery of health services are undergoing a period of reform. The new system will be simpler and more coordinated, allowing for better and more consistent care, shaped by the voices of consumers, communities and whānau.

The Public Health Agency within the Manatū Hauora Ministry of Health (MOH) will lead and strengthen population and public health, with greater emphasis on equity and the wider determinants of health such as income, education and housing. It will use data and other sources of intelligence to design policies and services that are better able to prevent disease and to monitor environmental threats to public health.

Te Whatu Ora – Health New Zealand will lead the day-to-day running of the health system across New Zealand, with functions delivered at local, district, regional and national levels. Te Whatu Ora will manage all health services, including hospital and specialist services, and primary and community care. Primary health, wellbeing and community-based services will be planned and then purchased through the four regional divisions of Te Whatu Ora. Each region will work with their district offices, located closer to local communities, to develop and implement plans based on local needs to improve the health and wellbeing of communities. Te Whatu Ora will also be responsible for improving services and outcomes across the health system.

Te Aka Whai Ora | The Māori Health Authority is responsible for ensuring the health system works well for Māori by developing strategy and policy to drive better health outcomes for Māori and commissioning kaupapa Māori and other services targeting Māori communities. Local iwi/Māori partnership boards will help shape appropriate health and wellbeing services for local communities, through being an influencing and decision-making voice for hapū, iwi and Māori at a local level and supporting Te Tiriti partnerships throughout the system.

Action 9.6: Build community resilience through social cohesion

Timeframe: Years 2–5 (2023–27)
Lead agency: MSD
Relevant portfolio: Social Development and Employment
Primarily supports: Objective C1
Status: Current

This work will improve inclusion and participation in society and build community resilience to lessen instability and isolation caused by climate change. The aim is to support the understanding of diversity within and across communities to allow everyone to feel safe and belong, and to access opportunities.

Action 9.7: Strengthen teaching and learning related to climate change

Timeframe: Years 1–6 (2022–28)
Lead agency: MOE
Relevant portfolio: Associate Education
Primarily supports: Objective C1
Status: Current

This work will improve community resilience by addressing inequities in learning outcomes that impact on lifelong wellbeing. It will support early learning services, schools and kura to include understanding of, and responses to, climate change in their local curricula and marau ā-kura (living, breathing curriculum), as well as learning that is important for social cohesion. The aim is to support all children and young people to grow as lifelong learners who are connected to the environment and their communities, and actively involved in a sustainable future.

Action 9.8: Continue to overhaul the welfare system

Timeframe: Years 1–6 (2022–28)
Lead agency: MSD
Relevant portfolio: Social Development and Employment
Primarily supports: Objective C2
Status: Current

This action will make ongoing improvements in support – such as for employment, health and communities – and in incomes for those interacting with the welfare system. This aims to achieve the Government's vision of a welfare system that ensures people have an adequate income and standard of living; are treated with, and can live in, dignity; and can participate meaningfully in their communities.

Action 9.9: Expand current funding for proactive community resilience

Timeframe: Years 1–6 (2022–28)
Lead agency: TPK
Relevant portfolio: Māori Development
Primarily supports: Objective C1
Status: Proposed

This will seek to expand funding for Māori to build their community resilience through the COVID-19 pandemic, and plug funding gaps for communities to carry out their long-term resilience plans.

Funding would be decentralised by expanding the scope of funds provided through Whānau Ora. Whānau Ora reaches Māori and Pacific communities as some of our most socio-economically vulnerable, but is accessible to all communities. Funding will be available for communities to proactively future-proof and adapt to the best of their ability, to whatever adversity comes their way.

Future proposed work programmes

Action 9.10: Implement an income insurance scheme to support adaptive capacity of communities and the economy

Timeframe: Years 1–3 (2022–25)
Lead agency: MBIE
Relevant portfolio: Social Development and Employment
Primarily supports: Objective C2
Status: Proposed

To better protect workers, whānau, households, communities and the wider economy, the Government is developing a proposal for a New Zealand income insurance scheme, which would support workers with a proportion of income replacement for up to seven months if they lose their job through no fault of their own due to a redundancy or a health condition or disability.

Workers would have the financial security to find a job that matches their skills, needs and aspirations. Businesses would be able to better match workers to jobs. This policy would reduce the economic impacts of a changing climate on workers and communities by, for example, cushioning the impact of a large employer closing or resizing in a small town or region, and enabling workers to transition to new job opportunities afforded by changes in the economy.

If a decision is made to introduce the proposed scheme, the Government would introduce legislation in 2022 and the scheme would start operating in 2024/25. Introducing an income insurance scheme would be an important step change that lets us manage the challenges and harness the opportunities that lie ahead for Aotearoa.

Action 9.11: Develop and deliver initiatives in *Responding to the Climate Crisis: An Implementation Plan* (2019)

Timeframe: Years 1–6 (2022–28)
Lead agency: MOD; NZDF
Relevant portfolio: Defence
Primarily supports: Objectives SW2 and SW3
Status: Proposed

This plan set out goals and objectives in response to the Defence assessment *Responding to the Climate Crisis: An Implementation Plan*, which explores the links between climate change and security, and how climate change will be a driver for future Defence Force operations. It underscores the importance of working with, and learning from, our Pacific partners to understand and respond to intensifying climate impacts.

The plan identifies actions Defence will take as part of a broader government programme on climate change and sustainability. It sets out initiatives for mitigation and adaptation of Defence Force infrastructure, capability and response operations that protect the security of New Zealanders and the region. Defence will also work with national security and emergency services sector agencies on system reforms.

Action 9.12: Produce guidance and tools for monitoring and evaluating the impact of adaptation initiatives

Timeframe: Year 3 (2024/25)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW2
Status: Proposed

This will help ensure adaptation actions effectively increase our resilience and manage the risks we face. Monitoring is essential for an effective plan, and this guidance will help users identify signals that an action is no longer meeting its objectives. Tools such as real options analysis (ROA), online calculators and other assessment tools will help with adaptation decisions.

Action 9.13: Review of active labour market programmes

Timeframe: Years 1–3 (2022–25)
Lead agency: MBIE, MSD
Relevant portfolio: Social Development and Employment
Primarily supports: Objective C2
Status: Proposed

Active labour market programmes (ALMPs) assist people into employment (including removing barriers to their ability to get or retain a job, or to move between jobs), increase earning capacity and improve the functioning of the labour market. The Government has been reviewing the ALMPs it provides and funds. It has committed to expanding existing, and introducing new, ALMPs to support people into work, or back to work, and to take up new job opportunities arising from changes in the economy. ALMPs will reduce the impact of a changing climate on workers and communities.

The review has focused on nationally provided ALMPs, but the Government will continue to deliver ALMPs in, and partner with, local communities, iwi, hapū and Māori businesses through regional contracting and partnerships.

Other actions across this plan will contribute to resilient communities

Actions in the natural environment domain will also contribute to resilient communities, including:

- action 6.6: Implement the Water Availability and Security Programme: This will support efforts to ensure water security for rural communities, including helping farmers adapt by making technological efficiencies and mapping areas suitable for water-intensive crops
- action 6.8: Deliver a collection of actions run by Biosecurity New Zealand: This will reduce risk to human health and support the development of the Health National Adaptation Plan.

Climate-resilient infrastructure will support greater community resilience. The needs of communities are strongly connected to the actions in chapter 7: Homes, buildings and places. A community's wellbeing is linked with the housing, gathering places, sites of significance and wāhi tapu within it. Relevant actions include:

- action 4.3: Establish an initiative for resilient public housing
- action 5.7: Reduce and manage the impacts of climate hazards on homes and buildings
- action 7.1: Research how cultural heritage contributes to community wellbeing and climate change adaptation
- action 7.2: Partner with Māori landowners to increase the resilience of Māori-owned land, homes and cultural sites.

Image: Kathrin and Stefan Marks | Creative Commons

CASE STUDY
Wildfire preparedness at Mount Iron, Wānaka

Extreme fire weather is increasing in Aotearoa and the number of people living at the rural–urban interface is also rapidly growing. During the 2020–21 fire season, more homes were destroyed due to fire weather and climate change than in any other fire season in the past century.

The conditions that led to Australia's devastating 2019–20 'Black Summer' fires are likely to occur in Aotearoa every three to 20 years – specifically in Central Otago, the Mackenzie Country and Marlborough. Research suggests that the general public does not fully understand the increasing wildfire risk or their mitigation options. More action is needed to build resilience so that communities across Aotearoa can respond to this increasing risk.

Some New Zealanders have started taking actions both individually and as a community to prepare for the increasing risk. A case study of the permanent residents of Mount Iron in Wānaka found they had high awareness of, and anxiety about, wildfire. Their views had been amplified by the October 2020 wildfire at Lake Ōhau, 70 kilometres away, which destroyed half the village (48 houses).

Mount Iron residents have voiced concerns about the increasing threat to both lives and property. Their concerns focus on decisions and rules in local development planning (eg, restrictions on removing protected, flammable kānuka vegetation around their properties), the flammability of cedar cladding of houses, and poor access for fire trucks on residents' one-way evacuation routes.

CHAPTER 10:

Economy and financial system

Chapter 10: Economy and financial system

Economy and financial system	
Government agencies with actions in this chapter	• Ministry for Primary Industries (MPI) • Ministry of Business, Innovation and Employment (MBIE) • Reserve Bank of New Zealand (RBNZ) • Te Manatū Waka Ministry of Transport (MOT) • Te Puni Kōkiri – Ministry of Māori Development (TPK) • Toka Tū Ake EQC • Treasury (TSY)
Why these actions are important for building resilience	Climate change is already affecting our economy. Its contribution to flood and drought from 2007 to 2017 cost $840 million in insured damages and economic losses. Climate resilience is core to economic security. This chapter focuses on how we will adapt and build resilience to the economic and financial impacts of a changing climate. Some actions will also help identify new economic opportunities. This is part of Aotearoa New Zealand's wider transition to a high-wage, low-emissions economy that provides economic security in good times and bad.
Significant risks addressed in this chapter E = Economy	• E1: Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes. • E2: Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.
Objectives relevant to critical actions EF = Economy and financial system	• EF1: Sectors, businesses and regional economies can adapt. Participants can identify risks and take action. • EF2: A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks.
Critical actions relevant to this chapter	• Deliver the New Zealand Freight and Supply Chain strategy to ensure our freight and supply chain system is resilient, reliable and prepared for disruption. • Strengthen the fisheries management system; support the aquaculture sector to sustainably grow. • Help financial entities to identify and manage their climate risks better, and, in turn, support financial stability. • Help businesses make decisions that recognise climate-related risks better and realise opportunities and attract more investment, through the climate-related disclosures programme. • Develop options for home flood insurance to support community resilience to the consequences of extreme weather events and facilitate recovery after the event.

