

He huringa āhuarangi, he huringa ao: A changing climate, a changing world

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Iwi/hapū (tribe/subtribe) governance institutions are increasingly asserting their rangatiratanga (autonomy) to manage climate change risks and meet the well-being of whānau (family)/hapū/iwi. However, there is a shortage of specific guidance for whānau/hapū/iwi with respect to climate change adaptation and mitigation. We provide a commentary about risk and uncertainty, knowledge gaps, and options for climate change mitigation and adaptation for whānau/hapū/iwi.

Ki te kore te tangata e manaaki i tōna taiao, ka kore te tangata e whai oranga

*If people do not take care of the environment,
we are not taking care of our own health and well-being*

I KAUPAPA—ISSUE

The Intergovernmental Panel on Climate Change (2021) loudly and urgently headlined for governments around the world the unequivocal fact that “human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred” (SPM-5).

Like other Indigenous Peoples, Māori maintain a critical concern for Mother Earth and recognise the fragility of our ecologies and the disruption that humans can cause (Harmsworth & Awatere, 2013). Now that the world is accepting the realities of climate change, questions concerning risk, impacts, and adaptation strategies as they pertain to Māori have to be answered (Awatere et al., 2021).

Iwi/hapū (tribe/subtribe) governance institutions are increasingly asserting their rangatiratanga (autonomy) to manage climate change risks and meet the well-being of whānau (family)/hapū/iwi. Even so, there remains a dearth of specific guidance for whānau/hapū/iwi to support their climate change adaptation and mitigation action. Most advice is framed for central and local government agencies.

Ngā Pae o te Māramatanga—New Zealand’s Māori Centre of Research Excellence, along with colleagues in the National Science Challenges, coordinated a multidisciplinary team of Māori researchers to explore climate change risks and adaptation solutions for Māori. This Arotahi (focus

paper summarises a more comprehensive report by the authors titled *He Huringa Āhuarangi, He Huringa Ao: A Changing Climate, A Changing World*—hereafter, *He Huringa Āhuarangi, He Huringa Ao*.

He Huringa Āhuarangi, He Huringa Ao is intended to be a tool to assist hapū/iwi with climate change adaptation planning but should not replace any formal arrangements between local government,

exposure, and vulnerability. The areas of overlap serve to define risk (see Figure 1). Risk is a function of climate hazards—which can be physical events or trends, such as episodic flooding, landslide or erosion events, or longer term sea-level rise—the degree to which things we value—such as people, assets, taonga (treasured possessions)—are exposed to the hazard, and their vulnerability to its effects. Vulnerability is influenced by socio-economic, physical characteristics, cultural

Climate change threatens not only the tangible components of Māori well-being but also the spiritual components and, critically, the well-being of future generations.

central government, and hapū/iwi. *He Huringa Āhuarangi, He Huringa Ao* shows that Māori well-being across the domains noted below will be moderately impacted by 2050. By 2100, the risks to ecosystems are likely to show severe impact, compromising many aspects of Māori well-being. Climate change threatens not only the tangible components of Māori well-being but also the spiritual components and, critically, the well-being of future generations (Awatere et al., 2021).

II TE WHAINGA—OBJECTIVE

In the sections that follow we:

1. Describe how we approached the task of assessing the climate change risks facing whānau/hapū/iwi and Māori business.
2. Consider the implications of projected climate change impacts for whānau/hapū/iwi and Māori business.
3. Provide a commentary about risk and uncertainty, knowledge gaps, and options for climate change mitigation and adaptation

III TIKANGA MAHI—INTEGRATIVE FRAMEWORK AND ANALYSIS

We assessed the risk facing whānau/hapū/iwi and Māori businesses using the elements of hazard,

processes, and tikanga Māori (Māori values and principles)—including adaptation and mitigation actions and governance—which can increase or decrease the consequences—and therefore the risk—resulting from exposure to a hazard.