Why we need to take action

Taking action now can reduce long-term costs and bring opportunities.

Climate change is already affecting our economy. It is increasing existing risks, such as floods and droughts, and has resulted in sea-level rise. Between 2007 and 2017, the contribution of climate change to floods and droughts alone cost New Zealanders an estimated $840 million in insured damages and economic losses.[1]

The public sector, businesses, property owners and civil society need to take action to reduce the scale of the long-term economic costs, and seize the opportunities of a changing climate.

Central government will take action, for example, through legislation, regulation, information or funding to incentivise others to reduce their risk.

Local government will make decisions, for example, on land use or local infrastructure.

Businesses (including iwi interests) and private citizens exposed to climate risks will consider future climate impacts when making long-term decisions, such as where to locate, how to earn an income and what type of insurance to buy.

We have a way to go. For example, less than 10 per cent of firms have assessed risks to their business from a changing climate, and less than 20 per cent intend to take action to reduce their risks over the next five years.[2]

The actions in this chapter will support the public and private sector and private citizens to better understand and take steps to reduce their risks to climate change.

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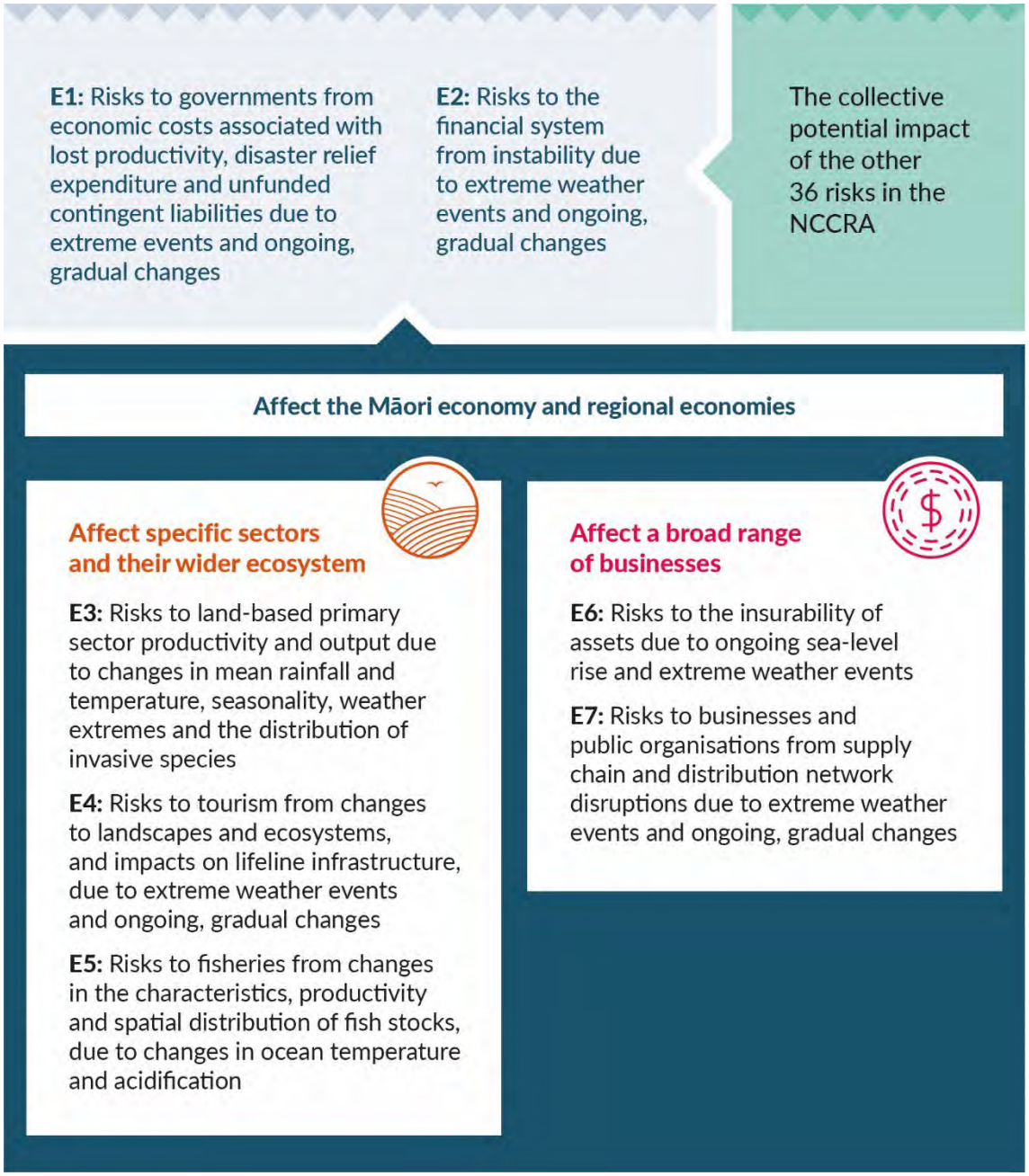
1 Frame D, Rosier S, Carey-Smith T, Harrington L, Dean S, Noy I. 2018. *Estimating Financial Costs of Climate Change in New Zealand: An Estimate of Climate Change-Related Weather Event Costs*. New Zealand Climate Change Institute and NIWA. Wellington.

2 Stats NZ. 2022. *Business operations survey: 2021*. Wellington.

Significant risks

This plan addresses the seven economic risks identified in the National Climate Change Risk Assessment 2020. These will create flow-on effects on the economy – see figure 9 and the discussion on the following pages.

Figure 9: The seven economic risks and their cascading impact across the economy



Flow-on effects

The risks to the economy set out in figure 9 will create the flow-on effects set out below.

Key export industries failing to adapt

Land-based primary industries, fisheries and aquaculture and tourism are Aotearoa New Zealand's most exposed industries as they depend on climate-sensitive natural resources.[3] These three sectors and their manufactured products form a significant part of the economy and comprise over 60 per cent of exports.[4]

Failure of firms in these industries to adapt adequately would reduce their productivity and potentially their viability. Impacts would flow on to their suppliers and customers and to our export earnings.[5] Climate-related impacts in other countries could also disrupt trade and influence demand for our goods and services.

Exposed local economies failing to adapt

Economic impacts will not be evenly distributed across Aotearoa. Many regional economies rely heavily on the three exposed industries. Economic activities in hazardous areas, such as low-lying land, will be further exposed. Failure to adapt could lead to business closures and job losses. This would have significant implications for workers and households, and, if widespread, could result in people having to leave some communities.

Disproportionate impacts on Māori

Māori are heavily invested in land-based primary industries, tourism and fisheries, which all have a significant Māori workforce.

Māori collectively own about 40 per cent of the fisheries quota, and have diversified interests across the sector, including catching, processing, marketing and food services. Māori also own 40 per cent of commercial forests. In 2018, gross domestic product (GDP) from Māori tourism was estimated at just over $975 million.[6]

Economic inequity means that some Māori businesses and workers have less capacity to adapt. Climate-related costs and disruptions could entrench those inequities. At the same time, Māori knowledge of sustainable practices and holistic economic models offer unique ways to adapt. If properly resourced, Māori can take a leadership role in adaptation.

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3 Ministry for the Environment. 2020. *National Climate Change Risk Assessment Technical Report*. Wellington.

4 The three sectors contributed about 62 per cent of export earnings for the year ended March 2020 (Stats NZ data on goods and services trade by country, and the tourism satellite account, both for the year ended March 2020).

5 Climate Change Adaptation Technical Working Group. 2017. *Adapting to Climate Change: Stocktake Report from the Climate Change Adaptation Technical Working Group*. Wellington.

6 Nana G, Reid A, Schulze H, Dixon H, Green S, Riley H. 2021. *Te Ōhanga Māori 2018: The Māori Economy 2018*. Prepared for the Reserve Bank of New Zealand by Business Economic Research Ltd (BERL). Wellington.

Less insurable infrastructure, business and housing assets

Some assets could become uninsurable. This will create further issues if they are used as collateral for lending. The value of buildings exposed to coastal flooding could increase from $12.4 billion now to $26 billion for a sea-level rise of 0.6 metres, and $44 billion at 1.2 metres.[7]

Insurance retreat would likely reduce private and public asset values, making households and firms or public entities less able to invest in adaptation.

There are likely to be more insurance claims, greater damage repairs and higher premiums. Claims for extreme weather events hit a record $321.6 million in 2021, breaking the previous record set in 2020 at $274 million.[8]

Disrupted supply chains

Local and global supply chains are critical to the functioning of the economy. Supply chains are disrupted by extreme weather (eg, flooding and power outages) and longer-term climate changes that reduce the supply of certain goods (eg, reduced global grain supply from prolonged droughts). Disruptions can range from the very local (eg, a washed-out road to a major tourist site), to major freight hubs, through to global distribution networks. The Intergovernmental Panel on Climate Change (2014)[9] suggests global climate impacts and their flow-on effects to our supply chains may be more significant to our economy than the direct impacts within Aotearoa.

Reduced financial stability

Financial stability means having resilient banks, insurers and other financial institutions. It means we have a system that can withstand severe but plausible shocks and continue to provide the services we all rely on.[10]

There are two main ways that climate change challenges financial stability. First, the realisation of physical risks could lead to abrupt change in asset values (eg, extreme weather damaging residential housing or farmland or changing production outputs). Second, a disorderly transition to a low-carbon economy could also have an abrupt effect on value (eg, regulatory changes and legal challenges driving down value in emissions-intensive industries).