The rating of risk is based on a consideration of the hazard, exposure, and vulnerability. We drew upon the qualitative assessment scale developed by the National Climate Change Risk Assessment Framework (Ministry for the Environment, 2019). Descriptions for each of the five levels within the risk scale range from *insignificant* to *extreme* and a description for each is provided in Table 1.

Additionally, a kaupapa Māori (Māori approach) process that affirms the importance of Māori self-definitions and self-evaluations was applied. The risk assessments were conducted by Ngā Pae o te Māramatanga climate change researchers using a consensus-based expert judgement approach, rather than being done separately, or by several people independently of each other. Risk scores were compiled for each of our domains of interest:

- He Kura Taiao—Living treasures
- Whakatipu Rawa—Māori enterprise
- He Oranga Tāngata—Healthy people
- Ahurea Māori, Tikanga Māori—Māori culture, Māori values and principles

Our subject experts identified kaupapa (topics) for each domain. For the He Kura Taiao domain, a contemporary ecological assessment generally

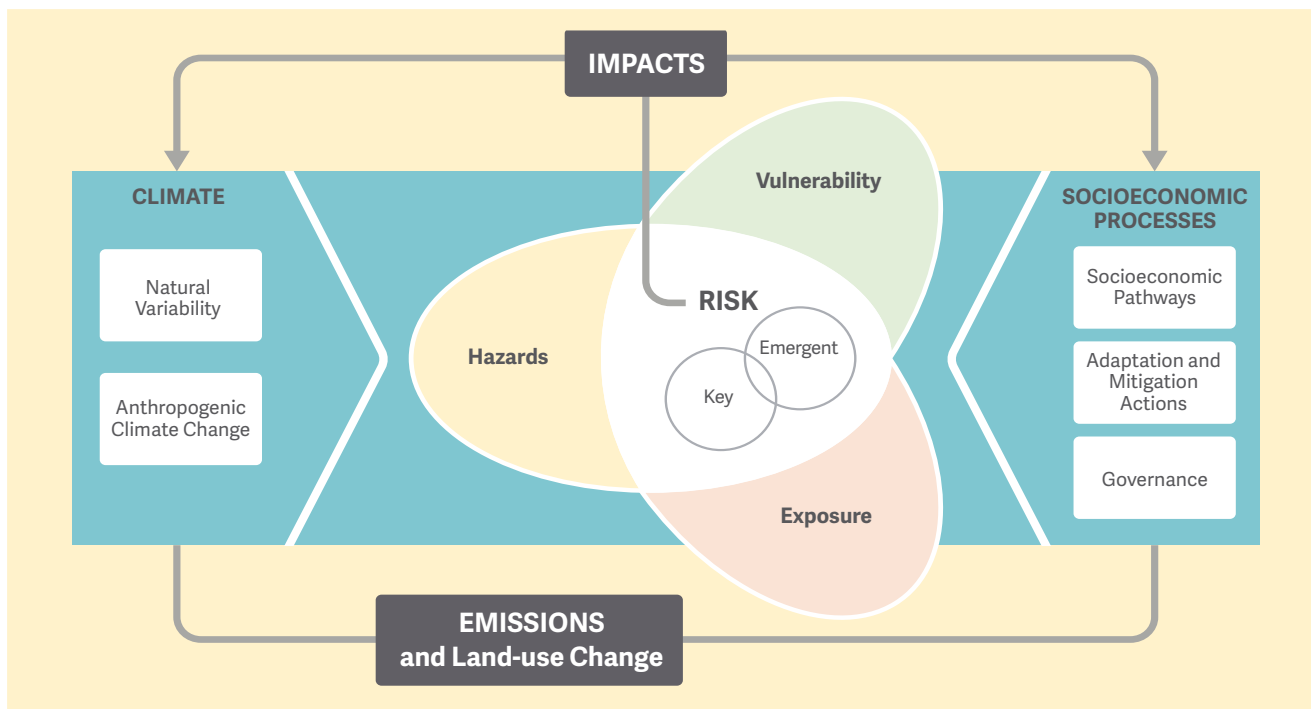


Figure 1. Schematic of the interaction between the physical climate system, exposure, and vulnerability producing risk (Oppenheimer et al., 2014, p. 1046).