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7 NIWA. 2019. *Coastal Flooding Exposure Under Future Sea-level Rise for New Zealand*. Wellington.

8 Insurance Council of New Zealand. 2021. Record Insurance Support for Communities – 2021 Extreme Weather Claims Exceed $300 M. (Accessed 4 April 2022).

9 Intergovernmental Panel on Climate Change. 2014. *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge.

10 Reserve Bank of New Zealand. 2022. Financial stability. (Accessed 4 April 2022).

Fiscal impacts of extreme weather and sea-level rise

In its 2021 statement on the long-term fiscal position, the Treasury modelled the impact of more frequent and severe storms and droughts.[11] The median impacts by 2061 appeared modest (net debt 3.77 per cent of GDP higher than baseline).

This analysis suggested the Government's fiscal position was relatively resilient. However, these national impacts did not reflect the severe shocks felt by affected communities or local government entities. The fiscal impacts could be greater, given the analysis did not consider sea-level rise, non-linear or 'tipping-point' changes, or effects beyond 40 years.

Reduced Crown revenue

The Government may face lower revenue if tax revenue falls or if productivity or GDP reduce, and the costs to replace or repair its own assets increase.

Objectives

Climate resilience is core to economic security.

The objectives and actions in this chapter focus on adapting and building climate resilience into our transition to a high-wage, low-emissions economy in a way that is fair, inclusive and upholds Te Tiriti o Waitangi.

This means an economy where:

- businesses, large and small, can innovate, thrive and pay higher wages
- our emissions are rapidly trending to net zero
- economic security is provided for all, in good times and bad.

The Government has identified two objectives for the economy and financial system.

Table 12: Government objectives for the economy and financial system

Code	Objective	Explanation
EF1	Sectors, businesses and regional economies can adapt. Participants can identify risks and take action	• Give businesses and property owners the tools and information they need to respond to climate risks. • Reduce barriers to adaptation and innovation. • Enable sectors most vulnerable to near-term or significant change (eg, tourism, land-based primary sector, fisheries and aquaculture) to take action now to reduce costs over time. • Provide regions with what they need to make informed assessments of their risk and reduce their exposure to climate-driven economic disruptions. • Help businesses, sectors and regions to identify economic opportunities that may arise from a changing climate.
EF2	A resilient financial system underpins economic stability and growth. Participants can identify, disclose and manage climate risks	• Financial entities can identify, disclose and manage the risks to their business. • Insurance access and affordability is understood and managed.

[11] The Treasury. 2021. *Te Tirohanga Mokopuna 2021: The Treasury's Combined Statement on the Long-term Fiscal Position and Long-term Insights Briefing*. Wellington.

Actions to support a resilient economy and financial system

Actions to support a resilient economy and financial system are set out in the sections below. Chapter 3: Enabling better risk-informed decisions and chapter 5: Adaptation options including managed retreat also contain actions that are critical to supporting a resilient economy and financial system. These are:

- action 3.5: Support high-quality implementation of climate-related disclosures and explore expansion
- action 5.4: Develop options for home flood insurance.

Addressing inequity

A climate-resilient economy will support vulnerable New Zealanders.

The economic and financial impacts of a changing climate will not be evenly distributed. Fisheries, tourism and land-based primary industries are particularly exposed to climate risks.

To create equitable climate-resilient economies, we must address how regional economies, rural communities, Māori and workers and households with strong reliance on these sectors will also be disproportionately affected. Workers that are left with more insecure employment and displaced workplaces due to climate impacts need to be supported.

The actions in this chapter focus on adapting and building climate resilience in a way that is fair and inclusive by:

- supporting sectors that are most vulnerable to near-term or significant change
- providing regions with what they need to make informed assessments of their risk and take action
- promoting financial stability to minimise the impact of financial shocks, such as rising prices, on those least able to adapt. Stable prices also help to encourage investment and grow job opportunities
- exploring options to improve the affordability and availability of flood insurance to support the wellbeing of vulnerable at-risk communities.

Critical actions

Action 10.1: Deliver the New Zealand Freight and Supply Chain strategy

Timeframe: Years 1–6 (2022–28)
Lead agency: MOT
Relevant portfolio: Transport
Primarily supports: Objective EF1
Status: Current

This strategy will present a long-term and system-wide view of the freight system. Climate adaptation is being considered through the resilience outcome, to ensure Aotearoa New Zealand's freight and supply chain system is resilient, reliable and prepared for disruption. This will inform investment by the Government, councils and private sector players.

The strategy looks across industries, sectors and modes to identify challenges and opportunities in the long term. This will lay the foundation for identifying any actions to reduce the risk of supply chain disruptions on businesses, industries and consumers.

The strategy's equity and safety outcome commits the Government to ensuring that the transition to resilient supply chains is fair, equitable and inclusive. This means ensuring the Government is considering opportunities to support Māori, regional economies, businesses and workers to adapt to expected changes.

By the middle of 2023, the Government will have launched the New Zealand Freight and Supply Chain strategy.

Action 10.2: Strengthen fisheries rules

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Oceans and Fisheries
Primarily supports: Objective EF1
Status: Current

The Government is progressing work on the Fisheries Amendment Bill, which includes several legislative changes to the Fisheries Act 1996. The aim is to strengthen and modernise Aotearoa New Zealand's fisheries management system. The Bill sets tighter rules about what fish commercial fisheries must bring back to port and what they can legally return. The Bill also allows for more agile and streamlined decisions in response to changes in fish stock abundance, by enabling development of the pre-set decision rules.

These rules will allow adjustment of the catch limits, and other sustainability measures within pre-agreed limits, in response to change in abundance. This will allow for the system to be more responsive to the effects of climate change.

By late 2022, the Fisheries Amendment Bill will be passed.

Action 10.3: Deliver the Aquaculture Strategy

Timeframe: Years 1–4 (2022–26) and ongoing
Lead agency: MPI
Relevant portfolio: Oceans and Fisheries
Primarily supports: Objective EF1
Status: Current

The Government's Aquaculture Strategy sets objectives and actions to support Aotearoa in becoming a world leader in sustainable and innovative aquaculture. One of the strategy's objectives is to support the industry to adapt to climate change.

Actions include: forecasting the effects of climate change on the aquatic environment and supporting actions for resilience; helping industry to transition to hatchery spat production; spatial planning approaches informed by climate change considerations to enable industry growth and adaptation; and the development of a comprehensive biosecurity approach.

By 2024, the Government will continue releasing implementation plans for the Aquaculture Strategy and reporting each year on the environmental effects of aquaculture.

Action 10.4: Reserve Bank of New Zealand supports the stability of the financial system

Timeframe: Years 1–2 and ongoing (2022–24)
Lead agency: RBNZ
Relevant portfolio: Finance
Primarily supports: Objective EF2
Status: Current

The Reserve Bank of New Zealand (RBNZ) is taking action to help regulated financial entities identify and manage climate risks better. This includes:

- introducing climate-related stress tests that model the effect of severe but plausible scenarios on the balance sheets of regulated financial institutions
- incorporating climate change in scheduled supervisor engagements with the management and boards of regulated entities
- developing guidance on managing risk for the entities the RBNZ regulates.

By March 2024, the RBNZ will have climate change considerations increasingly integrated into its supervisory, stress-testing and policy work.

Supporting actions

Action 10.5: Deliver the Māori agribusiness extension programme

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Agriculture
Primarily supports: Objective EF1
Status: Current

This action will deliver a tailored extension programme for whenua Māori. This will support collectives of Māori landowners and agribusiness to take a te ao Māori approach to meeting their aspirations for their whenua in a productive and sustainable way. As part of the programme, landowners will consider how best to plan intergenerationally for the impacts of climate change on their whenua. It will extend the current pilot programme, which offers resources and support to Māori landowning collectives.

Action 10.6: Continue delivering the Sustainable Land Management and Climate Change and Greenhouse Gas Inventory research programmes

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Agriculture
Primarily supports: Objective EF1
Status: Current

This work will fund research and develop tools to support the agriculture sector to adapt to climate change better, measure emissions and mitigate land-use impacts on freshwater. It includes science extension and policy research and the ability to respond to the social impacts of climate change.

Action 10.7: Continue delivering the Sustainable Food and Fibre Futures Fund

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Agriculture
Primarily supports: Objective EF1
Status: Current

The Sustainable Food and Fibre (SFF) Futures Fund supports innovative projects that design and test new approaches and solutions to risks such as climate change in the primary sector. The fund supports innovation in Aotearoa New Zealand's food and fibre sector by co-investing in initiatives that bring economic, environmental and social benefits for all New Zealanders. SFF Futures Fund projects include applied research that delivers tangible solutions for primary industries. Funding assists vulnerable groups, including rural farmers and Māori, with problem solving and innovation.

Action 10.8: Establish innovation grants

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Research, Science and Innovation
Primarily supports: Objective EF1
Status: Current

These grants will boost investment in private sector research and development and support innovation. They will share the risk with Aotearoa companies. This means more climate-focused innovation should happen faster, to better enable adaptation action and the transition to a low-emissions economy.

Action 10.9: Identify the impacts of climate change on regional economies

Timeframe: Years 1–3 (2022–25)
Lead agency: MBIE
Relevant portfolio: Economic and Regional Development
Primarily supports: Objective EF1
Status: Current

This work will involve modelling the economic impacts of a changing climate on regional economies and providing guidance for assessing climate impacts in local economic decisions. This will help to identify likely impacts and determine where our vulnerable communities are by exploring the distribution of economic impacts across different parts of Aotearoa. These findings will help regions make informed risk assessments, actions and investments to reduce their exposure to climate-driven economic disruptions and support vulnerable communities. Regional economic preparedness will be further bolstered by other proposals in the national adaptation plan, such as the Māori-led partnership.

Action 10.10: Monitor residential insurance premiums

Timeframe: Years 1–2 (2022–24)
Lead agencies: Treasury; Toka Tū Ake EQC
Relevant portfolio: Toka Tū Ake EQC
Primarily supports: Objective EF2
Status: Current

Monitoring residential premiums and uptake of insurance gives a better understanding of the scale of shifts in insurance availability and affordability.

Action 10.11: Consider climate risk in economic and fiscal monitoring and forecasting

Timeframe: Years 1–6 (2022–28)
Lead agency: Treasury
Relevant portfolio: Finance
Primarily supports: Objective EF2
Status: Current

Treasury's six-monthly economic updates are a core way to monitor and forecast the economic and fiscal environment. This includes the impact of shocks (eg, COVID-19 or natural disasters) on the Crown's financial position and tracking long-run changes. The updates highlight known quantifiable and unquantifiable climate adaptation risks as a tool in fiscal and economic management.

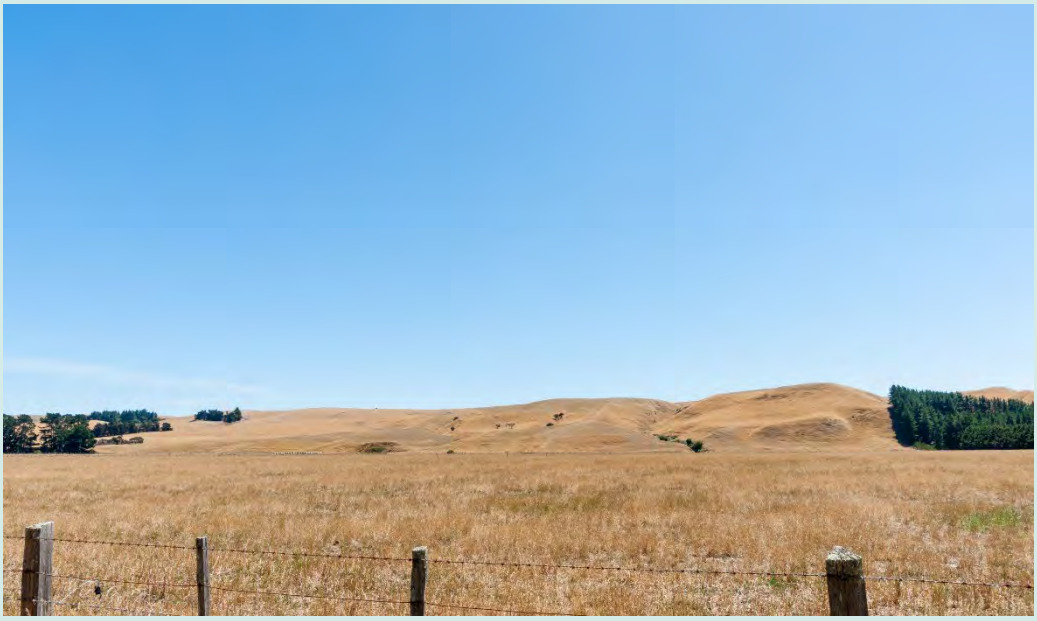


Image: Ministry for Primary Industries

CASE STUDY
Farming under drought conditions – primary sector adaptation

*"Adaptation is about surviving and thriving in the face of change."**

Climate change is increasing the frequency and severity of drought in Aotearoa. From 2007 to 2017, drought cost the country around $720 million. The primary sector is particularly vulnerable and can expect conditions to get drier.

Climate disasters place a huge strain on the lives of farmers and growers, and particularly on their mental health. To reduce the economic risks of drought and build climate resilience in farmers and growers, a national long-term adaptation strategy is needed.

"Unless we work together, we are going to lock ourselves into the status quo."

To develop a strategy that serves all stakeholders, a National Science Challenge consortium brought together farmers, growers, industry bodies, researchers and government. Online webinars and a one-day symposium were held in 2021. The resulting findings were captured in the *Growing Kai Under Increasing Dry* report.

The report emphasises that it is vital for the primary sector to adapt and protect its viability, and to collaborate widely. Solutions include:

- connecting policy, research and on-farm practice
- introducing long-term planning rather than short-term planning to respond to events
- enabling behaviour change and diversifying farming activities.

"We can be either proactive or reactive, but climate change impacts are inevitable."

The report notes that although incremental adaptation has been happening for a decade, transformational change is now required. In contrast to incremental adaptation, which involves actions such as changing seed-sowing dates, transformational adaptation involves identifying novel land-use opportunities.

"Neither a top-down nor bottom-up approach alone will do."

The report sets out key roles: farmers and growers are the decision makers on the ground; industry bodies work as knowledge brokers for adaptation; researchers contribute new possibilities for adaptation and co-develop solutions; and the Government has a significant role in enabling innovation, investment and flexibility.

** All quotes in this case study come from the National Science Challenge report,* Growing Kai Under Increasing Dry.

Action 10.12: Implement the Government response to the Prime Minister's Chief Science Advisor's report on commercial fishing

Timeframe: Years 1–6 (2022–28) and ongoing
Lead agency: MPI
Relevant portfolio: Oceans and Fisheries
Primarily supports: Objective EF1
Status: Current

This report makes several recommendations for the fisheries management system and for commercial fishers. The Government's response is underway and includes actions that support innovation across the system, progress an ecosystem approach to fisheries management and protect habitats of significance to fisheries management.

Action 10.13: Support the implementation of Aotearoa Circle Seafood Sector Adaptation Strategy

Timeframe: Years 1–6 (2022–28)
Lead agency: MPI
Relevant portfolio: Oceans and Fisheries
Primarily supports: Objective EF1
Status: Current

Building on scenario planning, the Seafood Sector Adaptation Strategy: Climate Adaptation Strategy 2021–2030 is a collaboration between the major seafood sector leaders, Government, environmental non-government organisations, iwi representatives and the research community. The strategy sets out a shared 10-year vision and goals, and actions to help achieve these. The aim is to enhance the resilience and adaptive capacity of Aotearoa New Zealand's seafood system. It includes actions to ensure adaptation information is more integrated and accessible, and to promote ecologically and economically efficient fishing and aquaculture. Te ao Māori is incorporated throughout the strategy – and specific implementation actions reflect this (eg, piloting and monitoring a te ao Māori approach to coastal management. An implementation group drawn from the strategy development agencies, established mid-2022, facilitates the strategy's implementation and progress reporting.

CASE STUDY
Seafood Sector Adaptation Strategy, 2021–2030

*"Only a collaborative, sector-wide adaptation strategy can address the impacts of climate-related risk in the seafood sector."**

Climate risk to fisheries is one of the 43 risks identified in the National Climate Change Risk Assessment 2020. In 2020, the Aotearoa Circle brought together 23 organisations in the seafood sector to assess climate risks and opportunities. This was based on the Task Force on Climate-related Financial Disclosures framework.

This group included industry players, government, iwi and community stakeholders. It adopted the Seafood Sector Adaptation Strategy, with comprehensive actions to be brought in from 2021 to 2027.

"As kaitiaki we work together to adapt to climate change and ensure a resilient future."

Goals

- **Bold leadership** will ensure stakeholders can better understand their risks and opportunities, and drive the actions.
- **Resilient prosperity** will develop adaptative capacity (eg, funding and research opportunities to diversify markets). It will also progress actions that enhance the resilience of the marine environment.
- **Practical knowledge** will enable the development and sharing of all kinds of relevant information and knowledge across the sector. This will inform the assessment of adaptation options.
- **Values-based governance** will mean stakeholders from across the seafood community will collaborate with policy makers as climate change is mainstreamed into regulatory and management-level decision-making.

This is an early example of a sector working together with Government, iwi and stakeholders to produce an adaptation strategy, including an implementation roadmap. It is an opportunity to adapt in ways that bring lasting co-benefits to habitats, ecosystems, communities and businesses.

** All quotes in this case study come from the Aotearoa Circle* Seafood Sector Adaptation Strategy: Climate Adaptation Strategy 2021–2030*.*

Action 10.14: Deliver the Tourism Industry Transformation Plan

Timeframe: Years 1–3 (2022–2025)
Lead agency: MBIE
Relevant portfolio: Tourism
Primarily supports: Objective EF1
Status: Current

The goal of this work is regenerative tourism. The first phase focuses on 'better work' and the second phase on the environment. The Tourism Adaptation Roadmap developed by the Aotearoa Circle will be an input for the environmental phase of the Tourism Industry Transformation Plan. This allows for a sector-wide assessment of risks and actions. Alongside action 10.15, this work will help to minimise the impacts of a changing climate on tourism workers, business owners and communities whose livelihoods depend on this at-risk sector.

Action 10.15: Review the settings for the International Visitor Conservation and Tourism Levy

Timeframe: Years 1–2 (2022–24)
Lead agency: MBIE
Relevant portfolio: Tourism
Primarily supports: Objective EF1
Status: Current

Currently, international visitors do not directly pay for many products and services they use where these are funded by local communities. The Ministry of Business, Innovation and Employment (MBIE), directed by the Minister of Tourism, is reviewing the International Visitor Conservation and Tourism Levy (IVL). This includes ensuring international visitors contribute to resilient, adaptable infrastructure and the natural environment they use during their visit. Resilient infrastructure, including a healthy environment, will reduce the risks from extreme weather. This action will support a focus on the spending priorities of the IVL, as well as any further work across the life of the national adaptation plan (eg, other tools) to support adaptation and climate resilience in tourism.

Action 10.16: Leverage government procurement for climate outcomes

Timeframe: Year 1 (2022/23)
Lead agency: MBIE
Relevant portfolio: Economic and Regional Development
Primarily supports: Objective EF1
Status: Current

This action will check the current government's procurement policy framework enables mitigation and adaptation in government investments. The greatest opportunity will likely be in construction contracts, making buildings and infrastructure resilient to a changing climate, and reducing carbon emissions and waste. This links to the Homes, buildings and places action plan (chapter 7).

Future proposed work programmes

Action 10.17: Support Māori small business resilience and transitions

Timeframe: Years 2–5 (2023–27)
Lead agencies: TPK; MBIE
Relevant portfolios: Māori Development; Economic and Regional Development
Primarily supports: Objective EF1
Status: Proposed

The aim of this work is to support Māori small and medium enterprises to develop low-emissions growth strategies, respond to climate-related risks and opportunities, and adopt resilient ways of working. Businesses would commit to reducing their emissions or improving their resilience to physical climate events.

This action will support Māori small businesses, which are disproportionately concentrated in sectors exposed to climate impacts and typically have less capacity to adapt than larger enterprises, to take action and demonstrate leadership in adaptation.