considers the impacts of climate change on some tree species of interest from a biosecurity perspective. Using a kaupapa Māori approach, the assessment includes how climate change will impact the physical, social, and spiritual connection that Māori have with the natural environment. At the same time, a contemporary economic analysis focuses on the risks to investment for various assets like production forests and fisheries quota. Our examination frames our analysis holistically, considering, for example, the risks to whānau in harvesting cultural keystone species for sustenance and maintaining manaakitanga (reciprocity). Each

domain was expanded into a number of components of interest with risk scores determined and potential adaptation strategies identified.

IV HE AROTAKE TŪRARU—RISK ASSESSMENT

He Kura Taiao—Living treasures

The production and ecology of freshwater, terrestrial and coastal-marine ecosystems and biodiversity in Aotearoa New Zealand will be challenged by projected warming temperatures and reductions

Table 1. Risk (consequence) rating scale (Ministry for the Environment, 2019)

| | |
|----------------------|--|
| Insignificant | No significant change in impact nationally that can be handled through business-as-usual processes or some local or regional impacts with no specialised management required |
| Minor | Some minor impacts at the national scale that could be addressed through local or regional management and adaptation processes |
| Moderate | Significant impacts at the national scale of interest to national agencies to address adaptation, or a major impact for 1–2 subnational climate zones |
| Major | Major impacts at the national scale of high interest to national agencies to quickly address adaptation, or an extreme impact for 1 subnational climate zone |
| Extreme | Extreme impacts at the national scale (or even in a few subnational climate zones) of heightened interest to national agencies to urgently address adaptation. May be of interest to international partners or financial or insurance institutions |

Table 2. He arotake tūraru (risk assessment)—He kura taiao, living treasures

| SECTOR | GROUP | INTERESTS | RISK | ADAPTATION STRATEGIES |
|----------------------------------|--|---|------|--|
| Terrestrial Ecosystems | Iwi (tribes), hapū (subtribes), whānau (family), trusts, incorporations, and pan-Māori | Indigenous flora and fauna | Now | <ul style="list-style-type: none"> Implement monitoring practices that provide for the early detection of climate-induced invasive plants, animals, and insects Support the control and manual removal of climate-induced invasive species Improve understanding of biodiversity–climate linkages, with a view to prioritising activities to restore degraded ecosystems and habitats Develop new approaches to ecosystem use, protection and management, that draw upon science and mātauranga Māori (Māori knowledge) |
| | | | 2050 | |
| | | | 2100 | |
| Terrestrial Ecosystems | Iwi, hapū, whānau, trusts, incorporations, and pan-Māori | Managed flora and fauna | Now | <ul style="list-style-type: none"> Use more water-wise irrigation technologies Grow crops that are better adapted to warmer, drier summers Implement monitoring practices that provide for the early detection of climate-induced invasive plants, animals, and insects Explore the suitability of tribal lands for reforestation/afforestation to harness the multiple functions of forests, from supporting biodiversity and ecosystem services to carbon sequestration and controlling erosion |
| | | | 2050 | |
| | | | 2100 | |
| Freshwater Ecosystems | Iwi, hapū, whānau, trusts, incorporations, and pan-Māori | Rivers and streams | Now | <ul style="list-style-type: none"> Enhance riverbank vegetation to slow erosion and provide shade and cool water for freshwater species Assist the migration of vulnerable animal species to suitable habitats Implement monitoring practices that provide for the early detection and removal of climate-induced invasive plants, aquatic animals, and insects Improve understanding of freshwater species vulnerability to climate change, with a view to prioritising activities to restore degraded ecosystems and habitats |
| | | | 2050 | |
| | | | 2100 | |
| Freshwater Ecosystems | Iwi, hapū, whānau, trusts, incorporations, and pan-Māori | Lakes and wetlands | Now | <ul style="list-style-type: none"> Enhance riverbank vegetation to slow erosion and provide shade and cool water for freshwater species Assist the migration of vulnerable animal species to suitable habitats Implement monitoring practices that provide for the early detection and removal of climate-induced invasive plants, aquatic animals, and insects Improve understanding of freshwater species vulnerability to climate change, with a view to prioritising activities to restore degraded ecosystems and habitats |
| | | | 2050 | |
| | | | 2100 | |
| Coastal-Marine Ecosystems | Iwi, hapū, whānau, trusts, incorporations, and pan-Māori | Coastal lagoons, estuaries and harbours | Now | <ul style="list-style-type: none"> Monitor the variability and rate of change in water temperature, pH, and carbonate systems at different sites Improve understanding of the effects of acidification on marine primary production, food quality, habitat availability, and aquatic species Develop new approaches to ecosystem use, protection, and management that draw upon science and mātauranga Māori Monitor, remove, and control the spread of climate-induced invasive species as well as reduce sediment and nutrient runoff to lessen the risks of harm to coastal-marine organisms |
| | | | 2050 | |
| | | | 2100 | |
| Coastal-Marine Ecosystems | Iwi, hapū, whānau, trusts, incorporations, and pan-Māori | Inshore and open ocean | Now | <ul style="list-style-type: none"> Monitor the variability and rate of change in marine temperature, pH, and carbonate systems at different sites around Aotearoa New Zealand Improve understanding of ecosystem effects of acidification on marine primary production, food quality, habitat availability, and aquatic species Develop new approaches to ecosystem use, protection, and management that draw upon science and mātauranga Māori Monitor, remove, and control the spread of climate-induced invasive species as well as reduce sediment and nutrient runoff to lessen the risks of harm to coastal-marine organisms |
| | | | 2050 | |
| | | | 2100 | |