Action 10.18: Research business adaptation preparedness and provide guidance for small businesses to adapt

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Small Business
Primarily supports: Objective EF1
Status: Proposed

This will help small businesses reduce their climate risks through targeted guidance and information. The guidance will be based on research that will increase understanding of what businesses are doing to adapt, and the pain points for business owners. The research will set a baseline for current action, inform future policy and drive the development of guidance and resources for small businesses.

This action will assist many of the businesses least able to adapt with climate adaptation, and least aware of the benefits of adaptation and effective ways to build resilience against climate risk. This will help ensure that the benefits of climate adaptation are distributed broadly throughout Aotearoa New Zealand's business demographics.

Action 10.19: Enhance industry partnership networks

Timeframe: Years 1–6 (2022–28)
Lead agency: MBIE
Relevant portfolio: Research, Science and Innovation
Primarily supports: Objective EF1
Status: Proposed

This action will pool knowledge and resources to solve sector problems. The partnerships will recognise the complexity and interrelatedness of issues, such as climate adaptation, and the need for sophisticated networks to test, scale up and spread innovation to help address challenges facing Aotearoa. These networks will speed up the connections and relationships needed to implement change at pace.

Other actions across this plan will contribute to a resilient economy and financial system

Aotearoa New Zealand's economy is connected with all the other outcome areas in this plan. A number of other actions will also contribute to a resilient high-wage, low-emissions economy, notably:

- action 3.13: Provide a forestry planning and advisory service: This service will promote better land use, tree selection, resilience and suitability for the landscape. It will support the forestry industry to identify climate risks and take action.
- action 3.14: Deliver the Integrated Farm Planning Programme: This programme will support producers to become more resilient in the face of a changing climate, including developing adverse events and resilience planning and increasing data-sharing capability within the primary sector. The new Ministry for Primary Industries (MPI) On Farm Support services will also guide integrated farm planning.
- action 3.19: Develop Te Ara Paerangi – Future Pathways programme for the research, science and innovation system: This will position our research, science and innovation system for the future. It includes focusing resources on national goals such as climate change and exploring how research can best honour Te Tiriti obligations and promote mātauranga Māori. A research, science and innovation system that is connected, resilient and adaptable can more effectively respond to the needs of businesses and sectors, and support the development of the right tools, information and innovative capacity to address climate risks.
- action 3.20: Continue prioritising research and investment in climate-related science: This will support innovative adaptation and contribute to a resilient economy and financial system by pushing the boundaries of knowledge and transferring this knowledge.
- action 6.1: Implement the Department of Conservation Climate Change Adaptation Action Plan: This plan includes actions for heritage, recreation and infrastructure of public conservation land and water. It will reduce risks to tourism from weather events and protect sites that are important for tourism.
- action 6.6: Implement the Water Availability and Security programme: This programme will help farmers adapt to varying water availability, avoid disruptions to business activity and land use, and potential flow-on impacts on sectors, regions and the wider economy.
- action 9.10: Implement an income insurance scheme to support adaptive capacity of communities and the economy: The Government is developing a proposal for a New Zealand income insurance scheme, which would support workers with a proportion of income replacement for up to seven months if they lose their job through no fault of their own. This would reduce the economic impacts of a changing climate on workers and communities, and enable workers to transition to new job opportunities afforded by changes in the economy.

CHAPTER 11:

Implementing the plan

Chapter 11: Implementing the plan

Engaging with key groups

The actions in this plan are varied and wide-ranging. Different actions aim to support different sectors and entities. During the implementation phase, the extent of engagement will also vary.

Some actions, such as the Aquaculture Strategy or Tourism Industry Transformation Plan, are sector specific. Others, such as the Health National Adaptation Plan, apply more to communities.

Other examples include the regular updates of local government guidance. Engaging with local government will be essential for this, as councils will have the most direct experience of which parts of the guidance work well and which could be strengthened.

Inclusive engagement, particularly with those disproportionately affected by climate change, will help to ensure actions lead to the intended outcomes.

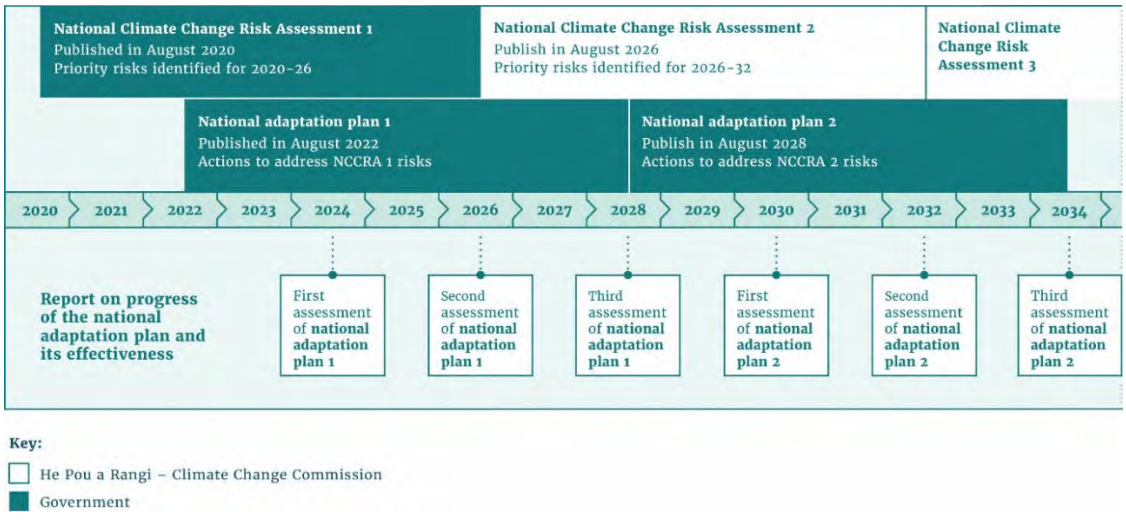
This approach to implementation will align us with the emissions reduction plan's equitable transition strategy. It will do this by encouraging engaged and active public participation in the plan, including in partnership with Māori.

Monitoring and reporting

Reporting on this plan

Every two years, He Pou a Rangi – Climate Change Commission will report to the Minister of Climate Change on the implementation and effectiveness of the national adaptation plan (figure 10). The Minister must respond to these reports within six months of receiving them. This provides an opportunity for the Government to adjust the actions and manage uncertainty and risk. The Government also has international commitments to report on Aotearoa New Zealand's progress towards building resilience.

Figure 10: The monitoring, evaluating and reporting process for adaptation action



Governance and oversight

Successfully implementing the national adaptation plan will require action across government. Strong governance and accountability mechanisms are needed to make continuous progress. A climate change interdepartmental executive board (IEB) is being established to oversee the emissions reduction plan and national adaptation plan. The IEB will monitor and report on progress each year (annual IEB report). The Climate Change Response Minister's Group will oversee the plan and drive progress.

Regulatory stewardship (monitoring the Government's regulatory systems) is a further opportunity to consider climate change and improve how we implement the plan.

Action 11.1: Establish central government oversight and coordination for implementing the national adaptation plan

Timeframe: Years 1–6 (2022–28)
Lead agency: MfE
Relevant portfolio: Climate Change
Primarily supports: Objective SW1
Status: Current

This will provide transparency of implementation of the plan across government, improve coordination within central government and enable accountability.

Annual reporting requirements by agencies will be completed each year, commencing in 2023.

Progress indicators

Each critical and supporting action in this national adaptation plan includes progress indicators to 2028. To help the Commission assess the plan's effectiveness in reducing risk, the Ministry for the Environment will regularly assess the preparedness of certain organisations. These include policy developers and service providers. The results from the first survey in 2020 set a baseline for assessing the effectiveness of future actions.

Adjustment of actions

Monitoring the progress of the national adaptation plan and reporting on its effectiveness will enable the Government to identify whether it is appropriate to adjust the actions in the plan. The IEB annual report will identify:

- any new actions to be included in the plan
- any proposed actions that have received a mandate and are re-categorised as current actions, either critical or supporting.

Research plan to fill knowledge gaps

Some actions in this plan depend on new or updated data or information. Others need additional knowledge before they can be applied. Additional data may also be needed to inform the next national climate change risk assessment, which will be published in 2026. This research strategy describes the data, information and research needed to fill these gaps.

Knowledge gaps

Across the research themes, the following are steps to prioritise to 2028:

- collate and complete **priority data** on risk (vulnerability, hazards, exposure)
- provide **open-access data**, accessible to a variety of audiences
- design, implement and share research platforms.
- **transform data into knowledge about vulnerability**, including monitoring and evaluating sensitivity and adaptive capacity. This addresses the call to understand vulnerability and, in some cases, generic use of the word 'risk'. Studies such as monitoring and scenario modelling are needed, including in the following areas:
  - ecosystems. Monitoring ecosystems helps us understand their state and their changes through time. This makes it possible to understand vulnerability. Integrated monitoring and research highlights current ecosystem functioning as it alters in response to changing conditions and extreme events. It also facilitates invasive/biosecurity monitoring, which is another climate impact. At a higher level, a national monitoring system will help with environmental reporting and resource management
  - community vulnerability to changing conditions and extreme events. Studies of the events and their aftermath can include the response to, and recovery from, exposure to hazards, the immediate effects and long-term follow-up. This includes both sensitivity (how communities are affected) and adaptive capacity (how they respond) through the entire cycle. Frameworks include the National Emergency Management Agency's '4 Rs': reduction, readiness, response, recovery
- support **mātauranga Māori and kaupapa Māori research**. A number of proposed actions will progress the development of iwi/Māori climate data and information. These include actions that focus on mātauranga Māori environmental indicators, iwi/Māori socio-economic risk and vulnerability assessment, mapping of taonga, and the extension of mapping the cultural footprint against high-impact weather
- **monitor and evaluate the effects** of policy and interventions. This includes ecological restoration, environmental design, effects of adaptation actions in communities, and the adaptive capacity of the built environment and infrastructure.

Timeframes for filling knowledge gaps

Short term (2022–25)

The first three years of this national adaptation plan are key for both collecting the data and information and starting long-term programmes. This will allow data and information to be made available for the second national climate change risk assessment, which will be published in 2026.