Addressing the risks of climate change to natural ecosystems and biodiversity will require political commitment to ensuring high environmental standards and more sustainable living arrangements, as well as deeper consideration of the rights of future generations.

in rainfall. Vulnerable flora and fauna may face habitat loss and in some cases extinction (see Table 2). Any decline in the quantity and quality of keystone species like pāua (abalone), kina (sea urchin) and kōura (crayfish) will adversely impact Māori customary practice, cultural identity, social cohesion, and well-being. Some hapū/iwi institutions are engaging with whānau to better understand the impacts of climate change. Other hapū/iwi institutions are developing comprehensive plans that articulate Māori values, tasks, and aspirations for addressing climate change risks. While these actions reflect a growing concern among Māori about climate change impacts, there

land tenure are already suffering from high rates of erosion. Over 80% of Māori land is defined as hilly to mountainous and susceptible to major erosion events such as landslides. Future-proofing this land is critical to reduce risk. Such impacts are likely to be exacerbated by climate change through extreme rainfall events leading to even higher rates of erosion. Māori are also soon to own nearly 40% of commercial forestry plantations, and these investments will be vulnerable to climate extremes such as high-intensity storms, drought, and wildfires. Changing drought occurrence, particularly across the eastern and northern areas of the country, is very likely to affect Māori forestry, farming, and

Due diligence will be required by whānau/hapū/iwi and Māori business to better understand climate change risks and opportunities, including strategies that consider divesting of risky assets and the adoption of new production systems and practices.

remains a need to better understand how different ecosystems and keystone species are at risk. At the same time, there is also a need to better understand how climate-induced changes are likely to affect the well-being of whānau/hapū/iwi. Addressing the risks of climate change to natural ecosystems and biodiversity will require political commitment to ensuring high environmental standards and more sustainable living arrangements, as well as deeper consideration of the rights of future generations.

Whakatipu Rawa—Māori enterprise

Changing climatic conditions are expected to result in diverse risks for Māori capital, enterprise, and employment. Because over 68% of Māori businesses are in the primary sector, many Māori assets are exposed to the risks of changing climate conditions (see Table 3). Large proportions of Māori

horticulture operations, including production yields and product quality. Māori investments in the fisheries sector are also significant—Māori own 33% of quota by volume—and nearly half of these investments are in potentially at-risk species like pāua, kōura and hoki (whiptail). Overall, changing climate conditions are expected to adversely impact the natural assets of the Māori economy. Due diligence will be required by whānau/hapū/iwi and Māori business to better understand climate change risks and opportunities, including strategies that consider divesting of risky assets and the adoption of new production systems and practices.

He Oranga Tāngata—Healthy people

The evidence strongly suggests that health impacts related to climate change will disproportionately affect Māori. However, the impacts will vary among

Table 3. He arotake tūrarū (risk assessment)—Whakatipu rawa, Māori enterprise

| SECTOR | GROUP | INTERESTS | RISK | | | ADAPTATION STRATEGIES |
|-----------------------------|---|---|------|----------|-------|---|
| | | | Now | Minor | Major | |
| Commercial Fishery | Iwi (tribe), hapū (subtribe), trusts and incorporations | Kōura (crayfish), pāua (abalone), snapper, gurnard, hoki (whiptail, <i>Macruronus novaezelandiae</i>), scampi, tarakahi (silver marine fish, <i>Nemadactylus macropterus</i>), ling, and orange roughly | Now | Minor | | <ul style="list-style-type: none"> Transition quota over time for kōura, pāua, hoki, scampi, tarakahi, ling, orange roughly Investigate management areas for snapper to determine individual risk/opportunity Retain quota for gurnard and potentially purchase more |
| | | | 2050 | Major | | |
| | | | 2100 | Major | | |
| Aquaculture | Iwi, hapū, trusts and incorporations | Green-lipped mussels, salmon, and multi-trophic | Now | Minor | | <ul style="list-style-type: none"> Sell quota for green-lipped mussels Sell quota for salmon in highly exposed areas Relocate salmon farms offshore or further south Enter sector for multi-trophic aquaculture |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Marine Tourism | Iwi, hapū, trusts and incorporations | Marine mammal watching | Now | Minor | | <ul style="list-style-type: none"> Transition to other investments; invest in alternative businesses that use the same infrastructure and equipment |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Agriculture — Beef and Lamb | Iwi, hapū, trusts and incorporations | Farms | Now | Moderate | | <ul style="list-style-type: none"> Invest in climate-resilient breeds and pasture species (e.g. drought and erosion tolerant) Invest in water storage, particularly for drought-prone areas Invest in diverse landscapes or agroforestry approaches for agribusiness |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Agriculture — Dairy | Iwi, hapū, trusts and incorporations | Farms | Now | Moderate | | <ul style="list-style-type: none"> Invest in climate-resilient breeds and pasture species (e.g. drought tolerant) Invest in water storage, particularly for drought-prone areas Invest in a diverse landscapes or agroforestry approaches for agribusiness |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Forestry — Exotic | Iwi, hapū, trusts and incorporations | <i>Pinus radiata</i> and Douglas fir | Now | Moderate | | <ul style="list-style-type: none"> Examine the risk potential for northern North Island plantations Evaluate the opportunity for southern plantations |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Horticulture — Kiwifruit | Iwi, hapū, trusts and incorporations | Kiwifruit, pip fruit, and viticulture | Now | Moderate | | <ul style="list-style-type: none"> Kiwifruit—move operations or transition to Zespri gold or another horticultural species Invest in water storage, particularly for drought-prone areas Invest in apple breeds with climate-resilient characteristics Viticulture—migrate vineyards southward or to higher altitudes |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Property | Iwi and hapū | Commercial and customary | Now | Moderate | | <ul style="list-style-type: none"> Develop adaptation strategies for commercial property in low-lying coastal areas like Auckland and Dunedin |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |
| Employment — Manufacturing | Iwi and hapū | Employers, employees, and unions | Now | Minor | | <ul style="list-style-type: none"> Advise Māori working in the food and beverage subsector to assess the risks of their position, particularly those working in horticulture Develop Māori capability through upskilling and provide approaches to transition to other sectors Help transition the labour force towards public health areas most impacted by climate change, including mental health, food insecurity, and infectious diseases |
| | | | 2050 | Moderate | | |
| | | | 2100 | Major | | |