During this period, research priorities are to:

- consolidate existing data and make them open access
- complete priority datasets
- start national networks of long-term monitoring of natural environments
- start and complete vulnerability studies.

Existing and concurrent research should aim to produce and publish results in 2024–25.

National Science Challenges

The National Science Challenges conclude in 2024. The projects with climate adaptation research are: The Deep South, Resilience to Nature's Challenges, Our Land and Water, New Zealand's Biological Heritage, Sustainable Seas, and Building Better Homes, Towns and Cities.

The results will likely be ready in time to inform the second national climate change risk assessment and ongoing national adaptation plan work.

Medium term (2025–28)

The second national adaptation plan will be published in 2028. Research priorities include:

- completing nationally prioritised datasets
- setting up the national ecological monitoring network
- continuing and beginning research programmes
- publishing research results, especially vulnerability studies and risk syntheses.

Long term (2028 onward)

Research in all areas will build on what has been learned, and address what remains to be known, as knowledge about climate change grows. This requires a commitment to long-term research, including national environmental monitoring and ecosystem studies.

Other actions during this period include:

- regularly updating maps and information on hazards and exposure
- collating research findings in vulnerability assessments and risk syntheses
- monitoring and evaluating restoration and adaptation.

Appendices

Appendix 1: Glossary

Glossary of terms

Key term	Definition
Adaptation	In human systems, the process of adjusting to actual or expected climate and its effects, to moderate harm or take advantage of beneficial opportunities. In natural systems, the process of adjusting to actual climate and its effects. Human intervention may help these systems to adjust to expected climate and its effects.
Adaptation options	The wide range of strategies and measures that are available and appropriate for addressing adaptation. They can take the form of structural, institutional, ecological or behavioural actions.
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or to respond to consequences.
Asset	Something of value, which may be exposed or vulnerable to a hazard or risk. It may be something physical, environmental, cultural or financial and/or economic, and its value may be tangible, intrinsic or spiritual (see **Taonga**).
Baseline	An initial set of critical observations or data used for comparison or a control.
Biodiversity	The variability among all living organisms on Earth. It includes diversity within species, diversity between species and diversity of an ecosystem. The living organisms may be from any sources, such as terrestrial, marine and other aquatic ecosystems, and the ecological complexes they belong to.
Capacity building	The practice of supporting an individual, community, society or organisation to respond to change by enhancing their strengths and attributes, and improving the resources available to them.
Cascading impacts	A series of events where an initial impact produces further impacts that are significantly larger than the first one. In relation to extreme weather events, an extreme hazard causes a sequence of secondary events in natural and human systems that result in major physical, natural, social and/or economic disruption. Cascading impacts are complex and multidimensional, and are associated more with the extent to which the natural and human systems are vulnerable, than with the size of the original hazard.
Climate	Informally, the average weather over a period ranging from months to thousands or millions of years. In more formal terms, a statistical description of the mean and variability of quantities, usually of surface variables such as temperature, precipitation and wind, averaged over a period (typically 30 years, as defined by the World Meteorological Organization). More broadly, climate is the state, including a statistical description, of the climate system.
Climate change	A change in the state of the climate that can be identified (eg, by using statistical tests) by changes or trends in the mean and/or the variability of its properties, and that persists for an extended period, typically decades to centuries. Includes natural internal climate processes and external climate forcings such as variations in solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use.

Key term	Definition
	The United Nations Framework Convention on Climate Change (UNFCCC) definition of climate change specifically links it to direct or indirect human causes, as: "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods". The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition and climate variability attributable to natural causes.
Climate resilience	The ability to anticipate, prepare for and respond to the impacts of a changing climate, including the impacts that we can anticipate and the impacts of extreme events. It involves planning now for sea-level rise and more frequent flooding. It is also about being ready to respond to extreme events such as forest fires or extreme floods, and to trends in precipitation and temperature that emerge over time such as droughts.
Coastal	Describes either the land near to the sea (eg, 'coastal communities') or the part of the marine environment that is strongly influenced by land-based processes (eg, 'coastal seas', meaning the part of the sea that is generally shallow and near shore). The landward and seaward limits of the coastal zone are not consistently defined, neither scientifically nor legally. Thus, coastal waters can either be considered as equivalent to territorial waters (extending 12 nautical miles and/or 22.2 km from mean low water), or to the full Exclusive Economic Zone, or to shelf seas, with less than 200 m water depth.
Coastal erosion	The process when the high-tide mark moves closer towards the land due to a net loss of sediment or bedrock from the shoreline. Also known as shoreline retreat.
Co-benefit	A positive effect that a policy or measure aimed at one objective has on another objective, thereby increasing the total benefit to society or the environment.
Consequence	The outcome of an event that may result from a hazard. It can be expressed quantitatively (eg, units of damage or loss, disruption period, monetary value of impacts or environmental effect), by category (eg, high-, medium- or low-level impact) or qualitatively (a description of the impacts). Alternatively, the outcome of an event that affects objectives.
(the) Crown	Generally, executive government conducted by ministers and their departments. The Crown does not normally include organisations with their own corporate identities, such as state-owned enterprises.
Cultural asset	Material artefacts, non-material items and natural places that have cultural value.
Cultural heritage	Those aspects of the environment that contribute to an understanding and appreciation of Aotearoa New Zealand's history and cultures. It includes historic sites, structures, places, areas, archaeological sites, sites of significance to Māori (including wāhi tapu) and cultural landscapes.
Disaster	A serious disruption of the functioning of a community or a society, at any scale, that occurs because hazardous events interact with conditions of exposure, vulnerability and capacity, leading to human, material, economic and/or environmental losses and impacts.
Disaster risk management	Processes for designing, implementing and evaluating strategies, policies and measures to improve understanding of current and future disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in

Key term	Definition
	disaster preparedness, prevention and protection, response and recovery practices. The aim is to increase human security, wellbeing, quality of life and sustainable development.
Displacement	The involuntary movement, individually or collectively, of people from their country or community, notably for reasons of armed conflict, civil unrest or natural or human-made disasters. In the context of this plan, displacement primarily refers to the involuntary movement of individuals or communities in response to climate change impacts.
Distributional impact	The effects of environmental policies (eg, higher transport or energy costs) across households, Māori, businesses, communities and regions. Some groups may pay more or receive fewer benefits from the policies.
Drought	An exceptionally long period of water shortage for existing ecosystems and the human population (due to low rainfall, high temperature and/or wind).
Dry year	An extended period when the energy supply in Aotearoa relies more on natural gas and coal because hydroelectric generation is reduced. This occurs because hydro lakes hold only enough water for a few weeks of winter energy demand if inflows (rainfall and snowmelt) are very low.
Dynamic adaptive pathways planning	A framework that supports climate adaptation decision-making by developing a series of actions over time (pathways). It is based on the idea of making decisions as conditions change, before severe damage occurs, and as existing policies and decisions prove no longer fit for purpose.
Ecosystem	A functional unit consisting of living organisms, their non-living environment and the interactions within and between them. The purpose of the ecosystem defines what components belong to it and where its spatial boundaries lie. Ecosystem boundaries can change over time. Ecosystems are nested within other ecosystems and their scale can range from very small to the entire biosphere. In the current era, most ecosystems either contain people as key organisms or are influenced by the effects of human activities in their environment.
Ecosystem health	A metaphor that describes the condition of an ecosystem, by analogy with human health. The health status of an ecosystem is based not on a standard measurement but on a judgement of its resilience to change, which varies depending on which measures are used and which social aspirations are behind the assessment.
Ecological corridor	An area of habitat connecting wildlife populations that have been separated by human activities or structures.
Ecological integrity	The ability of an ecological system to support and maintain a community of organisms where the composition, diversity and functional organisation of its species is comparable to those of natural habitats within a region.
Emergency management	The process of applying knowledge, measures and practices that are necessary or desirable for the safety of the public or property, and are designed to guard against, prevent, reduce, recover from or overcome any hazard, harm or loss associated with any emergency. Activities include planning, organising, coordinating and implementing those measures, knowledge and practices.
Emissions	In the context of climate change, emissions of greenhouse gases, precursors of greenhouse gases and aerosols caused by human activities. These activities include the burning of fossil fuels, deforestation, land use and land-use

Key term	Definition
	change, livestock production, fertilisation, waste management and industrial processes.
Equity	The principle of being fair and impartial, often also aligned with ideas of equality and justice. It provides a basis for understanding how the impacts of, and responses to, climate change (including costs and benefits) are distributed in and by society in more or less equal ways. The principle can be applied in understanding who is responsible for climate impacts and policies; how those impacts and policies are distributed across society, generations and gender; and who participates and controls the processes of decision-making.
Erosion	The process in which actions of water, wind or ice wear away land.
Exposure	Being present in a place or setting that could be adversely affected. Those that could be harmed in that environment include people; livelihoods; species or ecosystems; environmental functions, services and resources; infrastructure; and economic, social or cultural assets.
Extreme weather event	An event that is rare at a particular place and time of year. What is 'extreme weather' may vary from place to place in an absolute sense. The measure of what is 'rare' may also vary but it involves the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. In general, an extreme weather event would be as rare as, or rarer than, the 10th or 90th percentile of a probability density function estimated from observations. When a pattern of extreme weather persists for some time, such as a season, it may be classified as an extreme climate event, especially if it yields an average or total that is itself extreme (eg, high temperature, drought or heavy rainfall over a season).
Fiscal impacts	The implications a policy or event has for government expenditure or revenue.
Flood	An event where the normal boundaries of a stream or other water body overflow, or water builds up over areas that are not normally underwater. Floods can be caused by unusually heavy rain – for example, during storms and cyclones. Floods include river (fluvial) floods, flash floods, urban floods, rain (pluvial) floods, sewer floods, coastal floods and glacial lake outburst floods.
Frequency (of a hazard)	The number or rate of occurrences of hazards, usually over a particular period.
Governance	The governing architecture and processes of interaction and decision-making that exist in and between governments, economic and social institutions. Governance permeates all aspects of Aotearoa, from Te Tiriti partnership between Māori and the Crown, to the relationship between local government and communities, and from the economy to the built environment and to natural ecosystems.
Greenhouse gas	Gas in the atmosphere, which may have natural or human causes, that absorbs and emits radiation at specific wavelengths within the spectrum of radiation emitted by the Earth's oceans and land surfaces, by the atmosphere itself and by clouds. This property causes the greenhouse effect.