Any health policy that addresses climate change risks for Māori must begin from the position that the health of Māori is dependent on enduring Māori institutions like whānau, hapū, iwi and marae ..., together with core principles like kaitiakitanga (sustainable resource management), whakapapa (genealogy) and manaakitanga (reciprocity) that guide how these institutions care for the well-being of te ao tūroa (the environment) and future generations.

different communities and be influenced by a range of factors, including geographic location, socio-economic status, existing health conditions, health system capability, and the capacity to adapt. Direct impacts to health include increased exposure to heatwaves and weather events such as flooding. Indirect environmental effects from climate change include reductions in water availability and water quality as well as the arrival of infectious-disease vectors such as mosquitos that carry diseases

like dengue fever. The effects upon water supplies are likely to be greatest where reticulated supply systems are poorly developed or absent, and where communities do not have the resources to import water or pay for private treatment facilities. Other indirect impacts include disruption to health services, food insecurity, housing and livelihood stresses, and increased health inequities. A number of public health activities are needed to help whānau/hapū/iwi prepare for and cope

Table 4. He arotake tūraru (risk assessment)—He oranga tāngata, healthy people

| SECTOR | GROUP | INTERESTS | RISK | | ADAPTATION STRATEGIES |
|---|---|--|------|----------|---|
| Māori Health Status and Inequities | Individuals, whānau (family) | Minimising health risks of climate change; maximising health co-benefits of climate action | Now | Moderate | <ul style="list-style-type: none"> Individual/whānau level: walk/bike, use public transport, reduce meat and dairy consumption, and increase plant-based diets, ensure homes are insulated and energy-efficient Communities—cut back on deforestation, plant trees, design towns/cities to encourage healthy, low-carbon transport, develop renewable energy systems (wind, sun), build healthy, energy-efficient housing, establish community food gardens, improve waste and recycling systems |
| | | | 2050 | Major | |
| | | | 2100 | Major | |
| Institutional Health Systems | Mainstream health providers, Ministry of Health | Equity | Now | Moderate | <ul style="list-style-type: none"> Reorient systems to better enable iwi (tribes), hapū (subtribes) and whānau to thrive as Māori, create healthy and sustainable environments in which to live and raise children Dismantle colonial structures and systems that privilege Eurocentric values Recognise the relevance and value of distinctive Māori knowledge systems and Indigenous ways of knowing, being, and doing that are embedded in kaupapa Māori (Māori approaches) models of care, including rongoā Māori (Māori medicine) Establish meaningful Māori–Crown partnerships Ensure Māori health development is led by iwi and hapū, including both Māori health sector development and intersectoral action |
| | | | 2050 | Major | |
| | | | 2100 | Major | |
| Māori Identity and Health | Iwi, hapū, whānau trusts and incorporations, central government | Natural health, mental well-being, social connectivity | Now | Moderate | <ul style="list-style-type: none"> Support mana whenua (territorial authority) governance and kaitiakitanga (sustainable resource management) of natural resources Harness ecological restoration through tree planting to help reconnect Māori to the land, thereby strengthening mātauranga Māori (Māori knowledge) and Māori systems of healing Realise non-timber-based products like rongoā Māori through replanting indigenous species |
| | | | 2050 | Major | |
| | | | 2100 | Major | |

Table 5. He arotake tūraru (risk assessment)– Ahurea Māori, tikanga Māori (Māori culture and practices)

| SECTOR | GROUP | INTERESTS | RISK | ADAPTATION STRATEGIES | |
|---|---|---|------|-----------------------|---|
| Te Reo me Ōna Tikanga (Māori language and customs) | Iwi (tribe), hapū (subtribe), whānau (family) and pan-Māori | Language, practices, culture, and history | Now | Moderate | <ul style="list-style-type: none"> Apply Te Rautaki Reo Māori—The Māori Language Strategy, which has a module that reflects te ao tūroa (the environment) and encourage whānau, hapū, and iwi to record and share waiata (songs), pūrākau (stories), whakatauki (proverbial sayings), and karakia (incantations) associated with cultural landscapes Use toi Māori (Māori art) to capture existing cultural landscapes (e.g., whakairo [carvings], mōteatea [traditional chants], waiata [songs], pūrākau [stories], and haka [dances]) Plant riparian strips in coastal margins |
| | | | 2050 | Moderate | |
| | | | 2100 | Moderate | |
| Ngā Hākinakina (sports) | Iwi, hapū, whānau and pan-Māori | Sporting events | Now | Moderate | <ul style="list-style-type: none"> Ensuring rights to water flow rates are acknowledged Move the swim leg of multi-sport events to swimming pools or alternative sites with cleaner water to manage health risks associated with climate-induced low water flows and toxic algal blooms Have facilities available to manage extreme heat such as enough drinking water, sunscreen, water, and hoses at stages, and shaded areas for participants Have tournaments played earlier in the morning or late in the evening, ensuring that floodlights are available, and regular drink breaks Invest in insurance coverage for event cancellations or postponement |
| | | | 2050 | Major | |
| | | | 2100 | Major | |
| Ngā Hui Ahurei (festivals) | Iwi, hapū, whānau and pan-Māori | Festivals | Now | Minor | <ul style="list-style-type: none"> Have contingency plans for relocation of festivals, such as holding festivals at indoor venues Have facilities available to manage extreme heat such as enough drinking water, sunscreen, water, and hoses at stages, and shaded areas for participants Invest in insurance coverage for event cancellations or postponement |
| | | | 2050 | Moderate | |
| | | | 2100 | Moderate | |
| Ngā Tangihanga (funerals) | Iwi, hapū, and whānau | Mourning ceremonies | Now | Moderate | <ul style="list-style-type: none"> Relocate marae (communal facilities), urupā (cemetaries), wāhi tapu (sacred places), and wāhi taonga (significant sites) Invest in water treatment systems at marae and improve access to vaccinations Implement community-based health programmes that relate to vector-borne disease Invest in cooling facilities for marae such as air-conditioning Invest in and provide shade infrastructure, either natural, such as indigenous trees, or human-made, such as shade sails |
| | | | 2050 | Major | |
| | | | 2100 | Major | |
| Pouhere Taonga (cultural infrastructure) | Iwi, hapū, and whānau | Cultural and historical artefacts | Now | Moderate | <ul style="list-style-type: none"> Relocate marae and tūpāpaku (corpses) Ensure marae and other taonga have insurance coverage Plant trees to mitigate erosion to protect cultural landscapes Future-proof existing infrastructure Implement building restrictions Support sustainable planning approaches Protect and enhance coastal wetlands to store water and reduce flood impacts |
| | | | 2050 | Major | |
| | | | 2100 | Major | |

Sea-level rise and the displacement of whānau/hapū/iwi from coastal areas are likely to interfere with the transmission of Māori language and customary lore, and such outcomes are expected to have implications for identity, social cohesion, and Māori well-being.

with the health impacts of climate change (see Table 4). These include reorienting the health sector towards areas where climate change will have the greatest impact, such as addressing the health vulnerabilities experienced by Māori, including cardiovascular disease, chronic kidney disease, diabetes, and asthma, and ensuring that any interventions contribute to reducing social and health inequities. Any health policy that addresses climate change risks for Māori must begin from the position that the health of Māori is dependent on enduring Māori institutions like whānau, hapū, iwi and marae (communal facilities), together with core principles like kaitiakitanga (sustainable resource management), whakapapa (genealogy) and manaakitanga that guide how these institutions care for the well-being of te ao tūroa (the environment) and future generations.

and cultural infrastructure on exposed, erosion-prone lands such as marae and urupā (cemeteries) situated in low-lying coastal areas or river valleys. Climate-change-induced extremes such as flooding, fire and drought also pose risks for people gatherings such as Māori cultural festivals and sporting events. Plans that incorporate climate change considerations will be essential as part of due diligence requirements and managing potential future disruptions or cancellations. Whānau/hapū/iwi will need to consider adaptation strategies that protect the integrity of Māori language and customary lore, future-proof existing cultural infrastructure, and provide flexibility as well as safeguards for enabling whānau to engage in social/cultural activities that enhance our well-being and ensure an enduring cultural legacy for future generations.