Key term	Definition
	The main greenhouse gases in Earth's atmosphere are water vapour, carbon dioxide, nitrous oxide, methane and ozone. Human-made greenhouse gases include sulphur hexafluoride, hydrofluorocarbons, chlorofluorocarbons and perfluorocarbons.
Gross domestic product (GDP)	The sum of the gross value that all resident and non-resident producers in the economy added, at purchasers' prices, to a country or region plus any taxes and minus any subsidies not included in the value of the products in a country or a geographic region for a given period, normally one year. GDP is calculated without deducting for depreciation of fabricated assets or depletion and degradation of natural resources.
Hazard	The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.
Heatwave	A period of abnormally hot weather often defined with reference to a relative temperature threshold, lasting from two days to months.
Impacts	The consequences of realised risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather events), exposure and vulnerability. They are generally effects on human lives, livelihoods, health and wellbeing; ecosystems and species; economic, social and cultural assets; services (including ecosystem services); and infrastructure. They can be harmful or beneficial. Also known as consequences or outcomes.
Indigenous knowledge	The understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings. For many indigenous peoples, indigenous knowledge informs decision-making about fundamental aspects of life, from day-to-day activities to longer-term actions. This knowledge is integral to cultural complexes, which also include language, systems of classification, resource-use practices, social interactions, values, ritual and spirituality. These distinctive ways of knowing are important facets of the world's cultural diversity.
Infrastructure	The designed and built set of physical systems, along with their institutional arrangements, that interact with the broader environment to provide services to people and communities that support economic growth, health, quality of life and safety.
Insurance/ reinsurance	A group of financial instruments for sharing and transferring risk among a pool of at-risk households, businesses and/or governments.
Intergovernmental Panel on Climate Change (IPCC)	The United Nations body for assessing the science related to climate change. The IPCC is organised into three working groups and a task force: • Working Group I (WGI) – physical science basis • Working Group II (WGII) – impacts, adaptation and vulnerability • Working Group III (WGIII) – mitigation • Task Force on national greenhouse gas inventories.
Land use	All of the arrangements, activities and inputs (a set of human actions) that people undertake in a certain type of land cover (eg, forest land, cropland, grassland, wetland and settlements). Alternatively, the social and economic purposes for which land is managed (eg, grazing, timber extraction, conservation and city dwelling).

Key term	Definition
Maladaptation	Actions that may lead to increased risk of adverse climate-related outcomes, including increased greenhouse gas emissions, increased vulnerability to climate change and reduced welfare, now or in the future. Maladaptation is usually an unintended consequence.
Managed retreat	The purposeful, coordinated movement of people and assets (eg, buildings and infrastructure) away from risks. This may involve the movement of a person, infrastructure (eg, building or road) or community. It can occur in response to a variety of hazards, such as flood, wildfire or drought.
Māori values and principles	Values and principles that come from Māori views of the world and that Māori use to make sense of, experience and interpret the world. They form the basis for Māori ethics and principles.
Mitigation	In the context of climate change, a human intervention to reduce the sources or enhance the sinks of greenhouse gases.
Nature-based solutions	Solutions that are inspired and supported by nature and are cost effective, and at the same time provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features (eg, vegetation and water features) and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. For example, using vegetation (eg, street trees or green roofs) or water elements (eg, rivers or water-treatment facilities) can help reduce heat in urban areas or support stormwater and flood management.
Ocean acidification	A reduction in the pH of the ocean, accompanied by other chemical changes (primarily in the levels of carbonate and bicarbonate ions), over an extended period, typically decades or longer, which is caused primarily by uptake of carbon dioxide (CO_2) from the atmosphere, but can also be caused by other chemical additions or subtractions from the ocean. Anthropogenic ocean acidification is the component of pH reduction that is caused by human activity. Anthropogenic Ocean Acidification refers to the component of pH reduction that is caused by human activity (IPCC, 2011, p 37). It is a process in which the pH of the ocean reduces (becomes more acidic) and other chemical changes occur (mainly in the levels of carbonate and bicarbonate ions) over several decades or longer. The main cause is uptake of CO_2 from the atmosphere but other chemical additions or subtractions from the ocean can contribute.
Oranga Marae	Oranga Marae is a programme of support, advice and investment for marae. It gives whānau and hapū advice and support to help develop their marae and achieve their goals. This support may include building projects and activities to revitalise cultural knowledge. A key goal of the programme is to strengthen the ability of marae to pass on their ancestral knowledge of whaikōrero, karanga and local mātauranga, tikanga and kawa to descendants.
Pathway	The evolution of natural and/or human systems over time towards a future state. Pathway concepts range from sets of quantitative and qualitative scenarios or narratives of potential futures to solution-oriented, decision-making processes to achieve desirable social goals. Pathway approaches typically focus on biophysical, techno-economic and/or socio-behavioural changes, and involve various dynamics, goals and participants across different scales.
Place/places	Urban or rural areas, ranging from neighbourhoods to towns and regions. Adaptation must address both the physical elements of a place (eg, homes, buildings, infrastructure and spaces around them) and the social elements (eg, the identity of people and communities, cultural value).

Key term	Definition
Regenerative agriculture	An approach to land management that recognises how all aspects of agriculture are connected through a network. This differs from a linear view of agriculture as a supply chain. The principles behind regenerative agriculture aim to restore soil and ecosystem health, address inequality and leave our land, waters and climate in better shape for future generations.
Resilience/resilient	The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, by responding or reorganising in ways that maintain their essential function, identity and structure. Resilience is a positive attribute when it allows systems to maintain their capacity to adapt, learn and/or transform.
Retrofitting	The process of adding new technology or features to older systems, especially industrial installations and buildings.
Risk	The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Adverse consequences may affect human lives, livelihoods, health and wellbeing; economic, social and cultural assets and investments; infrastructure; services (including ecosystem services); and ecosystems and species.
Risk assessment	The scientific estimation of risks, which may be either quantitative or qualitative.
Risk management	The process of making plans, actions, strategies or policies to reduce the likelihood and/or scale of potential adverse consequences, based on assessed or perceived risks.
Sea-level rise	Change to the height of sea levels over time, which may occur globally or locally. Causes may be: • a change in ocean volume as a result of a change in the mass of water in the ocean (eg, due to melt of glaciers and ice sheets) • changes in ocean volume as a result of changes in ocean water density (eg, expansion under warmer conditions) • changes in the shape of the ocean basins and changes in Earth's gravitational and rotational fields • local subsidence or uplift of the land.
Storm surge	The temporary increase, at a particular location, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). It is the excess in height above the level expected from the tidal variation alone at that time and place.
Stressor	In the context of climate change, an event or trend, often not climate-related, that has an important effect on the system exposed and can increase vulnerability to climate-related risk.
Sustainable/ sustainability	Describes conditions where natural and human systems can persist. Ecosystems continuously function, biodiversity is high, natural resources are recycled and, in the human sector, people successfully apply justice and equity.
Three waters	Drinking water, wastewater and stormwater.
Tipping point	A critical threshold beyond which a system reorganises, often abruptly and/or irreversibly.

Key term	Definition
Uncertainty	A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may occur for many reasons. For example, the data may be imprecise, definitions of concepts or terminology may be ambiguous, understanding of critical processes may be incomplete, or projections of human behaviour may be in doubt.
Urban heat islands	Heat islands are urbanised areas that experience higher temperatures than outlying areas. Structures such as buildings, roads and other infrastructure absorb and re-emit the sun's heat more than natural landscapes such as forests and water bodies. Urban areas, where these structures are highly concentrated and greenery is limited, become 'islands' of higher temperatures relative to outlying areas.
Vulnerability/ vulnerable	Being predisposed or more likely to be adversely affected. Elements that contribute to this concept include sensitivity or susceptibility to harm and lack of capacity to cope and adapt.
Wellbeing	The health, happiness and prosperity of an individual or group. It can cover material wellbeing (eg, income and wealth, jobs and earnings, and housing), health (eg, health status and work–life balance), security (eg, personal security and environmental quality), social relations (eg, social connection, subjective wellbeing, cultural identity and education) and freedom of choice and action (eg, civic engagement and governance).
Whānau Ora	Whānau Ora puts whānau and families in control of the services they need to work together, build on their strengths and achieve their aspirations.
Wilding conifers	Introduced conifers that are spreading across the landscape through natural regeneration. Also known as wilding pines.
Zoonotic disease	A disease that can be naturally transferable from vertebrate animals to humans.

Note: This glossary is based on definitions used by the IPCC.