The assessment of climate change risks to inform adaptation planning must integrate Te Ao Māori perspectives to help whānau/hapū/iwi and Māori business with the challenges and uncertainty of climate change.

*Ahurea Māori, Tikanga Māori—
Māori culture, Māori values and principles*
Climate-induced changes to the natural environment in Aotearoa New Zealand are expected to fundamentally alter the way Māori interact with the natural environment, each other, and other communities (see Table 5). Sea-level rise and the displacement of whānau/hapū/iwi from coastal areas are likely to interfere with the transmission of Māori language and customary lore, and such outcomes are expected to have implications for identity, social cohesion, and Māori well-being. Some Māori communities are also likely to be disproportionately affected by climate change because of the physical location of valued domestic

V NGĀ KUPU ĀRAHI— FUTURE WORK

He Huringa Āhuarangi, He Huringa Ao emphasises diverse climate change risks, vulnerability, and adaptive capacities across Māori society. We make it clear that changing climate conditions will exacerbate many of the stresses and inequities already faced by Māori, and that there is a need to understand climate change risks from Te Ao Māori (the Māori worldview) perspectives. The assessment of climate change risks to inform adaptation planning must integrate Te Ao Māori perspectives to help whānau/hapū/iwi and Māori business with the challenges and uncertainty of

climate change. Urgent work is also needed to better understand the social, cultural, well-being, and fiscal implications of sea-level rise, including what duties local and central government might have with respect to actively upholding Māori interests under Te Tiriti o Waitangi (The Treaty of Waitangi). In association with these challenges of social organisation and governance, it is also likely that intergenerational approaches to future climate planning and policy will become increasingly important, elevating political discussions about conceptions of diversity that recognise non-human entities with rights in law, and challenging the way people manage, relate to, use, and value the natural world and its resources.

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ABOUT THIS RESEARCH PROJECT

This work is embedded in a Ngā Pae o te Māramatanga “Platform” project entitled *Future Proofing Māori Development Opportunities; Huringa Rangi Huringa Oranga* that commenced in 2019. The primary research question is “What strategies/approaches grounded in tikanga Māori can Māori institutions utilise in order to adapt and respond to climate change and natural hazards?”. Our long-term objective is “greater realisation of Māori aspirations and capabilities for flourishing Māori and tribal economies, environments and people”. The project is led by Shaun Awatere.

<http://www.maramatanga.ac.nz/project/future-proofing-m-ori-development-opportunities-huringa-rangi-huringa-oranga>

ABOUT NGĀ PAE O TE MĀRAMATANGA

Ngā Pae o te Māramatanga (NPM) is a Centre of Research Excellence, funded by the Tertiary Education Commission and hosted at the University of Auckland, comprising 21 research partners and conducting research of relevance to Māori communities. Our vision is Māori leading

New Zealand into the future. NPM research realises Māori aspirations for positive engagement in national life, enhances our excellence in Indigenous scholarship and provides solutions to major challenges facing humanity in local and global settings.

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ABOUT TE AROTAKI PAPER SERIES

Ngā Pae o te Māramatanga Te Arotahi series is a NPM Co-Director initiative. Te Arotahi papers provide expert thought, research and focus to a specific critical topic area to support discussion, policy and positive action to influence the creation of better law, policy or practice for our whānau, hapū, iwi and broader Māori communities. Te Arotahi is a free public policy occasional paper series. The target audience is anyone interested in specific recommendations for how Māori researched solutions can support change to policy, law or practice.

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