List of acronyms and abbreviations

Acronym	Full name
AHL	Animal Health Laboratory
ANZBS	Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy
CCAAP	Climate Change Adaptation Action Plan
CERF	Climate Emergency Response Fund
DIA	Department of Internal Affairs
DOC	Department of Conservation
EQC	Toka Tū Ake EQC
FMA	Financial Markets Authority
FNZ	Fisheries New Zealand
GDP	Gross domestic product
HNAP	Health National Adaptation Plan
HUD	Te Tūāpapa Kura Kāinga – Ministry of Housing and Urban Development
IPCC	Intergovernmental Panel on Climate Change
IVL	International Visitor Conservation and Tourism Levy
LIM	Toitū Te Whenua Land Information Memorandum
MBIE	Ministry of Business, Innovation and Employment
MCH	Ministry for Culture and Heritage
MFAT	Ministry of Foreign Affairs and Trade
MfE	Ministry for the Environment
MOD	Ministry of Defence
MOE	Ministry of Education
MOH	Manatū Hauora Ministry of Health
MOT	Te Manatū Waka Ministry of Transport
MPI	Ministry for Primary Industries
MSD	Ministry of Social Development
NEMA	National Emergency Management Agency
NIWA	National Institute of Water and Atmospheric Research
NPS-IB	National Policy Statement on Indigenous Biodiversity
PHEL	Plant Health Environment Laboratory
RBNZ	Reserve Bank of New Zealand
TPK	Te Puni Kōkiri – Ministry of Māori Development
UNFCCC	United Nations Framework Convention on Climate Change
XRB	External Reporting Board

Te reo Māori glossary

Te reo Māori	English
Ara whakamua	The path forward.
Hapori	Community, section of a kinship group, family, society.
Hapū	Kinship group, clan, subtribe.
Iwi	Tribe, large group descended from a common ancestor.
Kaitiaki or kaitiakitanga	Guardian or guardianship, stewardship – for example, of natural resources.
Karanga	Formal call, ceremonial call, welcome call.
Kaupapa Māori	Māori approach, topic, customary practice, institution, agenda, principles, ideology – a philosophical doctrine incorporating the knowledge, skills, attitudes and values of Māori society.
Kawa	Ceremony, protocol.
Kāwanatanga	Government, dominion, rule, governorship.
Kura	School, education, learning gathering.
Mahinga kai	Places where traditional food and other natural resources are obtained.
Mana	Prestige, authority, control, power, influence, status, spiritual power, charisma.
Mana motuhake	Self-determination.
Mana whenua	Power from and/or authority over land or territory.
Marae	Courtyard – the open area in front of the wharenui (meeting house) where formal greetings and discussions take place. Often also used to include the complex of buildings around the marae.
Marau ā-kura	Ministry of Education term referring to a living, breathing curriculum. Marau ā-kura reflects the expectations and aspirations of the whānau, hapū and iwi.
Mātauranga (Māori)	Māori knowledge systems and worldviews, including traditional concepts.
Mātauranga-a-iwi	Knowledge with an iwi-specific base.
Mauri	Life principle, life force, vital essence, special nature, a material symbol of a life principle, source of emotions – the essential quality and vitality of a being or entity. Also used for a physical object, individual, ecosystem or social group in which this essence is located.
Noa	Free from tapu, ordinary, unrestricted.
Papakaīnga	Original home, home base, village, communal Māori land.
Papatūānuku	Earth, earth mother and wife of Ranginui – all living things originate from Papatūānuku and Ranginui in Māori mythology.
Pou	Support, supporter, stalwart, mentor, symbol of support, metaphoric post – a person, group, iwi, gathering or object that strongly supports a cause or is a territorial symbol (such as a mountain or landmark) representing that support.
Rangatiratanga	Chieftainship, right to exercise authority, chiefly authority, ownership, leadership of a social group.

Te reo Māori	English
Ranginui	Atua (God)of the sky and husband of Papatūānuku – all living things originate from Papatūānuku and Ranginui in Māori mythology.
Rongoā crops	Medicinal plants.
Tāne mahuta	Atua (God) of the forests and birds and one of the children of Ranginui and Papatūānuku.
Tangaroa	Atua (God) of the sea and fish. One of the offspring of Ranginui and Papatūānuku.
Tangata whenua	The people of the land, local indigenous people. Māori are tangata whenua of the land on which they whakapapa back to.
Taonga/taonga Māori	Treasure, anything prized – applied to anything considered to be of value, including socially or culturally valuable objects, resources, phenomena, ideas and techniques.
Tapu	Sacred, prohibited, restricted, set apart.
Te ao Māori	The Māori world.
Te Tiriti o Waitangi/Te Tiriti	The Treaty of Waitangi. Note: While these terms are used interchangeably, the national adaptation plan acknowledges that the English version and te reo Māori translation are separate documents and differ in a number of respects.
Tikanga	Custom, practice, correct protocol – the customary system of values and practices that have developed over time and are deeply embedded in the social context.
Urupā	Burial ground.
Wāhi tapu	Sacred site – a place subject to long-term ritual restrictions on access or use, such as a burial ground, a battle site or a place where tapu objects were placed.
Wānanga	Conference, forum, seminar.
Whaikōrero	Oratory, formal speech-making.
Whakapapa	Genealogy, genealogical table, lineage, descent.
Whakataukī	Proverb, significant saying.
Whānau	Family, extended family, family connection.
Whenua (Māori)	Māori land. There are three types of whenua Māori: Māori freehold land, Māori customary land and general land owned by Māori.

Appendix 2: Climate risks addressed by this first plan

✸ The risk has disproportionate impacts on Māori.

✦ The risk is of particular significance to Māori.

10 most significant risks

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N1 Risks to coastal ecosystems, including the intertidal zone, estuaries, dunes, coastal lakes and wetlands, due to ongoing sea-level rise and extreme weather events.	H1 Risks to social cohesion and community wellbeing from displacement of individuals, families and communities due to climate change impacts. ✸	E1 Risks to governments from economic costs associated with lost productivity, disaster relief expenditure and unfunded contingent liabilities due to extreme events and ongoing, gradual changes.	B1 Risk to potable water supplies (availability and quality) due to changes in rainfall, temperature, drought, extreme weather events and ongoing sea-level rise. ✸	G1 Risk of maladaptation across all domains due to the application of practices, processes and tools that do not account for uncertainty and change over long timeframes.
N2 Risks to indigenous ecosystems and species from the enhanced spread, survival and establishment of invasive species due to climate change.	H2 Risks of exacerbating existing inequities and creating new and additional inequities due to differential distribution of climate change impacts. ✸	E2 Risks to the financial system from instability due to extreme weather events and ongoing, gradual changes.	B2 Risks to buildings due to extreme weather events, drought, increased fire weather and ongoing sea-level rise. ✸	G2 Risks that climate change impacts across all domains will be exacerbated because current institutional arrangements are not fit for climate change adaptation.
N3 Risks to riverine ecosystems and species from alterations in the volume and variability of water flow, increased water temperatures and more dynamic morphology (ie, erosion and deposition) due to changes in rainfall and temperature.	H3 Risks to physical health from exposure to storm events, heatwaves, vector-borne and zoonotic diseases, water availability and resource quality and accessibility due to changes in temperature, rainfall and extreme weather events.	E3 Risks to land-based primary sector productivity and output due to changes in mean rainfall and temperature, seasonality, weather extremes and changes in the distribution of invasive species.	B3 Risks to landfills and contaminated sites due to extreme weather events and ongoing sea-level rise.	G3 Risks to governments and businesses from climate change-related litigation, due to inadequate or mistimed climate change adaptation.

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N4 Risks to wetland ecosystems and species, particularly in eastern and northern parts of Aotearoa, from reduced moisture status due to reduced rainfall.	H4 Risks of conflict, disruption and loss of trust in government from changing patterns in the value of assets and competition for access to scarce resources primarily due to extreme weather events and ongoing sea-level rise. ✸	E4 Risks to tourism from changes to landscapes and ecosystems and impacts on lifeline infrastructure, due to extreme weather events and ongoing, gradual changes.	B4 Risk to wastewater and stormwater systems (and levels of service) due to extreme weather events and ongoing sea-level rise. ✸	G4 Risk of a breach of Treaty obligations from a failure to engage adequately with, and protect, current and future generations of Māori from the impacts of climate change. ✦
N5 Risks to migratory and/or coastal and river-bed nesting birds due to reduced ocean productivity, ongoing sea-level rise and altered river flows.	H5 Risks to Māori social, cultural, spiritual and economic wellbeing from loss and degradation of lands and waters, as well as cultural assets such as marae, due to ongoing sea-level rise, changes in rainfall and drought. ✦	E5 Risks to fisheries from changes in the characteristics, productivity and spatial distribution of fish stocks due to changes in ocean temperature and acidification.	B5 Risks to ports and associated infrastructure due to extreme weather events and ongoing sea-level rise.	G5 Risks of delayed adaptation and maladaptation due to knowledge gaps resulting from under-investment in climate adaptation research and capacity building.
N6 Risks to lake ecosystems due to changes in temperature, lake water residence time and thermal stratification and mixing.	H6 Risks to Māori social, cultural, spiritual and economic wellbeing from loss of species and biodiversity due to greater climate variability and ongoing sea-level rise. ✦	E6 Risks to the insurability of assets due to ongoing sea-level rise and extreme weather events.	B6 Risks to linear transport networks due to changes in temperature, extreme weather events and ongoing sea-level rise. ✸	G6 Risks to the ability of the emergency management system to respond to an increasing frequency and scale of compounding and cascading climate change impacts in Aotearoa and the Pacific region. ✸
N7 Risks to terrestrial, freshwater and marine ecosystems due to increased extreme weather events, drought and fire weather.	H7 Risks to mental health, identity, autonomy and sense of belonging and wellbeing from trauma due to ongoing sea-level rise, extreme weather events and drought. ✸	E7 Risks to businesses and public organisations from supply chain and distribution network disruptions due to extreme weather events and ongoing, gradual changes.	B7 Risk to airports due to changes in temperature, wind, extreme weather events and ongoing sea-level rise.	G7 Risk that effective climate change adaptation policy will not be implemented and sustained due to a failure to secure sufficient parliamentary agreement.

Natural (N)	Human (H)	Economy (E)	Built (B)	Governance (G)
N8 Risks to oceanic ecosystem productivity and functioning due to changes in sea surface temperature, ocean mixing, nutrient availability, chemical composition and vertical particle flux.	H8 Risks to Māori and European cultural heritage sites due to ongoing sea-level rise, extreme weather events and increasing fire weather. ✦		B8 Risks to electricity infrastructure due to changes in temperature, rainfall, snow, extreme weather events, wind and increased fire weather.	G8 Risk to the ability of democratic institutions to follow due democratic decision-making processes under pressure from an increasing frequency and scale of compounding and cascading climate change impacts. ✸
N9 Risks to sub-alpine ecosystems due to changes in temperature and a reduction in snow cover.			B9 Risks to telecommunications infrastructure (risk in addition to those identified in the National Climate Change Risk Assessment 2020).	
N10 Risks to carbonate-based, hard-shelled species from ocean acidification due to increased atmospheric concentrations of CO_2.				
N11 Risks to the long-term composition and stability of indigenous forest ecosystems due to changes in temperature, rainfall, wind and drought.				

Source: National Climate Change Risk Assessment 2020

Ministry for the
Environment
Manatū Mō Te Taiao

Te Kāwanatanga o Aotearoa
New Zealand Government